THE

Boston Journal of Chemistry.

DEVOTED TO THE SCIENCE OF HOME LIFE, THE ARTS,
AGRICULTURE, AND MEDICINE.

JAMES R. NICHOLS, M. D., EDITOR.

W. J. ROLFE, A. M., ASSOCIATE EDITOR.

VOLUME I.

JULY, 1866—JUNE, 1866

BOSTON.

PUBLISHED BY H. O. HOUGHTON AND COMPANY.

NEW YORK: HURD AND HOUGHTON, 13 ASTOR PLACE.

Printed at the Riverside Press, Cambridge.

1866.

BOSTON JOURNAL OF CHEMISTRY.

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BOSTON JOURNAL
OF
CHEMISTRY AND PHARMACY.

Volume I. Boston, July 1, 1866. Number I.

THE
Journal of Chemistry and Pharmacy
IS PUBLISHED BI-MONTHLY AT
150 Congress Street, Boston,
By Jas. R. Nichols & Co.
TERMS, FIFTY CENTS PER ANNUM.

All letters and communications should be addressed "Office of Journal of Chemistry and Pharmacy," Boston, Mass.

Pharaoh's Serpents.

A very curious toy is now being generally sold under the name of Pharaoh's Serpent. As this toy really constitutes an interesting chemical experiment, perhaps an account of it may prove interesting to our readers.

It consists of a little cone of tin-foil, containing a white powder, about an inch in height and resembling a pastille. This cone is to be lighted at its apex, when there immediately begins issuing from it a thick serpent-like coil, which continues twisting and increasing in length to an almost incredible extent. The quantity of matter thus produced is truly marvellous, especially as the coil which so exudes is solid and may be handled, although, of course, it is extremely light and somewhat fragile.

Having a little of the white powder, with which the cones are filled, placed at my disposal by a friend, I submitted it to analysis, and found it to consist of sulphocyanide of mercury. This salt, when heated to a temperature below redness, undergoes decomposition, swelling or growing in size in a most remarkable manner, and producing a mixture of mellon (a compound of carbon and nitrogen) with a little sulphide of mercury. The resulting mass often assumes a most fantastic shape, and is sufficiently coherent to retain its form; it presents a yellow color on the exterior, but is black within. The "serpent" shape of course results from the salt being burnt in a cone of tin-foil.

Both the mercurous and mercuric sulphocyanides decompose in the same manner; but the mercuric salt, containing more sulphocyanogen, seems capable of furnishing a larger quantity of mellon, and is the one used in the French serpents. A solution of pernitrate of mercury is readily precipitated by sulphocyanide of ammonium, and the mercuric sulphocyanide may be easily so prepared. It is best to use the mercurial solution as strong as possible, and to keep it in excess throughout the precipitation. Solution of perchloride of mercury is not so easily precipitated as the pernitrate, probably owing to the solubility of the mercuric sulphocyanide in the chlorides.

Perhaps I may be excused for adding that sulphocyanide of ammonium, suitable for the above purpose, may be very easily and economically prepared, as follows: One volume of bisulphide of carbon, four volumes of liq. ammon. fort, and four volumes of methylated spirit, are put into a large bottle, and the mixture frequently shaken. In the course of one or two hours the sulphide of carbon will have entirely dissolved in the ammoniacal liquid, forming a deep red solution. When this result is attained, the liquid is boiled until the red color disappears and is replaced by light yellow. The solution is then evaporated at a very gentle heat (about 80° or 90° F.) until it crystallizes, or just to dryness. The product is sulphocyanide of ammonium, sufficiently pure for the above purpose. One crystallization from alcohol will render it quite white.

One ounce of bisulphide of carbon yields, by this process, exactly one ounce of sulphocyanide of ammonium. —*London Pharm. Journal.*

Therapeutic Value of Mineral-Spring Waters.

BY JAS. R. NICHOLS.

Having beed led recently to make chemical analysis of what is known as "Poland-Spring Mineral Water," I was surprised at the result, inasmuch as the examination showed a paucity of solid and gaseous constituents quite remarkable, considering the notoriety it has acquired as a mineral water of curative properties. The spring from which it was taken is situated upon a high elevation in the town of Poland, Me., and issues from rocks of primitive formation. It is resorted to by large numbers of invalids from different points, and has acquired considerable celebrity for its supposed medicinal character. The water is collected in barrels and sent to this and other cities, and sold largely by the gallon. It differs from ordinary springs found in granitic regions in no essential particular, except it be in containing a *less* quantity of organic and inorganic constituents. Several invalid friends, of much intelligence, state that they have been benefited by a resort to the waters, and that remarkable cases of cures have come under their observation. The late Parsons Cook, D.D., of Lynn, certified to the relief received in a distressing malady; and numerous other clergymen and physicians testify in the same direction.

It is not unusual to receive specimens of water for analysis, stated to possess healing qualities of extraordinary power, which are found to be not unlike other springs, or having no peculiarities worthy of regard. There are numerous waters in this country and in Europe, medically in high repute, which are distinguished among chemists only for their *purity*. The celebrated waters of Pfeffers, to which Martin Luther resorted and was cured of terrible hypochondriasis, are almost chemically pure, and so are those of Wildbad and Baden, to which thousands flock from all parts of the world. These fountains, as resorts for invalids, date back to the time of the Roman Conquest, when Cæsar bathed in and drank the waters, extolling their virtues. Several of the springs at Ballston and Saratoga contain so few saline particles that they should be reckoned as nothing in considering or judging of the source of the therapeutic influence of the waters.

At this point the inquiry arises, From whence comes the remedial power of these fountains? By their use, are diseases ameliorated or cured? or are alleged beneficial effects purely imaginary, and without foundation in fact? The latter hypothesis is unsatisfactory, and there is a vast amount of unimpeachable testimony in the way of its ready reception. Indeed, it is not necessary to resort to this method of disposing of the difficulty. In the examination, we find little more than pure water to be the agent employed; and, if remedial benefits result, the pure nymph of the fountain, innocent of salt, should have all the credit. And is not water a medicine? When drank in quantities beyond the demands of thirst, in many diseases, especially those arising from arrested metamorphosis, it produces marked salutary results. I venture the opinion, derived from experience and observation, that simple water as a therapeutic agent is not sufficiently well understood among educated medical men. Its employment has been long abused by empirics, and therefore has fallen into discredit. In withdrawing from it attention, an important auxiliary in the treatment of disease is overlooked.

The consideration of its internal use in connection with the so-called mineral springs, leads to some observations upon that form of employment. It cannot be doubted that morbid accumulations of effete matter in the tissues and alimentary canal are more readily removed by draughts of water at proper times and in proper quantities, than by any other agent; and here we learn the secret regarding the benefits obtained by invalids at mineral springs. A large majority of those who resort to them are suffering from atonic conditions of the stomach and bowels. Constipation is almost certain to be a prominent trouble, and then follow nervousness, hypochondriasis, and a long train of evils. At home no more than a tumbler of water may be drank in the twenty-four hours; at the springs, three or four are swallowed before breakfast in the morning. The fæcal accumulations of the intestines are softened, peristaltic motions awakened, the food ducts are cleansed, and smiling health returns. The "minerals" and the salts of course get the credit,—*aqua pura* none at all. If the saline or solid constituents of a pint of almost any of the aperient spring-waters are isolated, and taken in a dry state, they seldom produce any action upon the bowels; but if they are re-dissolved and drank, laxative effects follow. This would seem to prove that a combination of water and salts is needful; but when it is found by further experiment that the water produces intestinal motion without the salts, a new view presents itself.

It is quite evident that the benefits received by invalids at mineral springs cannot be attributed solely to any unusual condition of the waters, but in a great degree to the liquid itself, taken medicinally, or at unusual hours and in unusual quantities. It must, however, be conceded that a change of air, habits, society, etc., etc., has much to do in the work of restoration; and therefore, although the water employed for domestic purposes at home may be equally efficacious, a resort to springs should not be discouraged, especially among those whose pecuniary means are ample. The proofs which science affords that the physical and chemical character of waters famous for their medicinal virtues differ in no essential particular from those in ordinary use in families, certainly favors the view, that, having regard to temperature, quantity, and time of employment, the home waters may be used medicinally for the relief of a large class of affections.

150 Congress Street.

Liquor Bi-Sulphite Soda.

The preparation of bi-sulphite of soda in the solid or crystalline form is attended with so many difficulties and so much uncertainty, that chemical manufacturers have relinquished its production.

The *bi-sulphite*, or a salt having two equivalents of sulphurous acid, is called for in the treatment of *zymotic* diseases; and this can be only properly and safely supplied in the form of concentrated solution, or *liquor*. The difficulties in the way of securing crystals, or granules, from the solution, by evaporation, are very great, and result usually in obtaining the *sulphite*, or *sulphate*, instead of a bi-sulphite. The crystals, upon the slightest exposure, are changed into sulphate of soda, or Glauber Salts, by the higher oxydation of the sulphurous acid.

This liability renders it almost inadmissible for therapeutic employment in solid form. In *liquor* containing fifty per cent. of the salt, it is perfectly preserved, and being dispensed in stoppered vials, no danger of change need be apprehended. It is, besides, very convenient for dispensing, and for employment by physicians, as it can be prescribed in drops, or fluid drachms, as may be desired.

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Treatment of Zymotic Diseases by the Alkaline Sulphites.

BY DR. DE RICCI.

The arrest of zymotic diseases is at the present moment a most interesting question. How many diseases which attack us are owing to some mysterious fermentation of poisonous materials in the blood, we are ignorant of; but we suspect that this is a more fertile source of disease than we have hitherto supposed. If we could stay all forms of catalytic action in the system, we might arrest some of our most fatal diseases. We therefore direct particular attention to the following paper by Dr. De Ricci and Dr. Purdon.

That sulphurous acid had the power of checking fermentation, was a chemical fact that had been known for many years, and in wine-making countries had from time immemorial been employed to stop vinous fermentation when it had reached the required point; but that sulphurous acid possessed the power of stopping other catalytic action besides vinous fermentation, was not so well known, and the great fact that the alkaline and earthy sulphites possessed, in common with the acid, this same important quality, was altogether unknown, until discovered and proved by Professor Polli, of Milan, to whom the entire merit of the discovery is due. When the humoral theory of disease was in a way revived, and when the truth of a zymotic or catalytic origin of many diseases was all but universally admitted, I presume it occurred to many others besides Professor Polli and myself, that if a substance could be discovered which could neutralize the zymotic principle — the ferment — without, at the same time, being injurious to life, a remedy would have been discovered for all zymotic diseases; and as this class comprehends almost, if not all, the most fatal diseases to which man is liable, the value of such a discovery would have been incalculable. I believe that in the alkaline sulphites we possess such a remedy, and to my friend Professor Polli is due the whole merit of the discovery. How the idea of employing sulphites instead of sulphurous acid, which cannot be administered, never occurred previously, cannot be well explained, although Claude Bernard's assertion that it was impossible to neutralize zymotic principles in the living frame without at the same time destroying its vitality, may have contributed somewhat to deter physiologists from trying experiments in that direction.*

Zymotic diseases are supposed to arise and to be propagated by a specific poison, which has the property of reproducing itself. A striking example of a zymotic disease we possess in small-pox. If a fraction of a drop of variolous infection is introduced into the circulation of an individual not proof against such infection, that fraction of a drop will in the course of a few days multiply itself millions of times. This increase is supposed to be the result of an action resembling fermentation; and though this fermentation be somewhat different from that which operates in a brewer's vat, it is yet very analogous to it, and, as it turns out, is subject in many instances to the same laws. It had been known for centuries that fermentation cannot continue in the presence of sulphurous acid; but it is a discovery of the last few years that the sulphites possess the same properties as the acid itself, and this fact has been established in many ways. Two animals of equal kind, size, and condition, were fed alike for a few days, with the exception that to one of them was administered a certain amount of a sulphite, until the urine passed off gave evident proof of the presence of the salt in the circulation. Both animals were then killed and exposed to the same conditions of heat, moisture, etc., etc. It being summer when these experiments were carried out, and the weather being warm, putrefactive fermentation very soon set in, but only in the animal to which no sulphites had been administered; the *sulphurized* animal (if I may be permitted to coin a new name), on the contrary, still remaining fresh for many days after the other one had long passed into an advanced stage of decomposition. Other animals, after having been saturated with sulphites, were killed, and every portion of their body, solids and fluids, gave on examination unquestionable proofs of the presence of the sulphites employed. These experiments seemed to prove that when the sulphites, whether alkaline or earthy matters not, are introduced into the stomach of a living animal, they may be absorbed and circulated *as such* throughout the organism. This fact now established, the following deduction was unavoidable — that as no fermentation can take place in the presence of a sulphite, and as sulphites can be administered with impunity to living animals, and are absorbed *as sulphites* into the circulation, in a disease depending on a fermenting or zymotic action we could arrest such action by saturating the system with one of these sulphites. Thus far this matter had been reasoned out well and satisfactorily, but facts were required to establish it, and to obtain these the following experiments were instituted: Two dogs of the same size and weight, and in good health, were fed perfectly alike for four or five days, excepting that to one was administered daily a certain quantity of bisulphite of soda. Having been thus prepared, some very fetid pus (about one drachm), obtained from an ill-conditioned abscess, was then injected with great care into the femoral veins of each dog, and the results watched. Immediately after the operation both dogs seemed stupefied; they laid down, refused all food, and remained prostrated for twenty-four hours. Both, however, seemed a good deal better on the following day, when a fresh injection of the same pus and to the same amount was again practised, both dogs being still fed alike, with the exception of the one to whom bisulphite of soda still continued to be administered in full doses. The effect of the second injection was most interesting. Both dogs were affected alike; both were seized with stupor; in both the pulse was rapid and feeble, while the respiration was greatly accelerated. Both dogs refused their food; both lay down in a state of stupor, and when made to rise and walk, tottered and reeled across the room. One dog, however, continued to receive daily a certain amount of sulphite of soda, and in four days was so far recovered as to be able to eat again his food with relish, while the wound in his femoral vein was healing rapidly. The other dog fared differently; he was fed equally, but he got no sulphites either before or after the operation, and the result was that he daily became worse; the wound in the thigh became gangrenous; the limb swelled up, and ten days after the second injection, the dog died with all the symptoms of typhus, the other dog being about and well. Upwards of three hundred dogs have been experimented on by Professor Polli and myself in this manner. We have varied the infecting substances by employing pus of different kinds — sanious matter, from ill-conditioned phagedenic and sloughing sores; we have employed defibrinated blood that had purposely been exposed for months to the air and become putrid; we have employed the discharge from the nares of glandered horses — and we have always obtained the same result. I do not mean by this to assert that in every case the sulphurized animal has recovered, while the other has perished; but in the great majority of cases those animals to whom the sulphites had been freely and largely administered did well, while the corresponding animal in almost every experiment perished. These are facts which any one can try for himself. And now, what has been the result of these facts when applied to the treatment of disease in the human subject? Just one year ago I published the details of a most interesting case of septicæmia treated solely and entirely with bisulphite of soda, where death seemed to be imminent and the patient given over, and where the infection had clearly resulted from repeatedly kissing, for several days in succession, the dead body of a beloved friend far advanced in a state of decomposition. My friend, Dr. B. MacDowall, professor of anatomy in our university, has on several occasions tested the value of these sulphites in the treatment of scarlatina and small-pox, and always with satisfactory results.

My friend, Dr. William Waters, of Carbery, treats all his cases of scarlatina with bisulphite of soda or magnesia, and not only administers it during the disease, but also as a prophylactic, with the greatest success; and last year fully established the safety of the remedy by administering it as a prophylactic to an infant three months old. Scarlatina of a very malignant type had broken out in the family of a gentleman in his neighborhood; the eldest boy died of it in three days. Dr. Waters administered the sulphites to all the inmates of the house, including the infant. Some of the family escaped the disease altogether, and those who did take it had it in the mildest possible form. The first case in which Dr. MacDowall tried this remedy was a most unfair one, it might be thought, but fortunately it turned out successfully. It was a case of confluent small-pox, which from collateral symptoms seemed to offer little if any hope of recovery; it was a case, in fact, in which nothing could be done, according to previous ideas. Sulphite of soda was prescribed in scruple doses every third hour, and, to the surprise of the doctor and the whole class, the patient not only recovered, but recovered without a scar. Dr. Cummins, of Cork, has published in the "Dublin Quarterly Journal," vol. 77, a very interesting paper on the treatment of scarlatina by alkaline sulphites, which he employed also as a prophylactic, and always with decided success.

I might add a great deal more, and cite cases of the most rebellious fevers treated at Tunis and other parts of the northern coast of Africa — fevers which, for intensity and malignancy, were scarcely if at all inferior to the Egyptian plague. These fevers have of late been all treated with bisulphite of soda and magnesia, and the success has been so great, the recoveries so marked, that the present sovereign of Tunis has publicly recognized Professor Polli's discovery by a handsome present and the decoration of an order of merit.

I might tell of the great success which has attended the local application of the sulphites in solution to putrid and phagedenic ulcerations, but shall content myself with quoting a short but most important letter which I received last spring from Dr. J. H. Purdon, of Belfast: "Though personally a stranger, I cannot refrain from doing that which I am sure will give you pleasure, viz., informing you of the success of a remedy you have introduced to our notice, the bisulphite of soda. The cases in which it has been tried by us have all been puerperal, and in all, so far as I have been able to ascertain, it has proved successful. The first case I tried it in was with a primipara. The labor had been complicated with placenta prævia and consequent hemorrhage. On the third day she had rigors, which were quickly followed by rapid pulse, great prostration, profuse perspiration, fetid diarrhœa, and fæces hippocratica. Opium and mercury were freely tried, when, finding after five days that the patient was gradually sinking, I determined, in consultation with my brother, whose patient she was, to administer the bisulphite of soda in scruple doses every four hours. From the third dose there was a progressive amendment, all the bad symptoms subsiding. After a few more doses, the lochia returned, and in a fortnight she was perfectly convalescent. The next case in which this remedy was tried was also a lady, but under the care of another physician, justly in extensive practice. It had been a 'face to pubis' case, very tedious, and finally requiring the aid of forceps. On the third day symptoms of uterine disease set in, for which mercury, opium, and quinine were freely administered, and the gums became rapidly affected. Notwithstanding all this heroic treatment, matters had reached by the ninth day a most alarming height. The patient complained of but little pain, but she was greatly prostrated, and the pulse was 140, and very feeble. Bisulphite of soda was administered, as in the previous case, together with opium and quinine, first every four hours, and then every six hours. The following morning the pulse was at 130; in the evening of the same day it had further come down to 106. The second morning, it was at 96; the third morning 86. The bisulphite was persisted in all through, and the case ended in perfect recovery.

"A few weeks after I saw another patient, in whom the usual symptoms of puerperal fever of the typhoid type had set in on the fifth or sixth day. It was determined to lose no time with other remedies, but to administer the bisulphite at once in scruple doses every three hours. The pulse at this time was at 140; by the next morning it had fallen to 120, when it steadily declined, and in a short week she was perfectly convalescent. Since these cases, my brother has had two more cases in the same locality as the first, in both of whom symptoms of the same character showed themselves. In both the same remedy was adopted, and in both the same successful result was obtained. I have heard of other successful

* Claude Bernard says, "Fermentation may arise in the blood, and give rise to poisonous principles, which may, in their turn, produce certain grave accidents in the living frame. . . . We cannot neutralize these ferments in the living organism — *it is impossible*; because, to effect such a purpose, it would be necessary to interfere with the character of the blood to such a degree that it would no longer be capable of sustaining life.

cases in this neighborhood amongst my professional friends, but can give you no details. I may add, however, that my brother and I have used it successfully both in anthrax and boils, which latter are very continuous in our jail, and we have found it to succeed admirably in 'putting a stop' to their recurrence."

I now conclude. I think I can safely assert, in the first place, that I have proved this remedy, the bisulphite of soda, to be perfectly *harmless*. It is not, like strychnine, arsenic, iodine, opium, or mercury, an instrument with double edge, cutting equally for good or for evil, according to the skill or the incapacity of the physician. It is perfectly harmless, for I have taken it myself, in *larger doses* than are required for therapeutic purposes, with perfect impunity. The physician, therefore, who wishes to try it, can do so freely, without fear of risk. Physiology leads us to believe that all zymotic diseases depend on a fermenting or catalytic principle in the blood. Chemistry teaches us that in the presence of sulphurous acid and the sulphites no catalytic action can take place, and practical experience confirms the teachings of science, by showing us palpably that zymotic diseases, even in their most virulent forms, become completely neutralized by this remedy. Who, then, shall not try it, and bring it to the only test which can decide of its value,—clinical experience? I stand at present nearly, if not entirely, alone in these countries as an advocate of this remedy; but, if I am not mistaken, the discovery of the use of the alkaline sulphites in the treatment of zymotic diseases will one day rank with the greatest discoveries in medicine.—*Glasgow Medical Journal.*

We congratulate chemists and druggists upon the prospective adoption in the United States of the decimal system of weights and measures.

The perplexity and annoyance of the Troy weights in pharmacy is felt by every one connected with the dispensing of medicines. No more simple, scientific, easily-understood system has yet been devised than the French metrical, and we look forward to its universal employment at no distant day.

On the 17th instant, the House of Representatives passed laws which legalize the use of the metrical or decimal system of weights and measures in the United States. The important movement met with no opposition, and it is probable that within a few days the action of the House will be confirmed by the Senate, when the metrical system will become the law of the land. In the beginning the use of the system is not to be compulsory, but optional with the people. As soon, however, as it becomes well enough understood, it will entirely supersede the present system. In order to make the system familiar to the people, it is proposed to issue one or more new coins, which shall represent some weight in grams and measure in a simple fraction of the meter. The post-offices are also to be supplied with gram weights, and mailable matter is to be estimated in grams, and a set of standards of the new weights and measures are to be supplied to each of the State capitals. It will be remembered that in the new system all weights and measures are deduced from a single unit, the meter, which is nearly equivalent to the ordinary yard.

Profuse Perspiration—Hot Water.—The application of hot water to the skin, that is, of water as hot as can be borne without pain, instead of leaving the skin moist, leaves it hot and dry. Hence it may be used as a remedy in cases of profuse perspiration. It may be useful to those who, though otherwise in good health, perspire to a distressing degree in hot weather; also in cases of perspiration of some particular part, as the axillæ, hands, feet, etc. The health in these cases is sure to be improved by free purgation, and by quinine, fresh air, and exercise. In the ordinary night sweat of phthisis it is productive of great relief; but in the true hectic, arising from absorption of decaying pus from some internal organ, it must be confessed to be of no avail.

The Hypophosphites—Their Therapeutic Value.

It is seldom that the attention of physicians is called to a more sensible and able article than the following by Dr. Brown, the distinguished surgeon and physician of the Albany City Hospital. Dr. Brown is evidently no "stumbling-block in the path of science," but a careful and discriminating investigator, who is willing to search for and embrace truth wherever found. He is the *real*, the *true* physician, who should receive the thanks of all interested in the progress of medical science.

His remarks regarding the *hypophosphite salts* are worthy of regard. The attention of physicians was called to these salts *eight years ago*, by Dr. J. R. Nichols, in a paper contributed to the "Medical and Surgical Journal" of this city. Dr. Brown alludes to this paper in his article.

It must be confessed by all candid and reflecting physicians that the medical profession is exceedingly slow to learn new facts. Such is the reluctance to forsake old methods of practice, that many stumble heedlessly on through life without once getting out of the rut in which they started. With these, inflammation is still the *phlogiston* of the ancients, and a heated surface and bounding pulse the signal for depletion, antimony, calomel, jalap, etc., without regard to time, place, or circumstances. Such men seldom learn anything, never make discoveries, never accomplish anything worthy of the noble profession in which they stand immovable as lamp-posts, bearing up only the light of others. On the other hand, there have always been men in the profession who are but too ready to experiment; who, having no stable theory of their own, eagerly embrace the last one that is presented. These are the victims in turn of every new delusion; they are ever astride of some hobby, from which they fall only to mount another.

The class first named will always remain obstinate stumbling-blocks in the path of scientific progress; truth must advance directly over them, if it advance at all. The second class are the fruitful parents of homœopathy, hydropathy, and kindred shams, which at various periods have scourged the world, and contributed greatly to bring the healing art into disgrace.

We have—thank Heaven!—a third class of physicians, never too old or too wise to learn, who are willing to give any theory a fair investigation, to accept whatever of truth may be found in it, and reject with keen discrimination that which stands upon untenable foundations. These are the *real*, the *true* physicians of the world, and worthy to stand by the bedside and minister to the ailments of suffering humanity. They are the men who make discoveries; who do not deem it labor lost to look through a bushel of the chaff of medical literature if they can separate from it one grain of truth; who are willing to mine patiently for the diamond *fact*, though it be imbedded never so deep in the clay of absurdity, speculation, and folly.

When, less than ten years ago, Dr. J. Francis Churchill announced to the Imperial Academy of Paris that he had discovered a specific remedy for pulmonary phthisis, the first class of doctors I have referred to simply pronounced the statement absurd, and continued to stumble along in the old paths with which they were familiar. The second class (such of them as chanced at the time to be unhorsed from some of their previous hobbies) mounted Dr. Churchill's theory and well-nigh rode it to death, carrying it to the most ridiculous extremes. The result has been, however, that some of the third class of quiet, thinking students of their profession, having applied the tests of judgment and experience to the subject, have found a new and important agent in materia medica, which, if not equal to all the sanguine anticipations of Dr. Churchill, is still of permanent therapeutic value.

As is well known to those who have read the work of Dr. Churchill, which must ever remain a lasting monument of the enthusiastic research of that physician, the remedies on which he mainly relies are the hypophosphite salts, resulting from a union of hypophosphorous acid with a salifiable base. Dr. Churchill's investigations led him to the conclusion that the tubercular diathesis depended upon a deficiency of oxidizable phosphorus in the system, and that the appropriate remedy would be the exhibition of phosphorus in a form capable of oxidation and assimilation. That phosphorus exists in large proportion in the animal economy has long been known, and the additional fact that it is found free in the brain is a demonstration of modern chemical investigation. It cannot be doubted by any intelligent mind that the phosphorus present in the body performs *some* important office, for nature does not distribute the elements without an object. In an article published in "The Boston Medical and Surgical Journal," in May, 1858, Dr. Nichols, the well-known chemist, remarks: "The vital importance of these agents (the hypophosphites) in maintaining a normal condition of the system can be understood by a consideration of the probable fact that in all the operations of the mind, in every effort requiring an expenditure of nervous force, they are called into action. In their rapid oxidation in the brain, on occasions of great intellectual effort, there may be a nearer approximation to literal truth in the remark that there are 'thoughts that burn,' than is generally supposed." This observation is supported by the fact that students and others who are performing a large amount of brain labor excrete an unusual amount of phosphates in the urine, a circumstance I have had the curiosity to test repeatedly. It has been asserted—I know not with what truth—that there is an almost total want of phosphorus in the brains of idiots. If chemical science should succeed in demonstrating this circumstance, it would add another convincing proof of the importance of this element as a generator of nervous power, and might afford a useful hint for the treatment of insanity and other mental aberrations.

It may be assumed, without any stretch of rational conclusion, that if oxidizable phosphorus exists in the brain, blood, and tissues of the animal body in its normal condition, its absence or diminution must create variations from the healthy standard,—in a word, *disease*. It thence irresistibly follows that the remedy consists in supplying the deficient element in a condition both assimilable and oxidizable. There is no dispute among chemists or physiologists as to the fact that the hypophosphite salts offer the most direct and philosophical means of supplying phosphorus to the system. The small amount of oxygen in combination renders them easily decomposable in the economy. In the language of Dr. Nichols, "what phosphoric acid may have failed to do in supplying the waste of phosphorus, it is almost certain that the acid containing the less amount of oxygen is capable of accomplishing." The principal theory, then, for the administration of the hypophosphites rests upon these three foundations:

1. That phosphorus is an essential element of the animal economy.

2. That its undue waste, by excretion or otherwise, is a cause of disease.

3. That the natural remedy is phosphorus in an oxidizable and assimilable form.

That the hypophosphites possess alterative and tonic properties cannot be doubted by any person who has witnessed the sometimes surprising effects following their administration. Dr. Newton says of them, in the "Chemical Gazette," "they seem to possess the power of increasing nerve force and promoting the function of nutrition." Another effect which has often been noticed by those who are familiar with their administration is the apparently anodyne influence exerted in cases of morbid vigilance and restlessness. Although the patient may have been disturbed and wakeful, no sooner does he commence taking the hypophosphites than he sleeps soundly at night. They produce no headache, constipation, or other unpleasant symptom, and the patient does not ordinarily become accustomed to them so as to require an increase of dose. The anodyne effect is probably incidental, and follows from the tonic impression upon the digestive apparatus, as it is well known that judicious physical exercise, or anything that improves the assimilation of the food, produces sleep in the same way.

While it yet remains to be proved that any remedy is capable of curing a well-marked case of phthisis that has advanced to the second stage, there can be no reasonable doubt that the hopophosphites, beyond any other remedy that we possess, will prolong the life of the patient. Dr. Wood believes that consumption is occasionally curable. That the disease depends chiefly upon defective nutrition is almost universally admitted, and if any medicine is capable of remedying the imperfect assimilation of the food, the

hypophosphites will accomplish it, for therein seems to lie their peculiar power. I have seen one case where the patient was much reduced in flesh and strength, with night-sweats and a racking cough, apparently dependent upon tubercular deposit in the left lung, which resulted favorably. Under the use of the hypophosphites, the patient gained strength daily, the night-sweats ceased, appetite returned, and he got rapidly well. I saw the patient again twelve months afterwards, and he appeared to be enjoying very tolerable health, without any signs of the disease which had threatened to put a speedy end to his existence. In the first or forming stage of phthisis, the hypophosphites may be given with every hope of a favorable result.

But if Dr. Churchill did not discover a remedy for tuberculosis, he certainly did bring before the medical world a class of medicines that are of the greatest value in the numerous diseases resulting from loss of nerve power; also in many of the diseases of infancy connected with the scrofulous diathesis, and those where the osseous system is defective. In all these cases I have seen them administered with the most beneficial results, and will here mention two or three cases as illustrations.

Mrs. N., 34 years of age, married, of delicate nervous organization; had suffered much from dysmenorrhœa; never had children. Patient when she came under my notice was considerably emaciated; countenance pale; pulse weak and considerably accelerated; much troubled with cold hands and feet; appetite capricious, but generally poor; frequent pain and sickness at stomach after meals; has some cough; is dejected and gloomy in spirits; had taken elixir of bark and iron, quinine, cod-liver oil, and various other tonics, with very little benefit. Prescribed the following: ℞. Hypophosphite lime, hypophosphite soda, āā ℥ ij.; water, Oi. A tablespoonful to be taken thrice daily. Without other treatment the patient rapidly recovered her health and spirits; appetite became excellent; digestion good; gained several pounds in weight, and after taking the hypophosphites six weeks was to all appearance perfectly well.

Mrs. H., aged 29, had enjoyed very good health until after the birth of her second child, after which she suffered for a year with indigestion, and the long train of nervous symptoms so often witnessed by practitioners that they scarcely need description. She became a prey to the most dismal fancies and gloomy forebodings; passed whole nights without sleep, often in paroxysms of mental anguish distressing to witness. Opiates seemed only to increase the sleeplessness of the patient. She was treated in turn by two medical gentlemen, who exhausted the whole catalogue of tonics and antispasmodics without giving any relief. When I saw the patient, in addition to the symptoms above detailed, there was much tenderness perceptible upon pressing the fingers upon the upper part of the cervical vertebræ. She was ordered to take ten grains of the hypophosphite of lime three times a day. No other treatment was had, with the exception that the patient was directed at first to take a dose of ammoniated tincture of valerian at bedtime, which was soon discontinued. Improvement was noticed almost immediately. On the second night her sleep was undisturbed. After continuing the medicine nearly two months, she appeared perfectly well; appetite and digestion good; sleep sound and refreshing. She assured me that she could never be sufficiently grateful for recovery from a condition she said was "worse than death."

I have only time and space to give one more case, which was that of a boy three years of age, suffering from marasmus. The little patient was much emaciated, his abdomen was distended, he had a diarrhœa, which his mother said had continued with occasional intermissions for nearly two years, sometimes accompanied with bloody discharges. Under the administration of the hypophosphites taken in milk, two grains twice a day, his recovery, apparently permanent, took place in a few weeks. I have known a somewhat similar case recover under the use of the syrup of the hypophosphate of iron, and will not stop now to consider whether the iron or phosphorus, or both, cured the patient.

Without protracting the discussion further, have I not said enough to warrant the conclusion that the hypophosphites are worthy a more prominent place than the appendix to the United States Dispensatory? In the class of diseases to which they seem so well adapted, I believe they will disappoint the practitioner in fewer instances than more pretentious remedies that come to us labelled *officinal*.

It may be proper to add, by way of caution to those who may desire to make a trial of the hypophosphites, that some of these salts in the market I have found nearly worthless, they doubtless being improperly prepared. It is of the utmost importance that they should be pure, containing the proper proportion of hypophosphoric acid, and it will be well to see that they come from the laboratory of some reliable chemist.—*Boston M. & S. Jour.*

Albany, N. Y., December, 1865.

Journal of Chemistry and Pharmacy.

BOSTON, JULY 1, 1866.

☞ The physicians and druggists to whom we send the first number of the "Journal of Chemistry and Pharmacy" will be considered subscribers for the year, unless notice of a desire for its discontinuance is made to us. The subscription price, fifty cents per annum, is not required in advance, but may be paid at the end of the year, if the journal is regarded as satisfactory by those who receive it. We leave our patrons to be the sole judges of its worth, and if any one feels that he has not been benefited to the amount of this small sum by its perusal, he may withhold payment and no fault will be found. These terms are rather unusual, but they are such as we prefer. As manufacturers of chemical and pharmaceutical products, we have for a succession of years been brought into intimate business relations with many thousand physicians and druggists, and have uniformly found them honorable and worthy of confidence and esteem. They are, moreover, gentlemen of culture, and fully competent to judge of the value of whatever literary or scientific matter is presented for their consideration, and therefore, so far as this journal is concerned, we cheerfully trust them.

Druggists and Physicians.

The relations between druggists and physicians should be frank and confidential. Their interests are nearly identical; the one procuring and dispensing the remedial agents which the other prescribes at the bedside of the patient. There is manifestly a mutual dependence and interest, which is not found in other professions; and therefore it is of the first importance that sources of information regarding the materials of medicine, and all new improvements and discoveries connected with the healing art, should be open to both, in order that the supply may always be kept in the line of advance with the demand. Serious embarrassments and disappointments are constantly experienced by physicians, who fail to find upon the shelves of the apothecary the new agents which advancing chemistry and pharmacy bring to their notice. In the country, this evil is more seriously felt than in cities; but even in cities, so long a time often elapses before the dispensing druggist furnishes the desired new agent, that the physician, pressed with active business and many cares, forgets the want, or substitutes perhaps a much less salutary or efficient remedy. Thus, progress in medicine is retarded, and many most valuable therapeutic agents remain for a long time unrecognized, or untried. One of the prominent objects in establishing this journal, is to furnish the dispensing druggist and the practising physician a common source of information, which will be alike important and acceptable to both. We shall endeavor to furnish gleanings from foreign and domestic chemical and medical journals, which seem to us new, and adapted to the wants of those who bestow upon us their patronage.

Zymology.

Zymology, or the doctrine of fermentation, has recently become a matter of much interest to medical men. The vinous and acetic fermentations have long been well understood, but the opinion is beginning to prevail that there are other mysterious processes going on in the animal economy, analogous to the action of ferments, which produce a large number of diseases or abnormal conditions of a very grave character. This view is supported by the results of many careful experiments, and seems to be well founded in fact. We call special attention to the article by Dr. De Ricci, of Dublin, republished in this journal, on the use of the *sulphites* in zymotic diseases. It should be read attentively by all interested in the progress of medical science.

Nitro-Glycerine.

A very great interest has been awakened in this remarkable liquid by the fearful explosions which have occurred in California and elsewhere.

We have been beset with inquiries regarding its physical character and appearance, its method of manufacture, etc.; and therefore we present in the *Journal* a few items of information regarding it. In appearance it resembles the denser kind of glycerine, and can be kept in vessels of metal or glass. It is exceedingly poisonous, one drop being probably sufficient to destroy life. A single drop, diluted with one hundred of alcohol, forms a tincture, of which one drop is sufficient to cause violent headache. Under the name of *glonoine*, it has been of limited use in medicine, being employed to relieve headache and neuralgic difficulties. It is a singular fact that, in numerous instances which have come under our observation, it has relieved headache in those suffering from the affection while it produced the same in those free from it.

Its preparation involves great caution and skill, and is not unattended with danger. We have prepared it, employing a dozen or more glass vessels, in which the amount of glycerine acted upon in each did not exceed a fluid drachm. These, placed in refrigerating mixtures, so as to maintain a temperature near the zero point, Fahrenheit scale, enable the operator to secure or complete the process in at least a part of the vessels. It is not unusual for decomposition or explosion to occur in the process of manufacture, and but small quantities should be experimented with. The nitric acid must be added drop by drop, and it should be of the strength 1.44°. The explosions of nitro-glycerine, even in minute quantities, are very violent and dangerous, and therefore it should be handled with care.

THE HYPOPHOSPHITE SALTS.—No more striking illustration of the rapidity with which rare chemical substances are adopted in medicine and the arts, when their nature and adaptation are well understood, than is afforded by the salts of hypophosphorous acid. A few years ago these salts would have been regarded as curiosities in the chemist's laboratory; now they are known, and used in large quantities, in all parts of the civilized world. In 1857 we prepared a few ounces of hypophosphite of lime, with considerable labor and ex-

pense, and supposed the demand would be fully met with this quantity for a long time. We had no conception of the amount which would be consumed within a period of six or eight years. During the past year (1865) we have furnished nearly *one ton* of the hypophosphites of lime, soda, potassa, ammonia, and iron, from our establishment alone.

It requires fully two pounds of phosphorus to manufacture one of hypophosphite of lime, and consequently the consumption of this element has been greatly increased. As the therapeutic value of the alkaline hypophosphites becomes better understood, the demand rapidly increases, and must so continue. To insure *perfect purity* in the salts, requires great patience, care, and skill in the chemical manipulation, and none but those of positive purity should ever be offered for sale.

The American Pharmaceutical Association.—This body, which held its annual session in this city last autumn, is one of no ordinary character. The general intelligence and dignified appearance of the members compared most favorably with other bodies, representing learning and science in the various departments or branches. The druggist or apothecary, wherever located, is usually in a favorable situation for acquiring a large amount of specific and general information. He has time for reading and study, and the books relating to his business necessarily treat of chemistry, botany, and the kindred sciences; and, therefore, he must be a dull scholar, indeed, if he does not acquire at least some knowledge of these branches of learning. The Association has accomplished a great amount of good by its meetings and publications, and should be sustained.

Discharge Spout for Bottles, etc.—This device is intended for application to all kinds of apothecaries' bottles, graduates, etc., also to many household articles, such as cans, jugs, measures, etc. One of its ends is to be inserted in the head of the bottle, and this is the receiving end; the other is the discharging end, and it is tapered off so as to form a spout that will conduct the liquid from the bottle without any liability of the same being spilled. As further security against the above contingency, the spout is encircled with a continuous inclined trough, arranged so that it will conduct back into the bottle any liquid which might run over upon the outside of the spout. A cap may be used for closing the spout, and in such case no other corking or stopping of the bottle will be necessary. Dr. L. B. Myers, of Elmore, Ohio, is the inventor, and the patent was issued on April 3, 1866.

The Atlantic Telegraph.—We have confidence in the success of the third attempt to lay the great international sub-marine cable. Before the issue of the second number of our journal the problem will have been solved, and the result will be known over the wide earth.

Science has been exhausted in efforts to insure success to the undertaking, and it will succeed. The first cable was a success so far as depositing it upon the bed of the ocean was concerned. One of the directors, the distinguished Mr. George Peabody, informed us recently that more than three hundred messages were actually transmitted through that cable. One government message sent, saved £20,000 to the English treasury.

Carbolic Acid.

The discovery of carbolic acid, one of the most powerful antiseptics found among the constituents of coal tar, gives to the medical world a new agent of superlative value. It is when pure colorless, and crystallizes in tables or long rhomboidal needles; it melts at about 100° F., and slowly volatilizes at common temperatures. It is soluble in water, and liquefies with exposure to humidity. It is very soluble in alcohol, ether, and acetic acid; also in glycerine, the fixed and volatile oils; but these last all modify its properties. It has been supposed to be too sparingly soluble in water to form an effective aqueous solution, but we have found this not to be the case. If the acid be positively pure, water takes up readily 5 per cent., which readily coagulates albumen and is destructive to animals and vegetables of the lower grades. It arrests and prevents spontaneous fermentations, and possesses in a high degree the full properties of carbolic acid. This solution is very convenient for physicians, and may be applied for the destruction of parasites incident to man, lice, fleas, harvest-bugs, and the sarcoptes or acarus of the itch; also for cleansing indolent, ill-conditioned ulcers, dressing wounds, and all disinfecting purposes. Its antiseptic properties are very remarkable, and it may be used wherever antiseptics are required. No remedy is so certain and safe as carbolic acid for *Itch*. One application of the solution with a sponge over the whole body does the work. Of course, the dress, bed-clothes, etc., of the patient, should be lotioned, to destroy the spores, acari, or ova, which they may contain. Bad-smelling ulcerations of the ancle and lower extremities are perfectly deodorized and healed by its employment. Syphilitic sores should be washed with the solution once each morning. It is impossible in a brief notice to enumerate all the important and useful applications of this new agent. The solution is sold in pound packages, the crystals in ounces. The crystals and solution as prepared by us may be procured of all druggists.

Ashes.

What a vast amount of valuable fertilizing material would be furnished us, if the ash of our bituminous and anthracite coals contained the same amount of alkalies and phosphates found in wood-ashes. If in the Divine purpose this had been so arranged, the value of the now worthless and troublesome residuum of our coal fires would be greater than all the guano islands of the Pacific, and the warming of our dwellings in winter would produce material for the fertilizing of our fields in summer. A distinguished medical professor once observed, that there were but two faulty points in the human mechanism, and those related to the teeth, and certain arrangements of the abdominal muscles, whereby hernia or rupture was liable to occur. So, perhaps, our good soil cultivator might say, as he sees load after load of coal ashes dumped into the street or into the ditch as worthless, "If now this would only fertilize my fields, how perfect would be the natural laws of consumption and supply. We consume coals, but after all they do not make bread; they do not give us back, beside their generous warmth, an abundance of cereal grains and luscious fruits." And perhaps he might say further, "How natural and reasonable seems the modification by which this waste product could be made of inestimable value. If the great Designer had just so slightly modified coals as to enable them to yield in each bushel of ashes a few pounds of potasses, soda, magnesia, and phosphate of lime, he would have hit our case, or met our wants exactly." Ah, yes; but he has not so constituted the black carbon of our coal measures. And what is man that he should question the wisdom of the Almighty? Let us regard with a religious faith all things as designed for the best good of man, and then everything that seems faulty in the natural world will stand out stamped with the divine beneficence.

Purity of Medicines.—Druggists owe it to themselves, to physicians, and the community in which they are located, to provide only pure and reliable medicines for the sick. It is little less than a crime to dispense a remedy knowing it to be spurious or of doubtful integrity. During the war, prices of everything in the line of druggist's stock were enormously increased, and the temptation to sophisticate and dilute was thus made very great. There probably has never been a time when so many miserable, worthless drugs were found upon the market, as at present, and it is of the first importance that purchasers should take unusual care in making their selections.

The price of an article should not be regarded. The first question to decide is, Is it pure? is it of such a character as one would wish to have administered to himself, or to a member of his family?

Carbolic Acid.—Mr. E. Davis, in a paper read before the Liverpool Chemists' Association, states that this acid, as now obtained in a pure state, is a colorless crystalline solid body, possessing most extraordinary antiseptic properties. One part of this substance added to five hundred parts of glue or flour paste will keep them perfectly sweet for years. Hides steeped in a watery solution of it and then dried in the sun are kept from emitting any unpleasant odor even after long voyages. Extracts of coloring matters, especially those containing tannin, are also preserved unchanged by the addition of a very small quantity of this acid. In medicine, carbolic acid has also been used most successfully in the treatment of skin diseases, ulcers, sloughing wounds, toothache, and internally for dyspepsia. In veterinary practice it has been found to be specific for foot-rot in sheep, and has proved very effectual in curing grease and canker in horses. Various dyes are obtained from carbolic acid; they are called picric or carbazotic acid, peonine, azuline, and azurine. The last named is a new dye for silk, producing a splendid orange color. The paper concluded with showing how manufactures and science had mutually benefited by their alliance in this, as in many other instances.

American Journal of Pharmacy.—It is a credit to the druggists and pharmaceutists of the country, that they are found ready to sustain a journal devoted to their interests of so high a character as this. It is learned, dignified, and conducted with much ability and tact. Prof. Proctor is not a pretentious man, or inclined to words of little importance. He selects with care, rejecting all that savors of empiricism, or that is designed to advance personal interests.

The Journal is an honor to the pharmaceutical literature of the country, and ought to be generously sustained by those whose interests it promotes.

☞ We hope to greatly improve our next number in variety and interest.

Tinctura Opii Deodorata, U. S. P.—We feel certain that we shall receive the thanks of physicians for placing within their reach an officinal preparation of opium which will, in every respect, fulfil all the desirable qualities of the empirical "elixirs" so generally patronized. We have made arrangements to prepare in a large way, with the employment of ether and water, the preparation of opium of the new pharmacopœia.

In order to have this most excellent preparation fulfil perfectly all those desirable ends of which it is capable, the opium used should be accurately assayed, in order that perfect uniformity be maintained in the preparation. Opium, as found in the market, differs so largely in the amount of morphine salts contained, that no preparation can be reliable which is not made from that of ascertained strength. The great danger arising from the use of ether, and the want of suitable apparatus and experience, causes this officinal, in its manufacture, to rest upon the disadvantage of not being adapted to the shop of the ordinary apothecary. It should only be made by those having competent knowledge and suitable laboratory appliances to render it accurate and reliable.

The ordinary sedative dose of this is twenty-five drops, equal to about one-sixth of a grain of the opium alkaloids.

If much pain or irritation is to be combated, ten, fifteen, or twenty-five drops more may be required. A pleasant tranquillity and calmness is usually produced by the minimum dose; but, in some cases, to complete the effect and produce quiet sleep, a repetition of the dose is required.

The advantages of this preparation are, that the cerebral disturbance, constipation, and other unpleasant consequences resulting from the use of opium in the usual forms, are entirely, or in a great measure, avoided.

This form of the drug may be resorted to to produce soporific and anodyne effects, when others could not be administered with safety; and, therefore, it is calculated to meet a want long felt by every physician in active practice.

The officinal name of this preparation, *Tincture* Opii Deodorata, is so manifestly improper, and calculated to cause mistakes and confusion among druggists, that we prefer to call our preparation "*Infusion* of Opium." In numerous instances physicians have written for "Tr. Opii. Dod.," and *laudanum* has been furnished. The new preparation is *not* a *tincture*, but more properly an *infusion*.

Messrs. J. R. Nichols & Co. furnish it in pound and ounce packages.

New Method of Treating Diseases of the Cavity of the Nose.

BY DR. THOMAS SKINNER, LIVERPOOL.

In March, 1859, a lady patient consulted me about her waitress, an orphan, in whom she took great interest, and whose only fault was an exceedingly fetid breath. On making an examination, I found that she was the subject of chronic ozæna. One morning, when syringing her left nostril, an enormous plug of congealed muco-pus came out of the right nostril, followed by a copious stream of water. The conclusion I then came to was inevitable, so I changed the nozzle of my instrument to the right side, and the stream came down the left nostril.

Since that time I have had many similar cases to treat, and I have always followed the same plan, and with marvellous success. I quite agree with Dr. Thudichum when he says, "It is really surprising what an amount of sordes will sometimes be removed from the nose by this rinsing process."

The means which I have always adopted have consisted of a pint jug of tepid water (my consulting-room water-stand with hot and cold water and waste pipe) and one of Higginson's invaluable syringes. Occasionally I have had to add a deodorant, and I know none better than the following tincture, a teaspoonful of it being added to a pint of tepid water: Tincture of camphor, tincture of myrrh, of each three drachms; soap liniment, two drachms; glacial acetic acid, twenty minims; oil of pitch, one drachm.

I have never had any difficulty with any of my patients when I have taken time and moderated the force of the injection to what they seemed able to bear, always commencing with great gentleness, and inserting the nozzle gradually whilst the injection is proceeding. I have never required in the worst of cases to medicate the injections further than stated. Constitutional treatment has accomplished all else.

In conclusion, allow me to direct the attention of Dr. Thudichum and your readers to the *surgical* aspect of this simple discovery.

In June, 1860, the child of one of my patients was brought to me, a little girl two years of age, who had pushed an Indian bead up the right nostril. The mother had made vain attempts to pull it down, and succeeded in pushing it entirely out of sight, accompanied with profuse bleeding and terrific squalling. While the mother held the child's face over my basin, I forcibly injected some tepid water by means of Higginson's syringe up the left nostril, when the bead with one single compression of the elastic cylinder made its appearance in the basin.

There is a Yankee method of treating such cases, which, though inelegant, is still very ingenious. It is as follows: An emetic is first administered to the patient; a pocket handkerchief is then tied tightly over his mouth, and held there until the usual medicinal effect takes place. It is not difficult to "calculate" the result. —*Lancet.*

Remedy for Epilepsy.

BY GEO. C. CLOSE.

A few months since, a copy of a recipe—said to be a remedy for epilepsy, and which had been put up by a New York firm, somewhat celebrated for their specialities—was handed to me, with a request to state my price for compounding it.

I did so, and returned it to the person who handed it to me. Soon after, I received from two independent sources copies of what I know to be essentially, and believe to be precisely, the same recipe, with the intimation that it was of French origin.

The reason I now call the attention of the Association to this matter is, that I am informed that the firm mentioned above, and whom, for the sake of a name, I will call Jones, Smith, & Co., are now advertising this article as their remedy for epilepsy.

I therefore wish to make the recipe public, so that when Jones, Smith, & Co.'s remedy for epilepsy is inquired for, members may tell their customers, if they choose, that the recipe has been published, and is not the property of the pretended owners. This I think will have a tendency, as it were, to "cut the corners" of quackery, which I believe is a legitimate object of this Association.

I have put up this recipe a large number of times, and am informed by one of my customers that it has proved an effectual remedy in his case.

It is as follows:—

℞

Potassii bromidi, ...	ʒ vi.
Ammonii bromidi, ...	℈ ii.
Potassæ Bicarb., ...	gr. xv.
Aquæ, ...	℥ iii.
Tinc. Columbæ, ...	℥ iss.

M.

Dose, a teaspoonful three times a day.

How to Cure a Felon.—As we often see friends suffer with these very troublesome things, we publish the following cure for them, which we have heard highly recommended: As soon as the parts begin to swell, get the tincture of lobelia, and wrap the part affected with cloth saturated thoroughly with the tincture, and the felon is dead. An old physician says he has known it to cure in scores of cases, and it never fails if applied in season.—*Journal of Medicine.*

How to make Coffee.

Prof. Chas. A. Seely sends to the "Scientific American" the following description of his method of making coffee. He thinks it an improvement upon that of Prof. Liebig, so extensively published a few months since. Our readers will find that a little attention to the science of coffee-making is not labor lost. Good coffee is often spoiled in the preparation.

I now propose a plan which, on reflection and after a considerable experience, I find to be nearer perfection. My coffee-making is a continuous process, and may be carried on for a life-time. It takes two days to get well started, but after that there is a daily routine. To begin, I take rather more than the usual amount of coffee, and pour on it hot water when it is ready to be used; in other words, I make French coffee. The grounds from this operation I leave to soak in the pot till the next day, when I begin coffee-making by pouring hot water on these grounds, which hot water I use according to the French plan of making coffee from fresh-ground coffee. The process is now in full operation, and every time coffee is wanted the manipulations of the second morning are repeated. I thus extract all the soluble and useful matter of roasted coffee, and waste nothing.

To put the art in the most practical form, I have found it necessary to modify the coffee-pot. Perhaps the simplest apparatus is the most ordinary pot provided with two strainers. The strainers are of cup-form, and fit into each other and into the top of the pot. For use I set a strainer on the top of the pot, and into the strainer I place fresh-ground coffee; over this I use a second strainer, containing the grounds of the last operation. Now hot water is poured into the upper strainer, and percolates down into the pot, carrying with it all the goodness remaining in the grounds, and the aroma and much of the extractive of the fresh-ground coffee. When the water has passed down, I throw away the now useless contents of the upper strainer, and upset the contents of the lower strainer into the pot. Delicious coffee is now ready to be served to the appreciative household.

I have now unwittingly made this article so long that I am obliged to omit the scientific considerations and arguments, pro and con, which I have thought over for the occasion, and a discussion of the question from an economical point of view, wherein I was prepared to show the millions of dollars per annum that an adoption of my process might save to the world. I dismiss the subject with reluctance.

Bottled Caloric.

"Never despair," says Professor Jeannet, of Bordeaux; "your coal-fields may fail, but acetate of soda will at any rate prevent your noble race from perishing during that gloomy British winter." This substance affords, in fact, says the Professor, a means of "storing up the solar heat." Its peculiarity is, that while it crystallizes when exposed, in solution, to a very slight degree of cold, it will cool without crystallizing if placed in a closed vessel. Cooling thus, it retains the greater part of the caloric which it had absorbed while being melted; and this caloric is given off the moment the bottle is uncorked or the jar uncovered. M. Jeannet has proved it. "One kilogramme of acetate, melted and then cooled down in a closed vessel to the freezing point of water, disengages, when crystallization is induced by uncorking, heat enough to melt three hundred grammes of ice, or to raise three hundred grammes of water from the freezing point to 79° centigr." Swift was not so very wild after all, then. Sunbeams from cucumbers would scarcely be stranger than solar heat from bottles duly placed "in a glass frame that the sun's rays may be concentrated upon them." Well may the *Union Medicale* call the path which M. Jeannet has struck out "a seemingly fantastic one." Still it clearly hopes for great results from the discovery, and seems to look forward to the time when there will be a brisk trade between England and the south of France in "bottled caloric," and when the Englishman, graduating his hospitality (as M. Kervigan tells us he does already in the matter of drinks) according to the quality of his guest, will, for an inferior, simply uncork a few bottles of the watery

sunshine of his native island,—treat an equal to the strong but coarse caloric of Bengal, but if he has a lord at his table, will send down to his "heat cellar" for some of the "meilleur cru of the cote rotie"—warm but full of bouquet. *Nous verrons.* Anyhow, it is kind of M. Jeannet to try to console us under such a visitation as that which Mr. Jevons predicts, in the possible loss of our coal fields.—*Pall Mall Gazette.*

Armenian or Diamond Cement.

This article, so much esteemed for uniting pieces of broken glass, for repairing precious stones, and for cementing them to watch-cases and other ornaments, is made by soaking isinglass in water until it becomes quite soft, and then mixing it with spirit in which a little gum mastic and ammoniacum have been dissolved. The jewellers of Turkey, who are mostly Armenians, have a singular method of ornamenting watch-cases, etc., with diamonds and other precious stones, by simply gluing or cementing them on. The stone is set in silver or gold and the lower part of the metal made flat, or to correspond with the part to which it is to be fixed; it is then warmed gently, and has the glue applied, which is so very strong that the parts so connected never separate. This glue, which will strongly unite bits of glass, and even polished steel, and may be applied to a variety of useful purposes, is thus made in Turkey: Dissolve five or six bits of gum mastic, each the size of a large pea, in as much spirits of wine as will suffice to render it liquid; and in another vessel dissolve as much isinglass, previously a little softened in water (though none of the water must be used), in French brandy or good rum, as will make a two-ounce phial of very strong glue, adding two small bits of gum albanum, or ammoniacum, which must be rubbed or ground till they are dissolved. Then mix the whole with a sufficient heat. Keep the glue in a phial closely stopped, and when it is used set the phial in boiling water. Some persons have sold a composition under the name of Armenian cement in England; but this composition is badly made; it is much too thin, and the quantity of mastic is much too small. The following are good proportions: Isinglass soaked in water and dissolved in spirit, two ounces (thick); dissolve in this ten grains of very pale gum ammoniac (in tears), by rubbing them together; then add six large tears of gum mastic, dissolved in the least possible quantity of rectified spirits. Isinglass, dissolved in proof spirit, as above, three ounces; bottoms of mastic varnish (thick but clear), one and a half ounces; mix well. When carefully made, this cement resists moisture and dries colorless. As usually met with, it is not only of very bad quality, but sold at exorbitant prices.—*London Chem. News.*

Antidote for Poisons.

Prussic Acid Antidote.—Take of liquor of perchloride of iron thirty-seven minims, protosulphate of iron in crystals, as pure as possible, twenty-five grains; as much water as make a solution of a protosesquisalt of iron measuring about have an ounce. Dissolve, on the other hand, seventy-seven grains crystallized carbonate of soda in about half an ounce of water. These quantities destroy the poisonous action of between one hundred and two hundred minims of medicinal prussic acid, officinal strength, on giving first the one liquid and then the other.

Antidote for Cyanide of Potassium.—The antidote for this compound is the same as for prussic acid, except the solution of protosesquisalt of iron is to be used without the alkaline solution, the prussic acid being already combined with an alkali; the use of the alkali, however, would not be injurious; a harmless yellow prussiate would be formed. In this case, in consequence of the possible presence of free acid in the stomach, the alkaline liquid should be given first,—the quantities given, as the prussic acid antidote would decompose thirty-five grains of cyanide of potassium.

Antidote for Arsenious Acid.—Measure out five fluid-drachms and seven minims of liquor ferri perchloridi into two or three ounces of water, then add to the liquid a solution of one ounce of crystallized carbonate of soda in a few ounces of warm water, stir till effervescence ceases; the resulting mixture destroys about ten grains of arsenious acid.

Antidote for Tartar Emetic.—Mix five fluid drachms and seven minims of liquor ferri perchoridi with a few ounces of water; mix in now a cream formed of ninety grains of calcined magnesia, rubbed up with water in a mortar, stir till, after gelatinizing, the mixture again gets thin; empty the mixture into a calico or muslin cloth, and press out the liquid; remove the mass from the cloth into a clean mortar, and rub it up with a little water into a smooth cream; in this state, it can destroy upwards of twenty grains of tartar emetic. It may also be used as an antidote for arsenious acid, of which it absorbs about twenty grains.—*London Pharm. Journal.*

Cochineal Coloring.—This coloring may be prepared without admixture of carbonate of potash, alum, etc., as follows:

Take of Cochineal, in powder,	℥ i.
Spirit of Wine,	℥ ii.
Water,	℥ vi.

Liq. Ammon. Fort., q.s., about viij. minims.

Mix the spirit and water, and in three ounces of the mixture, heated to near the boiling point in a flask, infuse the cochineal for fifteen minutes. Pour the infusion into another vessel, and repeat the process, with three ounces more of the mixed spirit and water; and a third time, with the remaining two ounces. Let the liquid stand till cold, when some fatty matter will rise to the surface; filter, adding spirit and water, up to eight fluid ounces. Then add liquor ammon. fort., q.s., to change the infusion to the desired tint.

Gastrodynia—Oxide of Manganese.—In cases of pain in the stomach following ingestion of the food, the black oxide of manganese is more efficacious in allaying the hyperæsthetic state of the mucous membrane than is even nitrate of bismuth. Manganese does not constipate the bowels. It has been tried in several hundred cases and the results were most satisfactory. It is also highly useful in pyrosis, generally removing first the watery discharge, and afterwards the pain in a short time. In certain irritable states of the stomach it is also of much service. In one remarkable case, in which a woman had been affected with vomiting for many months, it was very successful in quieting the stomach. The purified oxide of manganese may be given in doses of five grains to half a drachm. The salts of manganese are not so suitable for therapeutical purposes.

Asthma—Chloroform.—During the height of the asthmatic paroxysm chloroform is one of our best remedies. It acts by removing that which is the whole cause of the asphyxial stoppage, the bronchial spasm. It produces almost immediate relief in most cases, and in a few this relief is permanent after the insensibility has passed off; in most it is only co-existent with the insensibility. In some cases it is productive of harm, but these cases are very rare. In some cases it relieves the paroxysm without producing insensibility. No amount of asthmatic dyspnœa or asphyxia is any bar to its use. If given constantly, however, in large doses, for a long period, its use becomes a pernicious habit, and produces effects allied to those of chronic alcoholism.

Renal and Urinary Affections—Tincture of Perchloride of Iron.—The tincture of iron possesses most eminently the properties of an astringent, tonic, and styptic, coagulating blood or albumen with which it is brought into contact, and constringing the vessels and tissues to which it is applied. Hence arises its value in the albuminuria of Bright's disease, and in hemorrhage from the kidney, bladder, or urethra. We can only conclude, however, that it acts by its tonic influence on the system, for by analysis it may be proved that neither the iron nor the acid escapes by the urine.

The Internal Revenue Laws in Relation to Pharmacy.—The special commissioners appointed to investigate the working of the internal revenue laws in general, and more especially in relation to alcohol and alcoholic liquors, coffee, tobacco, etc., etc., have been industriously engaged in gathering testimony and other evidence. The committee appointed by the American Pharmaceutical Association at the last meeting, of which Dr. E. R. Squibb is chairman, have obtained a hearing, and have earnestly represented the views of the Association in reference to the sale of liquors, the stamp tax on proprietary articles, and especially in reference to the reduction of the tax on alcohol, as being greatly conducive to the interests of pharmaceutical and chemical manufacturing; and as probably, by giving less inducement to illicit distillation, and greater consumption in the arts, causing an equal, if not greater, revenue. What the final influence of the commission will effect on Congressional action, we cannot yet know; but we know that, on the main points, considerable harmony of opinion existed between the principal commissioner and three members of the committee, who consulted with him in regard to the more important changes needed.—*Journal of Pharmacy.*

JAMES R. NICHOLS & COMPANY,

MANUFACTURERS OF

STANDARD AND SPECIAL CHEMICALS,

No. 150 Congress Street, Boston.

(LABORATORY ESTABLISHED 1857.)

MANUFACTURERS OF ACIDS, ALKALIES, ETHERS, CHLOROFORM, PREPARATIONS OF GOLD, SILVER, TIN, ZINC, LEAD, IRON, BISMUTH, MERCURY, ETC., ETC. FINE CHEMICALS USED IN MEDICINE AND THE ARTS.

JAMES R. NICHOLS. CHARLES E. BILLINGS. ALBION R. CLAPP.

AMONG the large number of Chemical and Pharmaceutical substances manufactured by us, are several of a *special* character, or which are peculiar to our laboratory. We have upon our Price List, issued monthly, some remarks concerning these articles, which are given for the information of Druggists and Physicians who are constantly dispensing and prescribing them. We present the names of several, with the remarks appended.

ACID, CARBOLIC, SOLUTION.

Carbolic acid, in solution of proper strength for use by physicians, has been found very convenient and useful. This article, prepared by us, is well known and extensively used in all parts of the country.

ACID, CHROMIC.

In fine crimson crystals, much used for the destruction of warts and morbid growths. Used as a substitute for nitrate of silver, in ulcerations, erosions, etc.

CANTHARIDAL ACETIC VESICANT.

This article, originated by us, is well understood by physicians. It is the most prompt and convenient blistering liquid yet devised. The sale is rapidly increasing in all sections. The cork under the cap should never be thrown aside, but kept firmly in place, to prevent evaporation.

CANTHARIDAL ACETIC RUBEFACIENT.

This produces milder effects upon the skin, and is designed as a substitute for mustard and other irritants.

CERIUM, OXALATE.

Used for obstinate vomiting arising from pregnancy and other causes. Dose, from one to three grains, in sugar or water.

COD LIVER OIL.

In the production of this oil, we endeavor to excel in *purity*, *sweetness*, and *cleanliness*. A large proportion of the products of the cod-fishery on the New England coast is supplied to the trade through us, and the oil we furnish is well known for its superior excellence.

ETHER, SULPHURIC.

We have relinquished the manufacture of all inferior grades of ether. We now furnish our pure concentrated ether, for dentists' and surgeons' use, only in packages holding one pound.

ETHER SPIRITS NITROS.

This superior officinal nitre we furnish only in one-pound packages. It does not keep well in larger.

FOOD, NUTRITIVE.

Prof. Liebig, the distinguished chemist, first suggested this form of food, and used it in his family. It is highly nutritious, easily prepared, and generally acceptable to invalids and children. The best malt from Canada barley, and the freshest wheat, are used in its preparation. It forms a rather dark soup, owing to the malt in the solution, and it has a sweet taste, which also arises from the malt, and not from added sugar.

GLYCERINE, CHEM. PURE.

This glycerine is equal to any produced in this country or Europe. Put up in elegant wedge-shaped bottles of white glass.

IODOFORM.

This is a very extraordinary substance, in scales of a yellow color and pearly lustre. It illustrates the remarkable change produced in a body by slight chemical combinations. Twenty-nine parts in thirty of the compound is iodine.

INFUSUM OPII DEODORATA.

This is a new preparation of opium, prepared with the use of ether and water, by which the deleterious principles of opium are removed. It is intended to take the place of various elixirs and solutions, which are largely used. It is officinal in the new Pharmacopœia.

IRON CITRATE AND STRYCHNIA.

A combination first prepared by us in 1858. It is now esteemed by physicians in all parts of the country as a most valuable remedial agent. Our preparation is readily soluble in cold water, and contains *one per cent.* of strychnine, one grain to one hundred of citrate of iron. Dose, 3 to 6 grains.

IRON CITRATE AND QUININE.

We have for many years prepared this after the English method, which renders it very soluble. It is in beautiful scales of an emerald-green color. They should not be exposed to the light, as thereby their brilliancy and transparency are impaired; nor kept in damp places, because of its tendency to quick solution.

IRON, PROTOXIDE, SOLU.

This form of iron, originated by us, is well known in all parts of the country. Associated with bark, it forms the Elixir of Bark and Iron, which is receiving so great attention from physicians and invalids all over the United States and Canada. We furnish it only in standard bottles holding 16 oz.

PROPYLAMIN.

Prepared by us since 1850, and used extensively in cases of rheumatism. Put up in 1-2 and 1-4 oz. glass stoppered vials, which should always be securely closed. The chloride formerly prepared by us we do not now make, as physicians find it possesses little or no medicinal value.

SODA, BI-SULPHITE, LIQUOR.

This is a new remedy for which considerable inquiry has arisen. Used for yeasty vomiting, depraved or morbid secretions, and for the destruction of parasitic plants, etc. Will not keep in crystals.

SYRUP OF HYPOPHOSPHITES COMP. (LIME, SODA, POTASSA, IRON.)

The Syrups of Hypophosphite salts are the same as prepared by us for the past eight years. They contain but little sugar, and the salts used are *perfectly pure*. The syrups have become standard articles, and are extensively prescribed in all sections of the country.

SYRUP IODIDE OF LIME.

This is a new and elegant form in which to administer the iodide of lime. It is pleasant to the eye and taste, and of the highest efficacy as an alterative and tonic. It is very largely in demand.

FLUID EXTRACT SARSAPARILLA WITH IODIDE OF LIME.

A combination of sarsaparilla with iodide of lime has long been desired by the profession and invalids. It is put up in a form so as to supersede the numerous secret preparations of the kind, and is sold exclusively by many druggists as a popular and reliable preparation.

VALERIANATE AMMONIA ELIXIR.

This article, so long prepared by us, is too well known to need particular description. The preparation is approved of by all who have made trial of it.

S. CHISM, — Franklin Printing House, 134 Washington Street, Boston.

BOSTON JOURNAL

OF

CHEMISTRY AND PHARMACY.

VOLUME I. Boston, September 1, 1866. NUMBER II.

THE

Journal of Chemistry and Pharmacy

IS PUBLISHED BI-MONTHLY AT

150 Congress Street, Boston,

BY JAS. R. NICHOLS & CO.

TERMS, FIFTY CENTS PER ANNUM.

All letters and communications should be addressed "Office of Journal of Chemistry and Pharmacy," Boston, Mass.

Gun-Paper.

Mr. G. S. Melland, of Lime Street, London, who has distinguished himself among British makers of fire-arms, has recently invented a "gun-paper" to supersede the old gunpowder. The invention consists in impregnating paper with a composition formed of chlorate of potash, nine parts; nitrate of potash, four and a half; prussiate of potash, three and one-fourth; powdered charcoal, three and one-fourth; starch, one-twelfth part; chromate of potash, one-sixteenth part; and water, seventy-nine parts. These are mixed and boiled during one hour. The solution is then ready for use, and the paper passed in sheets through it. The saturated paper is now ready for manufacturing into the form of a cartridge, and is rolled into compact lengths of any required diameter. These rolls may also be made of required lengths, and cut up afterward to suit the charge. After rolling, the gun-paper is dried at 212 deg. Fahr., and has the appearance of a compact grayish mass. Experiments have been made with it, and it has been reported favorably of, as a perfect substitute for gunpowder, superseding gun-cotton and all other explosives. It is said to be safe alike in manufacture and in use. The paper is dried at a very low temperature. It may be freely handled without fear of explosion, which is not produced even by percussion. It is, in fact, only exploded by contact with fire, or at equivalent temperatures. In its action it is quick and powerful, having in this respect a decided advantage over gunpowder. Its use is unaccompanied by the greasy residuum always observable in gun-barrels that have been fired with gunpowder. Its explosion produces less smoke than from gunpowder; it is said to give less recoil, and it is less liable to deterioration from dampness. It is readily protected from all chance of damp by a solution of xylodin in acetic acid. The xylodin is prepared by acting on paper with nitric acid, one part thereof being dissolved in three parts of acetic acid of specific gravity of 1,040.

In experimenting with this new explosive substance, six rounds were first fired with cartridges containing fifteen grains of gunpowder, and a conical bullet, at fifteen yards range, which gave an average penetration of one and one-sixteenth into deal. Six rounds were then fired with ten grains of gun-paper and a conical bullet at same range, and gave an average penetration of one and three-eighths into deal. Here was thirty-three per cent. less of paper than powder, and greater penetration with paper. Six rounds followed, with an increased charge of fifteen grains of gun-paper and a conical bullet, at the same range, and at each shot the bullet passed through a three-inch deal. At nineteen yards range, twelve grains of the paper, fired from a pistol of fifty-four gage (forty-four-inch), sent a heavier bullet through a three-inch deal. A fouled revolver was preserved four days, but betrayed no symptoms of corrosion after using gun-paper. It is expected that gun-paper will be manufactured cheaper than gunpowder.—*London Artisan.*

Food and Health.

BY JAMES R. NICHOLS.

The high price of meats during the past four years, and the consequent substitution of cheaper articles of food by the laboring classes, has afforded excellent opportunity to observe the effects upon the health of a diet containing but little of the nitrogenous element.

The articles substituted for flesh have been from necessity the cheaper kinds of farinaceous food, such as flour bread, potatoes, with root vegetables, etc. Bread from fine flour has however formed the chief staple, and this has been consumed without butter, or any fatty substance in combination. In cities and large towns the forms of food have been narrowed down to a point, as regards variety and economy, never before reached, and but few of those possessed of ample pecuniary means have any conception of the sufferings of the poor in this regard.

The effects upon the mental and physical health have been clearly noticeable by those who have observed carefully. We should expect debility, decline of muscular strength, derangement of vital functions, mental weakness, loss of courage and moral force, and such has been the result. Irishmen naturally strong and full of pluck have been observed to weep, become homesick, and talk of getting back to "ould Ireland." Observing one of these in our employ, who was living at a cheap boarding-house, looking very dejected, we said to him, "Pat, what is the matter with you? are you ill; have you lost all your friends; what is the matter?" "An' faith I don't know," he replied; "it seems as if the last drap of strength had gone clean out of me." "Well, what do you get to eat?" "An' faith, 'pon my honor, and there I believe is the trouble. Never a bit of meat do I get, and no buther; it is all white bread and pratees, with sometimes a cabbage. Give us a little meat and a spoonful of milk with the bread, and I believe I could jump quite clean over the street." Poor fellow, he was starving, not for want of quantity of food, but for that kind which could alone sustain his nerves and muscles. He was subsisting upon starch, and no wonder the strength had gone "clean out of him."

Hundreds of men, women, and children, have suffered, and are suffering, from the want of food containing the nitrogenous or albuminous and phosphatic principles. They are suffering just as do infants when ignorant mothers undertake to "bring them up" upon arrow-root exclusively. There is a want of nutriment for the brain, the muscles, and the bones, in the kinds of food which they think they are forced to adopt, and a decline in all the vital processes takes place.

Serious illness often occurs from this cause, and the physician is called in to prescribe. If a discerning, sagacious man, he at once decides that the proper medicine for such patients is not found in his saddle-bags, but rather at the meat-market, or shop of the produce-dealer. But flesh is too costly to prescribe as an article of constant, daily use, and so are butter, eggs, milk, and other articles containing the requisite albuminous and mineral constituents. What shall he recommend as a diet, which will restore strength to the weak, and sustain after the recuperative process is completed? In that noble cereal, wheat, Infinite Wisdom has stored up all the chemical principles needed to sustain life and impart strength, and when the *whole grain*, after being finely ground, is made into sweet, light bread, it forms an article of food of superlative excellence. It is cheaper than fine flour, and is not, like that, deprived by sifting of its most important elements of nutrition. Let pure wheat bread be freely used by the poor and the rich, as a substitute for the starchy, watery, or stimulating forms of diet so generally adopted, and there would unquestionably result a much higher standard of general health. There is no act connected with the preparation of the different forms of human aliment, which is really so absurd and unnatural, as that of bolting wheat meal. It is thwarting the designs of the Almighty. He has in this grain so beautifully blended all organic and inorganic substances fitted to repair the waste of the body, that to separate them by artificial means seems almost presumptuous and wicked.

DR. RICHARDS, of London, has invented an instrument used for freezing any part of the body to insensibility to pain, by means of a spray of ether. This method of producing local anæsthesia promises to be of much service in surgical operations. For instance, the operation requisite to remove in-growing toe-nail is very painful; by freezing the toe, or parts around the nail, it can be removed entirely without suffering. The instrument of Dr. Richards is so simple, that with a phial, glass tube, and what can be bought at any rubber store, almost any physician can make one.

The instrument consists of a four-ounce bottle, having a small tube reaching close to the bottom, and surrounded outside of the bottle, where it is bent under an angle, by a somewhat wider tube, ending at about the same place with the narrow inner tube, into a small opening. This wider tube is connected with a short rubber tube, having two rubber balls at its end. In using the instrument, the bottle is filled partly with ether and the balls compressed in the hand. They, acting like a common rubber syringe, blow air into the bottle, while part of it passes through the wider tube mentioned. The air in the bottle forces a stream of ether through the narrow tube, which, on leaving the orifice, is mixed with the air, coming from the surrounding wider tube on the same spot, and is thus blown in a spray upon the part to be treated. The rapid evaporation of the ether, aided by the air current, freezes the parts within a few moments to perfect insensibility.

A BLACK INK, not corroding steel pens, and neutral, may be prepared by digesting in an open vessel forty-two ounces of coarsely powdered nutgalls, fifteen ounces of gum senegal, eighteen ounces of sulphate of iron (free from copper), three drachms of aqua ammonia, twenty-four ounces of alcohol, and eighteen quarts of distilled or rain water. Continue the digestion until the fluid has assumed a deep black color.

Deodorizing Infectious Emanations does not destroy the Virus or Contagious Principle.

One of the most important duties which the physician is called upon to perform, is to direct the employment of means whereby mephitic vapors, arising from impure sources, are rendered harmless or non-infectious. The usual agents employed are chlorine, ozone, and substances capable of exerting powerful oxidizing influence upon such bodies. Permanganate of potash, recently introduced, is perhaps to be regarded as one of the most powerful agents of this kind. Medical men and chemists have supposed that when a noxious vapor was *deodorized* it was destroyed, and all danger from infection removed.

It has been observed that malignant, contagious diseases have each a peculiar smell. Small-pox has been compared to a he-goat; that of measles to a fresh-plucked goose; scarlatina to cheese; typhus fever to ammonia. Many physicians are so sensitive as regards these odors that they can declare the nature of the disease immediately upon entering the patient's dwelling. Where the smell is most intense the poison is more operative, and it is important that measures should be taken to protect the attendants by neutralizing it. Hypochlorite of lime, solution chloride of soda, sulphate of iron, chloride of zinc, will in most cases destroy the offensive odor; but the recent important experiments of Mr. William Crooks, F.R.S., editor of the London *Chemical News*, tend to show that they have not the power to destroy the septic germs, and therefore, in their use, contact with floating virus is rendered more bearable, but there is no removal of danger. This is certainly a very important matter, and one that should be well understood by every physician.

The conclusions arrived at by Mr. Crooks correspond with those of Dr. De Ricci, Dr. Purdon, and others, as found in the article upon zymotic diseases, published in the last number of this journal. The nature of infection is defined as a seed or germ of an organism, either animal or vegetable, having power to grow and propagate its kind; or, in other words, it is a ferment, which, introduced into the system in the minutest quantity, instantly commences to reproduce itself to an indefinite extent.

The paper is a long one, and therefore we have room only for some of the more interesting paragraphs.

At first sight nothing appears more perfect than the action of a powerfully oxidizing disinfectant, like chlorine or ozone, upon noxious vapor and septic germs. In presence of an excess of either of these agents, all organic impurity is at once burnt up, and reduced to its simplest combinations; and could we always rely upon the presence of a sufficient amount of either of these bodies, no other purifier would be needed. But in practical work upon a farm these disinfectants were always very inadequate, except perhaps for half an hour or so during the day; at other times, the oxidizing agent has presented to it far more noxious material than it can by possibility conquer, and being governed in its combinations by definite laws of chemical affinity, the sulphureted and carbureted hydrogen, the nitrogen and phosphorus bases, etc., would all have to be burnt up before the oxidizing agent could touch the germs of infection; while the continued renewal of the gases of putrefaction would be perpetually shielding the infectious matter from destruction.

It is here that the great objection lies to disinfectants which act by oxidation. If we arrange in a series (as set forth in par. 12) the possible substances which may be met with in an infected shed, and gradually mix with them chlorine or ozonized air, we find that those vapors having strong and fetid odors, and which stand at the head of the list, are the first to go; while the actual virus of the disease — the organized particles which have no odor whatever — are the last to be attacked. But in using disinfectants of this class, the only test of efficiency which a workman would employ is the sense of smell, and I have on several occasions known it happen that a deodorized shed, to all outward appearances disinfected, was still in reality saturated with infection. It so happens that the stinking gases of decomposition are of little or no danger in the atmosphere, while the deadly virus cells of infectious diseases are inappreciable to the sense of smell. Mere deodorization is therefore no protection whatever.

The following experiment tends to illustrate, if not to prove this: Cheese mites were put into water mixed with strongly-smelling cheese and sulphureted hydrogen. Aqueous solution of chlorine was gradually dropped into the mixture from a burette. The smell of sulphureted hydrogen was the first to go, then some smell of cheese, but it required a considerable quantity of chlorine to kill the mites. Exactly the same experiment was now repeated, only leaving out the sulphureted hydrogen and cheese. The chlorine now had nothing to divert its energy from the cheese mites, which were consequently killed before one-fourth the quantity of chlorine used in the first instance had been added.

Again, oxidizing disinfectants possess little if any continuous action. What they attack is destroyed perfectly, but what they leave has no special resistance to decomposition conferred upon it. They remove the products of decomposition, but they do not take away the power of further putrefaction.

Oxidizing disinfectants produce their effect by actually destroying infecting substances. Antiseptics act simply by destroying their activity. The former act more energetically upon dead than living organic matter. Antiseptics attack first the opposite end of the scale, and destroy vitality; they exert little or no action on the foul smelling and comparatively harmless gases of decomposition, but they act with intense energy on the inodorous germs of infection which these gases may carry into the atmosphere along with them.

If, therefore, the theory which I started be correct; if the matter which conveys infection from one animal to another be of the nature of an organized germ; if it owes its tremendous power of destruction to the presence in it of vitality, then antiseptics are the only agents fitted to deal with this special case; for they leave almost untouched the crowd of simply odorous gases, and seek out and destroy the one thing to be feared.

We present some experiments illustrating the effects of carbolic acid in arresting and preventing putrefactive fermentation in flesh.

Some meat was hung up in the air till the odor of putrefaction was strong. It was then divided into two pieces: one was soaked for half an hour in chloride of lime solution, and was then washed and hung up again; the offensive smell had entirely disappeared. The other piece was soaked in a solution of carbolic acid containing one per cent. of the acid; it was then dried and hung up. The surface of the meat was whitened, its offensive odor was not removed, though it was masked by the carbolic acid. In two days' time the bad odor had quite gone, and was replaced by a pure but faint smell of carbolic acid. In a few weeks' time the pieces of meat were examined again. The one which had been deodorized with chloride of lime now smelt as offensively as it did at first, while the piece treated with carbolic acid had simply dried up, and had no offensive odor whatever. It was then hung up for another month and examined; no change had taken place.

A piece of fresh meat was put in a one-per-cent. aqueous solution of carbolic acid for one hour; it was then wrapped in paper and hung up in a sitting-room in which there was a fire almost daily; at the end of ten weeks it was examined. It had dried up to about one-fourth of its original size, but looked and smelt perfectly good and fresh, a very faint odor of carbolic acid being all that was perceptible. It was soaked for twenty-four hours in water, and then stewed with appropriate condiments and eaten; it was perfectly sweet, and scarcely distinguishable from fresh meat, except by possessing a very faint flavor of carbolic acid, not strong enough to be unpleasant.

These are important experiments. They point out in a striking manner the difference between mere deodorizers and antiseptics. Hitherto attention has been almost entirely confined to the deodorization of gases arising from putrescence. The effect has been combated, while the removal of the cause has received scarcely any attention. Chloride of lime, one of the strongest of the class of deodorizers, acts, as has been shown, only on the gases of existing putrefaction, but it has no influence over the future. Carbolic acid, on the other hand, has scarcely any action on fetid gases; but it attacks the cause which produces them, and, at the same time, puts the organic matter in such a state that it never re-acquires its tendency to putrefy.

Blistering in Acute Rheumatism.

[The following cases are related by Mr. E. Howard Moore, and exhibit "the rapidity, efficacy, and safety of the plan" of treating acute rheumatism by free blistering. They were treated at the Infirmary of the Bethnal Green Workhouse.]

Case 1.— W. H., admitted February 17. All joints affected, but chiefly the right hip, both knees, and right ankle. To these blisters (acetum lyttæ) were applied, which gave relief immediately the serum was evacuated. Next day the right shoulder and wrist were intensely painful and swollen, and were treated in the same way and with a similar result, which shows the necessity of blistering all joints simultaneously, whether affected much or little. Discharged cured, March 1, without any cardiac mischief.

Case 2.— W. L., admitted March 3, aged 19. Second attack. Rheumatic pains confined to the knees and ankles, but the fever in this case ran very high. Blisters applied to the affected joints, as in the other case, with an equally satisfactory result. Discharged cured, March 15, without any heart affection.

Case 3.— C. N., admitted March 21. Blisters were applied to right hip, both knees and both ankles, as in these joints only was pain felt. Much relief was afforded by the following day; but feeling some pain in right shoulder, he asked to have a blister applied to it. Discharged cured, April 3, without any heart affection.

Case 4.— J. L., admitted April 6. Blisters applied to right elbow, right wrist, and right ankle, and also over the heart's region, on account of a slight mitral regurgitant bruit. Discharged cured, May 1, without any heart affection.

Case 5.— J. B., admitted April 12. In this case the wrists only were affected. Blisters were applied, as in the other cases, above the seat of pain. Next day able to move the joints without much pain. Discharged cured, April 24.

Case 6.— S. J., aged 58, admitted April 28. Joints affected were right hip, right and left knee, and right ankle. To these blisters were applied. The fever in this case was well marked. Discharged cured, May 23, without any heart affection.

N. B.— In all these cases no medicine was given, except in case 4, when a morphia pill was ordered at night, and in case 6, a saline mixture as a placebo.— *Medical Times and Gazette.*

Citric Acid as an Application in Cancer.

BY CHARLES J. DENNY, ESQ., BIRMINGHAM.

The following case may be taken as a good example of the facts which I am desirous of laying before the profession:—

Mr. D., an old sailor, aged 70, consulted me in January last for an affection which caused intense pain along the whole side of the face, and great difficulty in mastication. His medical attendants had been treating it as a case of "tic." On examination, I found it to be a scirrhus of the tongue, caused most likely in the first instance by a carious tooth. In this diagnosis I was confirmed by Mr. Oliver Pemberton and Mr. Thomason, of this town, and more recently by Mr. Crompton. The disease had extended too much to think of removing it. In every other respect he appeared a strong, healthy man. Life was miserable to him, and all I could do was to palliate. Large doses of morphia, chloroform, chlorodyne, and conium were tried at intervals, with little benefit. He was sinking from bleeding and constant pain. A curious fact is that he could invariably tell some days before the bleeding began, as the tongue at those times felt swollen,

and the pain was more intense than usual; whereas after the bleeding there was little pain for some days. He showed me a paper one day in which citric acid was recommended as an application in cancer. I had no confidence in it; but at his urgent request I ordered him a mouth-wash, containing one drachm of citric acid to eight ounces of water. He came to me a few days after, and said he felt greatly relieved from its use. When at all suffering he applied it, and the pain disappeared like magic. I may say here that it must be used two days before much effect can be expected. He can now sleep well, and go about his business comfortably, which is that of letter-carrier for a large works. He takes no opiates, and firmly believes, as I do, that he has found out the means of "soothing the way to death."

The application may possibly prolong life, in so far as it relieves pain, and so prevents, at least in part, the break-up of the constitution consequent thereon. It will be seen that this treatment is applicable in many ways, internally and externally. I have tried it in two cases of cancer of the breast and one of cancer of the uterus, and with perfect success, so far as relieving pain goes.

I have purposely avoided any theoretical views on this treatment, which will, I hope, receive an impartial trial on a large scale, and be duly reported upon.—*Lancet.*

Use of Bromide of Potassium in the Sleeplessness of Functional Nervous Diseases.

BY DR. C. E. BROWN SEQUARD, F.R.S., ETC.

It is of the utmost importance to improve the sleep, which is generally so bad in patients attacked with a morbid increase of the reflex excitability. For this purpose an invaluable remedy has recently been discovered: it is the bromide of potassium. Excepting when pain is one of the causes preventing sleep (in which case opium, aconite, and belladonna should be employed together), I have found that this remedy has a most wonderful power to produce a quiet and refreshing sleep, without any drawback that I am aware of. I usually give to adults a dose of thirty grains of that salt a quarter of an hour before the last meal, and a second dose of from thirty to fifty grains at bed-time. In cases in which, without any nervous complaint, there is sleeplessness owing to some cause of cerebral excitement, as well as in all neuroses, excepting hydrophobia, tetanus, very severe cases of delirium tremens, and some forms of insanity, sleep is almost always induced by that remedy. In some cases I have found it necessary to increase the dose of the bromide, and to give also one grain or one grain and a half of codeine an hour before bed-time. In those affections in which the bromide of potassium is not powerful enough as a sleep-inducing agent, a warm bath of four, five, or six hours' duration is often successful.—*Lancet.*

Iodine in the Treatment of Uterine Leucorrhœa.

The treatment of leucorrhœa is a constant subject of difficulty and vexation to the medical practitioner. Although the use of various astringents will often effect improvement, yet this is seldom lasting, and the recurrence of the symptoms is a continual source of annoyance. We have lately observed a plan which is being pursued by Dr. Murray at the Great Northern Hospital, and which promises to be a very useful addition to our means of treatment in this very troublesome condition. Dr. Murray first ascertains, by means of the speculum, that the discharge proceeds from within the uterus. He then introduces a small short-haired brush (much like that used for washing phials) by a screw-like motion, so that the thick, phlegm-like layer on the uterine wall is swept off with every turn of the brush. When this reaches the fundus he steadily withdraws it, charged as it is with the mucous deposit. Its place is then taken by a gum-elastic catheter, with several apertures, through which is injected a lotion consisting of one part of the compound tincture of iodine to two parts of water. The uterine wall is thoroughly washed with this. The muscular contraction which follows this injection is remarkable, the tube being tightly grasped, so that its re-introduction at the time is extremely difficult. Dr. Murray has reason, after an experience of many cases treated by this plan, to feel highly satisfied with its success.—*Lancet.*

Carbolic Acid.

ITS PRACTICAL AND HYGIENIC APPLICATIONS.

So many inquiries have reached us regarding the uses and forms of employment of this new and most important agent, that we present a summary of published facts and statements relating to it.

Ants which infest plants or trees may be at once destroyed by watering with a solution of one per cent. of carbolic acid, and this destroys also the eggs. Bugs are destroyed by the five per cent. solution, which leaves no mark of its action on the furniture. Worms and larvæ in wood are killed by the same. All kinds of insects are kept at bay from dead animals and vegetables, which it is desired to preserve, and if used in granaries it would save the loss of twenty to twenty-five per cent., which is now consumed by insects. In short, by the use of such an agent for the destruction of parasitic animals and plants in agriculture, and the storage of food, a notable addition to the food of man may be made.

The scope of its utility in the field of hygiene is so wide that we can here only notice a few of the most prominent instances. The putrefaction of organic matters in sewers or manufactories is well known to be the cause of insalubrity, which is now receiving so much attention; but the whole of the disinfectants now most in vogue have many drawbacks. For example, the chloride of lime, sulphate of iron, charcoal, powders prepared with coal tar, dirty or chemically alter the objects they are put in contact with. Others, like chlorine, free or combined with potash or soda, iodine, mineral and vegetable acids, can only be employed in few cases, as they destroy the useful substances they should protect. Further, some only act on the putrid gases, but not on the fermentation, or injure the workmen, or are too dear. The carbolic acid, on the other hand, is cheap, and does not dirty or act in any way on the tissues or apparatus with which it is placed in contact. Further, when it has done its part it flies off on exposure of the objects to the air, and leaves nothing but the good it has done. Also it has no deleterious action on the workmen, but, on the contrary, preserves them from many diseases. It likewise acts differently from the disinfectants most in use. Charcoal absorbs the putrid gases. Chlorine decomposes the hydrosulphuret of ammonia, throws down sulphur, and combines with the ammonia. The acids act by depriving these gases of their bases. But the carbolic acid exercises no action on the putrid gases, but it acts on the living germs carried along by those gases, and by killing them stops putrefaction. It therefore strikes at the cause and not the effect, like other disinfectants. The gases disengaged during putrefaction are chiefly ammonia, sulphuretted hydrogen, carbonic, acetic, butyric, and valerianic acids; besides, at times, azote, deutoxyde of carbon, and hydruret of methyle. Very few of the ordinary disinfectants can destroy all these, especially at common temperatures; their action, therefore, leaves much to be desired. Even charcoal, which absorbs them all, when once saturated is useless, because it does not stop the fermentation which reproduces them. Therefore the carbolic acid, which stops fermentation, is superior to them all. The following are a few of its uses:

It may be used for preserving fresh meat by what is similar to smoking; also to prevent the putrefaction of corpses before interment, by sprinkling the corpse with saturated carbolicised water and soaking the cloths with it. In slaughter-houses and knackers' yards it prevents all foul smells. Flies will not settle on flesh impregnated with the acid, and thus a source of danger from their propagating the glanders is cut off.

Tan-yards, manufactories of glue, leather, parchment, tallow, and other places where dead animal matters are worked in, may be rendered free from smell and wholesome by the use of carbolic acid. Urine and sewage may have the putrefaction arrested and foul smells prevented by adding carbolic acid, which afterwards evaporates, and allows these matters when spread on the land to be most powerful manures. Fæcal matters are disinfected in a few moments by water containing one to two thousandths of carbolic acid, which will thus be of great use in the sick-room. In pig-styes, stables, pigeon-houses, and collections of stagnant water, it will be found of great utility. For purifying drinking water from putrefying organic matters, it is quite effectual, though the quantity necessary, viz., six drops of carbolic to the quart, gives a smoky taste. This may be of great service in travelling and in campaigns, as bad water is the source of so much disease, and carbolic acid is so portable and cheap.

Vaccine matter mixed with equal parts of carbolic acid produces no result when inoculated. Touching the puncture with carbolic acid immediately after inoculation with pure matter in an infant prevents the formation of the pustule. Hitherto it has been found that cauterization has not prevented the development of the disease, and M. Renault inoculated thirteen horses with glanders, and applied the actual cautery to the spot at different times varying from one hour to four days. All these horses took the glanders and died of it. Also twenty-two sheep were inoculated with the virus of the rot (clavelee) and the spot deeply cauterized with the red-hot iron, at intervals of from five to thirty minutes. All the sheep took the disease. Dr. Clere has also failed to stop the effects of the vaccine by cauterizing with caustic potash within five minutes. The carbolic acid appears, therefore, to have a power of destroying virus superior to the actual cautery and caustic potash. Two cases are reported of cure of glanders by the external and internal use of carbolic-acid preparations.

When a thin layer of the pure acid is painted on the skin, a pretty severe smarting is felt for about an hour. The epidermis wrinkles, and a white coating spreads over the part touched, and gradually disappears, being succeeded by a congestion which lasts twenty days. This offers all the characters of inflammation, but on tearing the raised epidermis no serosity flows out. The epidermis gradually exfoliates, leaving a brown stain for a long time. The whole exactly resembles a burn in the second degree, but which does not go on to suppuration. The mixture of carbolic acid with equal parts of alcohol acts similarly, though somewhat weaker. But this is a more convenient form as a rubefacient, owing to the crystalline nature of pure carbolic acid, while this mixture is liquid. It also causes less smarting and does not leave the above brown stain on the skin. The mixture with glycerine, fixed oils and ether quite destroys the rubefacient action. This must be remembered in prescribing, as no doubt combination takes place and impairs its properties, for olive oil with five per cent. of carbolic acid had no power of preventing putrefaction. Acetic acid in equal parts increases the painful action on the skin, as might be expected.

Application of the carbolic acid on the mucous membrane produces smarting, cornification of the epithelium, and milky coloration. The smarting does not last so long, doubtless owing to the secretion carrying off the acid. When inhaled, produced no particular effect on mice. Also thirty grammes of carbolic acid were mixed through a handful of tow and placed in a horse's nose-bag, and the animal exposed to the sun's heat. After thus breathing the vapor for an hour and a half, the horse seemed to experience no inconvenience, and remained perfectly well. Also the workmen are not incommoded by the vapor during the making of carbolic acid.

Locally it is a caustic irritant, and combines with albumen. Upon the infusoria and microphites and insects it acts as a violent and rapid poison, therefore it is precisely such an agent as we require for an antiseptic and antiparasitic.

We can supply the pure carbolic acid in white crystals or liquid (crystals in winter, liquid in summer), and also in saturated aqueous solution. The *solution* is put up in pound packages, and is very convenient for all the purposes for which carbolic acid is used. Full directions for its use for all purposes accompany the packages. This is one of the most important new agents which advancing chemistry has developed.

VARNISH FOR PAINTINGS.—Take mastic six ounces, pure turpentine one-half ounce, camphor two drachms, spirits of turpentine nineteen ounces; add first the camphor to the turpentine; the mixture is made in a water bath; when the solution is effected, add the mastic and the spirits of turpentine near the end of the operation; filter through a cotton cloth.

Journal of Chemistry and Pharmacy.

BOSTON, SEPTEMBER 1, 1866.

PARTICULAR NOTICE.

WILL OUR PATRONS WHO RECEIVE THIS, THE SECOND NUMBER OF THE JOURNAL, PLEASE NOTIFY US BY MAIL OF ITS RECEPTION, THAT WE MAY CORRECT OUR LIST, AND PREVENT OVERSIGHTS AND MISTAKES IN THE FUTURE. THIS REQUEST WE HOPE NO ONE WILL FAIL TO COMPLY WITH, WHO RECEIVES THIS NUMBER.

The Journal.

We confess to a feeling of gratification at the success of the Journal. The large number of letters of commendation received from all parts of the country, from physicians and druggists, were certainly unexpected. We have no inclination to disguise the fact, that one object in establishing this Journal is to call attention to our chemical and pharmaceutical products. It is not, however, our only object. We believed that there was need of a journal differing somewhat from any published; one that would present such new and important facts in chemistry, pharmacy, and medicine, as must be of interest to physicians and druggists.

At the present time great progress is making in chemical and pharmaceutical science, and it is important that there should be as prompt and general diffusion of this knowledge among those interested as possible. We shall, in the conduct of the Journal, endeavor to deserve the high commendations bestowed upon it.

☞ We have to thank many of our medical friends for their kindness in sending to us orders for remedial agents. We have endeavored, so far as we were able, to fill these orders, but we can do so only at considerable business disadvantage. Our laboratory and store arrangements are designed for the delivery of goods only in packages of larger amount than most physicians care to purchase. If physicians who wish to use our agents will direct the druggists with whom they deal to procure them, we think the cost will not be enhanced; and if they will *carefully examine* the articles dispensed as ours, to see if they are properly labelled and stamped with our seal, the chances of deception will not be great.

Nitrous Oxide.

There is hardly room for doubt that the nitrous oxide gas is a safe and valuable anæsthetic. If called upon to choose the agent to produce insensibility in a minor surgical operation in our own case, we should select the nitrous oxide. It is pleasant, clean, and the return to sensibility attended with no disagreeable feelings. The gas must be pure, uncontaminated by carbonic acid, or other deleterious agent. If it is breathed from a common gas-bag with an ordinary pipe, the expiration into the bag of carbonic acid by the patient soon contaminates the entire contents. The pipe should be furnished with a valve, so that the expired breath shall pass to the air without, and not into the bag or vessel. A simple arrangement will effect this.

☞ It frequently happens that pharmaceutical and chemical articles which are new, and not well understood by druggists, are rejected because of some peculiarity which they presume does not belong to them. For instance, carbolic acid, which in cold weather is in the form of dry snow-white crystals, is during the summer months despoiled of its beauty, and becomes almost or quite a liquid. Druggists, not knowing that this is a physical change inseparable from the pure acid, return it as impure. No chemical change is effected in it, and its medicinal character is the same summer and winter, in crystals or liquid.

There are quite a number of crystalline salts and other substances which in their pure state are quite different in physical appearance from the impure or commercial articles, and it is no unusual occurrence to have fault found with them on that account. Dealers, having been accustomed to the impure, do not understand what the appearance of that of the highest integrity should be. We make these remarks by way of explanation, and trust they will be understood.

The Atlantic Cable.

We predicted in our last number the entire success of the third attempt to lay the Atlantic Cable. This prediction has been verified, and we are in perfect telegraphic communication with Europe at the present moment. What a wonderful triumph of science is this! Man speaking with man through the vast depths of the ocean; intelligence transmitted through a frail wire, resting in the dark abysses of the Atlantic. Over rocks, crags, mountain peaks, across vast plains, through mud, sand, cretaceous deposits, slime, and sea-weed, the electrical impulse is driven. It must obey; it cannot leave the track, so long as the harness holds.

What a vast amount of travel is accomplished in transmitting a single word. The signature to the queen's message, Victoria, if Morse's instrument was used, would require the electricity to travel more than *seventy thousand* miles, in going and returning. This splendid achievement of modern telegraphic science has led us to overhaul a pile of rusty wheels, magnets, and wires, which have been stored in an obscure corner of our laboratory for nearly a quarter of a century, the *debris* resulting from our first attempt at constructing telegraphic apparatus. We *did succeed* with these imperfect implements in transmitting signals years ago, before a wire radiated from this "hub of the universe." Every step in the progress of telegraphy has been watched with intense interest, from the earliest dawn of the idea to the present time, when we are permitted to behold the last and greatest triumph, the Atlantic Cable.

Sulphurous Acid Gas.

A couple of pamphlets have been sent to the Department of State at Washington, from Scotland, written by a Dr. James Dewor, in which sulphurous acid gas is recommended as a disinfectant for popular use. Notices of the contents and recommendations of these pamphlets have appeared in the newspapers, and we fear many persons will be induced to experiment with this most dangerous agent. There is no gas so suffocating and destructive to animal and vegetable life as the sulphurous acid, and operative chemists guard more carefully against its escape in the laboratory, in preparing the aqueous solutions and alkaline sulphites, than almost any other substance.

Our gardener, in our absence the past winter, having read in some newspaper that it would destroy the green aphis upon plants, filled the greenhouse with the gas, and he not only destroyed the insects, but all the valuable plants, and nearly lost his own life. Whoever undertakes to "fumigate" their buildings by burning sulphur according to the recommendations of these publications, will perform a very dangerous experiment, and it is our duty to warn our readers against it.

Sulphurous acid is undoubtedly a powerful disinfectant, and in some hands might be used with great efficiency; but we do not believe that any directions or cautions can be given in regard to its employment which will render it safe for general use by "farmers," "gardeners," "stablers," etc.

Questions and Answers.

You state in the Journal that it is published *bi-monthly;* in accordance with this, ought it not to be published *twice* a month, instead of once in two months? P.

As quite a number of journals issued once in two months call them bi-monthly, we supposed the form of statement had a well-understood meaning. The "American Journal of Pharmacy" announces upon the cover that it is issued bi-monthly," meaning by that once in two months. We presume but few fail to so understand it. Ultimately we intend to make the Journal a monthly, or perhaps semi-monthly publication.

How can nitro-glycerine be safely kept for experimental purposes in small quantities? S. M., Iowa.

It may be kept in the form of tincture, dissolving it in strong alcohol, one part to eight of alcohol. When wanted for use, the addition of water precipitates the nitro-glycerine, and it may be secured for use by decanting the water.

Will you please inform me what "Chimogene" is? DRUGS.

Chimogene is the name given to a highly volatile substance discovered by Prof. Vanderweyde, which he recommends as an anæsthetic agent. The meaning of the term is "cold-generator." It has not been used in this country.

As you have had much experience in practical chemistry, may I be permitted to inquire if the use of water can be economically employed in stoves, or other contrivances for heating, whereby increase of heat is obtained? CALORIC.

We answer, *no.* This idea is a fallacy which has long occupied the public mind, and ought to be dispelled. The notion of decomposing water, separating it into its gaseous constituents, by the combustion of coal in stoves, and then burning the gases, is absurd. The well understood principle of the correlation of forces settles the point, and any attempts of the kind, with the view of obtaining economical results, will be attended with failure.

What is probably the correct chemical explanation of the reactions which take place in the production of *nitro-glycerine?* CHEMIST.

The most convenient way of answering this inquiry is by the use of chemical symbols, and as our correspondent signs himself chemist, he will probably understand them. It is supposed that the nitric acid $3NO^5$ splits into $3NO^4$ and O^3, which latter combines with 3H from the glycerine $= C^6H^8O^6$ to 3HO, while the $3NO^4$ take the place of 3H in the glycerine, and produce the compound nitro-glycerine $C^6H^5(NO^4)O^6$. This probably is the correct view, although there is some slight difference of opinion among chemists. We would remark in this connection that it is impossible to conceive of any explosive agent more terrible than this. In some experiments in our laboratory the disruptive force of nitro-glycerine has been shown to be very great. The noise accompanying the explosion of even minute quantities is deafening. In one instance, the concussion resulting from exploding about three drops, by striking with a hammer, was so extreme as to produce deafness in one ear, which after two weeks has not been wholly removed.

Carbolate of Lime.

Carbolic acid unites with lime, forming a carbolate, in which form it is well adapted for use as a cheap disinfectant and deodorizer. The crystallized acid and solution are prepared with great purity for medicinal and surgical uses, and therefore they are quite expensive. They may be used for disinfecting sick-rooms and night vessels, for the destruction of parasites and insects on plants, &c., but for cleansing stables, barn-yards, cess-pools, and for destroying insects in orchards, &c., the carbolate of lime is the article needed.

We have made arrangements for the extensive manufacture of carbolate of lime, believing it to be the most valuable of all known disinfectants. Those who have read the articles upon carbolic acid published in the Journal will clearly understand its nature and value. The cost to the consumer is not greater than chloride of lime, so extensively used, and as a prompt and certain disinfectant it is far more valuable. The odor is not unpleasant to most people, resembling that of coal tar or kreosote. We put it in packages of 10, 20, 50, and 100 pounds, so as to make it convenient for druggists and consumers. The ten-pound packages cost $1.25 each, the larger ones less in proportion to quantity.

A Cheap Furnace for Chemical Experiments.

A correspondent, who is an amateur chemist, sends a drawing and description of a cheap furnace, which he says he has used successfully for two years. He takes a piece of eight-inch stove funnel, twelve or fourteen inches high, and furnished with a cap at the top, which can be removed at pleasure. At the bottom a small hole is cut in the side to receive the pipe from a blower, and the whole funnel is lined inside with pipe clay mixed with sand.

Three inches from the bottom the lining is increased in thickness and receives some bits of wire, which form a grate. The blower is eight inches diameter, and three wide, having four fans made of sheet iron, tin, or even pasteboard, as is also its case, and is driven by a small pulley belting from a larger one designed to be turned by hand. The whole arrangement can be secured to a board, that portion under the furnace being protected by sheet-iron.

In such a furnace our correspondent says he has melted cast-iron and manganese in a few minutes. He prefers coke to coal, as giving a more intense heat. His suggestions appear to be valuable to amateurs who do not wish to incur the expense of a complete apparatus. — *Scientific American.*

CONSTIPATION. — *Atropia.* — Atropia, when it has been taken internally for a few days, produces slight relaxation of the bowels, and if constipation existed it is removed. The stools, however, are but little altered in character, and the intestinal secretion but slightly increased. This peculiar action of atropia arises from its depriving the mucous membrane of the bowel of its mucous covering, whereby the fæces more readily excite muscular action. The action of atropia differs from that of common purgatives in that its relaxing power is not followed by a disposition to constipation. In cases of simple constipation the following plan of treatment is the best: ℞. Magnesiæ sulphatis ʒj.; acidi sulphurici aromat. drops x.; tinct. aurantii ʒj.; aquæ ad ℥j. M. Let the above draught be given the first thing in the morning and last thing at night, on an empty stomach, and let one-sixtieth of a grain of atropia be added to the draught at bedtime.

TO WASH CALICO WITHOUT FADING. — Infuse three gills of salt in four quarts of water; put the calico in while hot, and leave it till cold, and in this way the colors are rendered permanent, and will not fade by subsequent washing. So says a lady who has frequently made the experiment.

The article upon Zymotic Diseases in our last number awakened so much attention and interest, that we are induced to present the following upon fevers, by Dr. Jones. It is well worthy of careful perusal, as it presents some new ideas regarding the cause and nature of disease.

Fevers.

BY DR. H. BENCE JONES, F.R.S.

Of all the modified peroxidations that can occur in the body, small-pox is the most definite, because the poison can be got apart, and the quantity necessary for producing the action can be fixed, and through the most glorious discovery of vaccination it can be set in action whenever we please. We can almost see it passing from the cellular tissue into the blood, and from the blood into every particle of every texture, rendering it incapable of undergoing the same action again.

Let us look a little closer at this action of small-pox poison. If the minutest particle of substance, a little dried albuminoid substance, in a peculiar chemical state of action, on a lancet, or in the dust of the air, is put into the cellular tissue or is inhaled into the lungs, it passes on to the blood, and through it into every texture. In a few days the chemical actions of oxidation and nutrition throughout the body are altered, and the particle of matter has reproduced itself immeasurably. The violently increased chemical action, the peroxidation, is shown by the increased heat of the body, the violent fever. The altered nutrition is evident not only in the eruption of pustules in the cellular tissue under the skin, but in the altered condition of the blood and in all the textures of the body; each particle of substance being rendered incapable of undergoing the same process again, and by assimilation every future particle that takes the place of every modified particle is also generally incapable of being modified again.

Throughout the course of the general peroxidation, and more especially at the end of the fermentation, local peroxidations often come on in any part of the body. Inflammations of the eyes, the ears, the mucous membranes, the joints, the serous membranes, the parenchymatous tissues, anywhere an unmodified peroxidation is ready to begin, and this easily gives rise to suppuration or causes obstructions which the feeble circulation cannot overcome.

The most striking facts concerning this small-pox ferment are, first, the very small quantity of substance that produces so much effect; secondly, the immeasurable increase of the poison in the body, each pustule having the same property as the original ferment; thirdly, the period of incubation during which the poison must at first slowly increase in every texture, and there give rise to the modified peroxidation and altered nutrition which constitute the attack.

The poison of scarlet fever, of measles, and of typhus, though less tangible, are not less substantial than the small-pox ferment. Like it, they can most probably be dried and carried from place to place, and pass into the mouth with the dust which we each moment inhale or swallow. In chemical composition scarlet fever, measles, and typhus ferments most probably resemble albumen in complexity, and, like albumen, they may be altered in composition and action by heat, alcohol, arsenic, tar acids, and many metallic salts. As soon as they reach any spot where they can oxidize, they set up an oxidation and reproduction in each contiguous particle of albuminous substance. From the cellular tissue, the air passages, or the stomach or bowels, the contact action spreads into the blood, and there it multiplies, whilst it is carried into all the capillaries, and through them into every texture of the body; then the increased oxidation and formation of ferment becomes most violent, and fever to a greater or less degree is present. Long after the strongest action is reached, a slower action continues, and at any time or in any part or texture of the body, whilst the specific chemistry is going on, an ordinary local peroxidation may be lit up, and a more or less acute inflammation may be added to or follow the fever which the ferment has produced.

During the height of the fermentation in typhus fever, the heat may rise to 5, 6, or even 10° Fah. above the ordinary temperature; and when the fermentation is ended, the albuminous textures of the body are so changed that they are incapable of going through the same process again. Between these two results there are innumerable other products of chemical change, varying with the kind and degree of fermentation. In typhus fever it is said that urea is increased and carbonic acid diminished. To these and a multitude of other chemical questions regarding fermentation chemistry will give definite answers; but of all questions, one of the most difficult to answer and yet one of the most important, is the amount of oxygen that is consumed in the different kinds and degrees of peroxidation which can take place within us.

In each organ, according to the intensity of the action set up by the ferment, altered functions may arise, and these may be still more altered when an ordinary peroxidation at the same time takes place. Thus the brain, heart, lungs, kidneys, liver, or any texture composing these organs, may show by more or less wrong mechanical results the effect of the ordinary or modified peroxidation; and the effects of the fever and of the inflammation may be so mixed that neither during life nor after death may any accurate separation be possible.

Closely related in chemical composition to these violent ferments are the less active ferments of ague and typhoid fever. There is so little difference in the chemical composition of vegetable and animal substances that the distinction between animal and vegetable poisons is no longer possible. Vegetable albuminous matter undergoing change may produce almost, if not quite, exactly the same poison as animal albuminous matter. Hence, probably, the resemblance between ague poison and the typhoid fever poison, and the possibility that sometimes one and sometimes the other of these poisons may be formed from the same changing matter under different circumstances.

Ague ferment is probably a highly complex nitrogenous substance, capable of being dried and carried by the wind far from the place where it was produced. It enters by the mouth with the dust, and, like animal or vegetable alkaloids, it passes from the blood into every texture of the body, and acts on each much or little, according to its chemical properties. Probably it acts most strongly on the nerves that regulate oxidation, causing for a time contraction of the arterial vessels, and consequent suboxidation everywhere. The increased obstruction of the small arteries reacts on the tension of the blood, and this produces increased contraction of the heart, which continues to increase until the obstruction yields, and a state of peroxidation is set up, by which the poison is partially destroyed. During the remission, probably the poison is reproduced until sufficient, in from one day to three days, is formed to go through the same action again.

This theory of ague admits of a reasonable explanation of the action of quinine and arsenic in stopping the paroxysms of the complaint. On the ague poison itself quinine and arsenic may have no action, but they pass into every texture from the blood, and combining with the nervous substance on which the ague poison acts, they form a compound on which the ague poison is incapable of producing an effect before it is oxidized and destroyed.

The ague poison, unlike the small-pox or typhus fever ferment, instead of protecting the body by making it incapable of undergoing the same action again, makes the nerves more ready, on the slightest renewal of the poison, to undergo the same action again; so that it has been said that the ague poison may lie dormant for years. It is far more probable that a much smaller quantity of the poison can produce the return of the symptoms than that the original ferment should retain its properties for months, or even for years, after its first action had passed by. In this respect, and in some others, the action of ague poison proves that it is a very peculiar ferment, and hence, though I have placed it near to the typhoid ferment because of its origin, I must shortly point out to you the different effect which the true typhoid ferment produces.

The typhoid ferment is probably formed out of vegetable or animal albuminous substance. In sewers, in drains, in ditches, possibly even in the drains of the human body, a substance may be formed which is not volatile in itself, but by foul gases or currents of air can be carried into the mouth, and in some period between a few hours and fourteen days it sets up a modified peroxidation.

More slowly absorbed and less rapidly reproduced and changed than typhus ferment, it passes into the blood, and from it into each texture; whilst some of the poison has a local action on the glands of the small intestine, and produces increased action, effusion, obstruction, and retrograde action, causing ulceration, sloughing, and even perforation, by which mechanically the contents of the bowel may escape and an uncontrollable simple peroxidation may be set up. The poison that has passed into the tissues acts on each organ more slowly than the typhus poison; still, like it everywhere, it gives rise to altered functions, and everywhere local peroxidations are ready to occur; bronchitis, pneumonia, peritonitis, tubular nephritis, cystitis — any of these and many other inflammations may be set up at any time during the course of the fever. Probably the substances produced by the increased chemical action in typhus and typhoid fever will be found to be very similar. There may be the same amount of heat, the same excess of urea, the same excess of antecedent substances from which the urea is formed; possibly the same consumption of oxygen when the same temperature in each fever occurs; but in the properties of the ferment formed in the body a distinct difference of diffusibility must exist, the typhus poison passing with greater ease into neighboring bodies; whilst the typhoid poison rarely, if ever, is communicated by infection.

Mechanical Disorders that arise out of the Chemical Errors in Fevers.— In all fevers the loss of mechanical power is quite as remarkable as the increase of chemical action. The chief amount of energy liberated by the action of oxygen in the body seems expended in the production of heat, so that far less than the ordinary amount of power remains to be employed in the production of mechanical motion. The muscles may be considered as machines for the conversion of chemical force into mechanical motion. How this is done cannot be explained in the present state of our knowledge of the mechanical, chemical, or electrical actions in the muscle; but that the muscular force arises from some equivalent force, and sooner or later must come from the chemical force in oxygen, hydrogen, and carbon, opens an immense field for investigation, and is easier of belief than that force should be each moment created and destroyed. The amount of sugar and fat present in any muscle would soon be used up if in the working of the muscle itself fresh fuel was not produced. The action of oxygen on the syntonin in the muscle may be direct, and may give rise to the force required; but it is more probable that the syntonin splits into substances of two classes, one ending in urea, which is incapable almost of combustion, the other in inosit, which would immediately give water and carbonic acid.

In fever the poisonous ferment in the muscle probably determines a different chemical action from that which takes place in the muscle in health. The increased heat and increased urea mark the increased action, but loss of motor-power in the muscles shows that the conversion of chemical into mechanical force does not take place.

This mechanical disorder becomes by its action on the muscles of respiration or circulation the source of complications and dangers in fever to which I must shortly allude. Gradually in the course of fevers the sounds of the heart may be found to become more and more feeble, and the respiration, without any wrong in the lung, becomes shallow and weak from the diminished power in the muscular tissue. The diminished tension in the arteries has a direct effect upon the circulation through the capillaries, and the motion in the veins is more or less stopped; hence congestion of blood in the venous system occurs, hemorrhages, effusions, and coagulations in the veins may take place anywhere. The imperfect action of the muscles of respiration produces the same mechanical effects in the circulation through the lungs; imperfect oxygenation takes place in the lungs from the stoppage of blood in the pulmonary veins; without any inflammation, œdema of the lungs, hypostatic consolidation, may occur. The circulation through the lungs is so feeble that even the force of gravity acting on the blood in the lungs cannot be counteracted, and accumulation takes place in the most dependent parts.

The muscles of the bladder are also so weakened that the urine accumulates, and frequently external muscular pressure is required, after the catheter has been passed, to cause the urine to flow.

In another large class of zymotic diseases the qualitative and quantitative errors of oxidation are scarcely detectable, whilst the qualitative and quantitative errors of nutrition chiefly mark the action of the poison.

Of these diseases true syphilis may be taken as the type.

It can scarcely now be doubted that the actions of two poisons have been included under the term syphilis. The first, like impetigo, is capable of being communicated, and often repeated, because it exists only locally, or passes up to the nearest lymphatic glands; whilst in the true syphilis the poison from the local sore enters the blood and passes from it into each texture, where it multiplies and produces changes of nutrition, and, partly unchanged and partly changed in composition, passes out perhaps in each secretion.

This true syphilitic ferment resembles very closely the small-pox ferment in the universal diffusion of the poison, and in the consequent protection it gives from another attack by rendering a second similar change in each texture impossible. The protective power of the alteration is to a slighter degree extended to the progeny through the germ and spermatozoon; so that a race partly protected by inheritance may suffer less from these diseases than a purer race, whose textures are free to undergo the full change which constitutes the disease. Both poisons give rise to increased cell growths, effusions, oxidations, congestions, and ulcerations; and these may take place in any part of the body, for the poison exists everywhere.

True syphilis differs, however, altogether from small-pox in its definiteness of course as to time. Syphilis produces no fever to terminate the fermentation in a definite period, and it may consequently remain active or dormant in the textures for years.

It is vain now to ask what circumstances at the end of the fifteenth century produced the first modified albuminoid matter which gave rise to the first true syphilitic poison. In cancer, which bears a distant resemblance to syphilis, although the spontaneous generation of the first cancer cell is daily occurring in some predisposed texture, yet we are as yet quite unable to say what produces the first modified particle of matter which multiplies and communicates its composition to adjacent predisposed textures by contact, and is carried by lymphatics and blood-vessels to every part of the body, and affects the nutrition of each part with which it comes in contact, provided the textures are in a condition to propagate the cancer cells.

Another instance of spontaneous generation of a poisonous ferment is presented to us in rabies; and with this poison also, unless a peculiar condition of system exists, the ferment when inserted has no action; and here also our knowledge is at present unable to say what circumstances determine the formation of the first particle of poisonous saliva; except by its effects, the peculiar change in the albuminoid matter of the saliva in the present state of chemical knowledge could not be recognized.—*Medical Times and Gazette.*

Liquor Bismuthi.

Take of Subcarbonate of bismuth a troy-ounce;
Citric acid (in powder) 420 grains;
Nitric acid, sp. gr. 1.42, a troy-ounce and a half;
Pure caustic potassa 450 grains;
Distilled water,
Alcohol, each, a sufficient quantity.

Dissolve, by gradual addition, the subcarbonate of bismuth in the nitric acid, and, when effervescence has ceased, dilute the solution with a fluid-ounce and a half of distilled water; now add the citric acid, and stir until it is dissolved. In eight fluid-ounces of distilled water dissolve the caustic potassa, and add this gradually to the acid solution. Permit the mixture to stand for six or eight hours, then transfer to a moistened paper filter, and wash the precipitate until the washings no longer contain nitrate of potassa. Transfer the still moist magma to a dish, and add, very gradually, water of ammonia until the precipitate is dissolved, and a neutral solution is obtained. Dilute this solution with an equal volume of distilled water, and treat half a fluid-ounce of the liquid with hydrosulphate of ammonia, in slight excess; wash the precipitate on a tarred filter, dry on a water bath, and weigh. Multiply the weight of the sulphide of bismuth by the fraction .908, to determine its equivalent in teroxide of bismuth. Apply the same ratio to the remainder of the liquid, and dilute it to such an extent that a fluid drachm shall contain one grain of teroxide of bismuth, seven-eighths of which measure must be made up with distilled water, and the remainder with alcohol. The average product of liquor bismuthi, from a troy-ounce of subcarbonate of bismuth, was fifty fluid-ounces, indicating a loss of bismuth amounting to 7.6 per cent.

This loss is occasioned by the slight solubility of citrate of bismuth in the washings, and though this portion may be recovered, it is too small in amount to compensate for the time and trouble necessarily expended in its separation.—*Journal of Pharmacy.*

Dr. Maynard's Collodion.

Dr. J. P. Maynard, of Dedham, Mass., was the first to suggest the use of collodion in surgery. In a paper read before the Norfolk District Medical Society he gives the following as his formula for preparing the article: —

Take two parts of sulph. acid, sp. gr. 1.850, and one part nitric acid, sp. gr. 1.450. Mix them; allow the temperature to fall to about 100 Fahrenheit. Add to this, raw cotton, to point of saturation. Let it soak about one to two hours. Pour off the acids. Wash the cotton till litmus paper shows all acidity removed. Dry thoroughly. The cotton will now be found to be converted into a gum, completely soluble in ether of about .750 sp. gr., or in pure ether 3 parts, and alcohol 95 per cent. 1 part. About two ounces of cotton thus prepared will make about one pint of collodion of proper consistency for surgical purposes. For photographic objects, a less amount will be sufficient. The conditions for success by this formula are simply precision in the details and careful manipulation, which a little experience will perfect.

Recipes.

EXTRACT OF VANILLA.

Take of Vanilla (good), ...	1 oz.
Granular sugar, ...	2 oz.
Simple syrup, ...	1 pt.
Dilute alcohol sufficient quantity.	

Cut the vanilla transversely in small sections and triturate it with sugar until reduced to powder. Put this in a glass funnel prepared for percolation, and pour on diluted alcohol until a pint of tincture has passed; add this to the syrup and mix them.

DR. HOSMER'S COUGH PILLS.

Powdered opium, ...	½ drachm.
Powdered squills, ...	1 "
Powdered digitalis, ...	½ "
Tart. antimony, ...	10 grains.

Make 60 pills. Dose from ½ to a whole pill at bedtime.

This pill is stated to have been prescribed by Dr. Hosmer of Watertown, for more than forty years, with success.

RHUBARB MIXTURE.

Pulverized rhei, ...	6 drachms.
Calcined magnesia, . . .	1½ oz.
White sugar, ...	9 oz.
Essence peppermint, . . .	4 drachms.
Aquæ ammonia, ...	6 drachms.
Diluted alcohol, ...	1 pint.
Brandy, ...	4 oz.
Water, ...	2½ pints.

Mix and digest seven days.

This is a pleasant and excellent preparation for children and adults, the favorite prescription of a well-known physician of Massachusetts.

CARIOUS TEETH — CARBOLIC ACID.—This is an excellent substitute for creasote in cleaning out the carious cavity of a bad tooth. It can be obtained pure, creasote rarely or never can. Creasote never allays toothache; carbolic acid will frequently do so.

In the following remarks upon Professor Liebig's food, by Dr. Hassall, he differs in opinion from Professor Liebig as respects the preparation of the malt. Having prepared this food in large quantities since first suggested, and used it freely, our experience leads us to regard Professor Liebig as correct in having the malt coarsely ground, and straining out the husks in the preparation. Where they are ground up with the malt flour, they are apt to produce irritation upon the bowels, and therefore should be excluded. Dr. Hassall, as regards low temperature in cooking, is correct. It is better not to boil the preparation as directed by Liebig.

Liebig's Food for Infants and Invalids.

BY DR. ARTHUR HILL HASSALL.

In the preparation of this food, the two principal objects at which Liebig aimed were, first, to produce a food which should resemble human milk in the relative proportions of its heat-giving and flesh-forming constituents; and, second, to reduce it to the state most easy of digestion and assimilation.

It should be clearly understood, however, that the formula given by Liebig, although it furnishes an article having about the same relative composition as human milk, is yet of twice its strength, or, to use the words of Liebig himself, it contains "the double concentration of woman's milk;" and therefore there is reason to believe that in some cases this food will prove too rich for the infant's stomach, and will require dilution.

It appears to me that the great merit of Liebig's preparation consists in the use of malt flour as a constituent of the food; this, from the diastase contained in it, exercises, when the fluid food or soup is properly prepared, a most remarkable influence upon the starch, quickly transforming it into dextrin and sugar, so that, in the course of a few minutes, the food, from being thick and sugarless, becomes comparatively thin and very sweet. That the action of the diastase on the starch is very considerable, is amply proved by the following analysis:—

Uncooked Food.

Albuminous matter . .	9.25 grains per cent.

Dried Cooked Food.

Albuminous matter .	15.84 grains per cent.
Fatty matter . . .	8.49 "
Sugar or glucose . .	37.73 "
Sugar of milk . .	10.90 "
Dextrin and starch .	27.04 "
Total . .	100.00

It will be observed, by an examination of the above figures, that a very large proportion of the starch has become converted, in the course of the preparation of the food, into sugar.

Correct and ingenious as are the principles upon which this food has been designed, yet the directions given for its preparation are certainly open to considerable improvement. Thus Liebig directs that the malt should be ground in a common coffee-mill and the coarse powder passed through a sieve. This necessitates the subsequent straining of the food, — a tedious operation, — in order to remove the bran and remaining particles of husk. And, further, that the food should be put upon a "gentle fire" previous to its being finally boiled. Now, a gentle heat may mean almost any temperature nearly up to the boiling point; and, since the action of the diastase is destroyed at about 150 deg. Fah., the temperature ought never to be allowed to exceed that degree.

I recommend, therefore, that the malt should be well freed from husk and finely ground; that the wheat flour should be lightly baked; and, finally, that a thermometer should be employed in the preparation of the food. Indeed, in some samples recently submitted to me by Messrs. Savory and Moore, I find that the first two points noticed have been attended to, and that they use malt freed from husk and finely ground, and the wheat flour baked.

The effect of baking the wheat flour is to partially cook the starch entering into its composition, so that less heat is required in the preparation of the liquid food. I find that a temperature ranging between 140 deg. and 148 deg. is amply sufficient to effect the complete transformation and solution of the starch and corpuscles, and, indeed, to cook the food sufficiently. — *Lancet.*

Tape-worm and Pork-eaters.

It has been a common impression, in many sections, that the tape-worm is produced from eating pork. Mr. H. A. Wilder, an African missionary of the American Board, communicates a note to the *Scientific American*, in which some facts are stated that contradict this idea. He says: —

Now it is a fact that throughout this colony, and among all the Kaffir tribes, pork is considered an abomination, and is never tasted while they are in a heathen state. It is also a fact that not one person in a hundred is free from tape-worm. It passes from them in enormous quantities, often without agency of medicine, as though the bowels became so full of the animal that a part must be discharged to make room for the new growth. The only remedy they know, and that grows abundantly in this country, is the male fern.

On the other hand, those natives who have adopted European styles of living, eating pork, are not, so far as my observation extends, so much troubled with tape-worm as the wild natives. The diet of the latter consists chiefly of Indian corn and sour milk. They eat the flesh of cattle, sheep, goats, antelopes, etc., but never of hogs or fowls.

One thing more I will mention, which may be of use to others. I have found rock oil — kerosene — a most effective vermifuge. I give it as an enema for the pin-worm, and by the mouth and as an enema for other kinds. It is free from the irritation which spirits of turpentine produces, and is quite as efficient. Has anybody else had the same experience?

Citric, Acetic, and Carbolic Acids. — Citric, acetic and carbolic acids, when applied in a diluted state to cancerous tumors, have a powerful effect in removing pain. The carbolic acid has a powerful effect in correcting the offensive fœtor of cancerous discharges. All three have a solvent effect on cancerous tissue, the citric acid least, the acetic acid next in degree, and the carbolic acid most. When a weak solution of carbolic acid is applied to cancer cells under the microscope, they are dissolved, and the nucleus even disappears almost entirely. In a case of mammary tumor, to which it was applied, the thick, serrated, and everted edges disappeared, and cicatrization of many of the sores occurred. The following is the best formula: — Acidi carbolici ʒ iss.; spiritus vini rectificati ʒ j.; aquae ad ℔ ij.

Cheap Ice Pitcher.

The following simple mode of keeping ice-water for a long time in a common pitcher, is worth knowing. We have tried it. Place between two sheets of paper (newspaper will answer, thick brown is better) a layer of cotton batting, about half an inch in thickness; fasten the ends of paper and batting together, forming a circle; then sew or paste a crown over one end, making a box the shape of a stove-pipe hat, minus the rim. Place this over an ordinary pitcher filled with ice-water, — making it deep enough to rest on the table so as to exclude the air, — and the reader will be astonished at the length of time his ice will keep, and the water remain cold after the ice has melted.

Storage of Gun-cotton. — Gun-cotton is now made into ropes for storage, and kept under water. When an order is received at the manufactory, a few hours suffice to send the cotton on its way. It has been found that by making the ropes with many air channels through the mass, the cotton explodes almost instantaneously, and is as violent in action as the strongest fulminates. Charges for guns are now made into two parts; an exterior composed of cotton of loose texture (the ignition of which starts the ball), and an interior of a denser material, which supplies the gas necessary to keep up the constantly accelerating speed of the ball. The result is great gain in initial velocity. Compared with powder in an Enfield rifle the cotton gave a trajectory having an incurvation of $3\frac{1}{2}$ inches, the powder $3\frac{5}{8}$ inches, in the first 100 yards.

Blue Ink from Prussian Blue. — By the following process, M. Vogel has always obtained a good solid blue ink with Prussian blue and oxalic acid: Dissolve in a matrass, in a large quantity of water, ten grammes of sulphate of protoxide of iron; boil, and then add sufficient nitric acid to sesquioxidize all the iron. Then add a solution of yellow prussiate of potash, containing ten grammes of this salt, and leave the precipitate to deposit. After decanting the supernatant liquid, throw the deposit on a filter, wash it with cold water, and leave it to drain until it can be easily raised from the filter with a knife. Then, without further drying, mix it in a porcelain mortar with two grammes of oxalic acid in crystals. Let the reaction continue for an hour, then gradually add 400 cubic centimetres of water. This produces a dark blue solution, which, even after long standing, does not precipitate. — *Moniteur Scientifique.*

On the Treatment of Hydrocele. — Dr. Jollie recommends the following plan, which he has followed for some years, and invariably with success:

"I tap the hydrocele by trocar and cannula in the usual way, draw off the fluid, and then introduce through the cannula into the cavity of the tunica vaginalis a common surgeon's probe, which has been previously coated for an inch of its length with nitrate of silver. I prepare the probe by heating the extremity to a dull red heat in the flame of a gas-light, and placing it in a little finely-powdered nitrate of silver, and then again subjecting the probe to the heat, so as to form a smooth coating to the instrument. If your correspondent and other surgeons will make use of this method, they will, I have no doubt, quickly, effectually, and cheaply relieve their patients of a troublesome complaint." — *Lancet.*

Mercurialized Collodion as an Application to Condylomata. — A patient aged fifty-six, under the care of Dr. G. Finco of Padua, had around the anus a large number of condylomata, which had increased in size under the use of nitrate of silver. Dr. Finco mixed twenty-five *centigrammes* of corrosive sublimate with fifty-two *grammes* of collodion, and, having shaken the mixture well, applied it with a brush over the two largest tumors. The next day, these had almost disappeared. In the course of sixteen days, Dr. Finco destroyed more than sixty condylomata; and the patient had no return of his disease. — *British Medical Journal.*

COMMENDATORY LETTERS.

I received your Journal of Chemistry and Pharmacy for July, and allow me to say that I am much pleased with it, and trust you will meet with encouragement to continue the publication.
J. Stedman, M. D., Jamaica Plain, Mass.

Inclosed find fifty cents for subscription to the Journal of Chemistry and Pharmacy. I would not be without it for any amount.
S. E. Sheffer, Houghton, Mich.

Have seen your Journal, and like it much. Send it to my address.
C. H. Winchester, M. D., Adrian, Mich.

I am so much pleased with your Journal that I send you the year's subscription in advance, and also that for my friend Dr. Leonard.
William Wood, Windsor Hill, Ct.

I consider the Journal of Chemistry and Pharmacy quite an important acquisition to scientific medical literature.
A. Pratt, M. D., Chester, Ct.

Have seen your Journal, and am much pleased with it.
D. C. Williamson, M. D., Providence, R. I.

I have perused the Journal with much interest, and send the subscription price, fifty cents.
A. W. Sidney, M. D., Fitchburg, Mass.

The Journal now before me is full of interest. Inclosed is pay for subscription.
A. J. Hart, M. D., China, Me.

Its utility extends far beyond its character as an advertising medium. I like it much.
J. V. Tabor, M. D., Stetson, Me.

Fifty cents inclosed for your promising Journal.
C. T. Manchester, M. D., Pawtucket, R. I.

The above are given as specimens of hundreds of letters received from all parts of the country. We doubt if any new journal was ever received with more favor, or had immediately a more extended circulation.

BOSTON JOURNAL
OF
CHEMISTRY AND PHARMACY.

VOLUME I. Boston, November 1, 1866. NUMBER III.

THE
Journal of Chemistry and Pharmacy
IS PUBLISHED BI-MONTHLY AT
150 Congress Street, Boston,
BY JAS. R. NICHOLS & CO.
TERMS, FIFTY CENTS PER ANNUM.

All letters and communications should be addressed "Office of Journal of Chemistry and Pharmacy," Boston, Mass.

Chemistry of the Sea.

BY JAMES R. NICHOLS.

While standing by the shore of the sea, contemplating its solemn grandeur, and reflecting upon its mysteries, we are apt to overlook some of the interesting and wonderful facts connected with its chemical history and character. It is natural that what is palpable to the eye, and so well calculated to awaken sublime and poetic emotions, should overpower the desire to study the "hidden things" of God, as connected with the great deep. It would be difficult at the sea-side to obtain listeners to a lecture upon the chemistry of the sea, but I venture to assume that under the less busy and exciting circumstances of home, where in these cool autumn months most of my readers may be found, the topic will not prove devoid of interest.

That which usually first arrests the attention of visitors to the sea, is the bitter and saline character of the waters, and the inquiry is made, From whence arises this remarkable condition? It may be said in reply, that it is but an exaggeration of that of ordinary lakes, and rivers, and springs; the same materials exist in them, only, in most instances, in infinitesimal quantities. As the atmosphere is the grand reservoir into which all gaseous or vaporous bodies pass, so the sea is the vast receptacle into which all the soluble substances washed from the earth are deposited. All kinds of soluble matter, washed out by percolating rains, descend to the ocean, by the agency of brooks and rivers, and as there is no outlet, no streams running from it, to carry them away, and as in the process of evaporation they are left behind, these soluble salts and minerals have been accumulating for ages, until they form prominent constituents of the waters. All bodies of water on the globe, into which rivers flow, but from which there is no outlet, except by evaporation, must necessarily be salt lakes. The Great Salt Lake in Utah, that of Aral, near the Caspian, and the Dead Sea, in Judea, are remarkable examples of this kind. The Utah basin is filled with a saturated solution of this substance. This excessive saline condition is probably due to the existence of large bodies of salt in close proximity, or somewhere within the reach of streams that flow into it. Chloride of sodium, or common salt, is one of the most abundant of all the soluble substances found upon our earth, and consequently it predominates in sea waters. But while it is the most abundant and perhaps the most useful, it is by no means the only valuable substance carried into the sea. In quantity, next after salt, come certain combinations of magnesia, next salts of lime, the carbonate held in solution by excess of carbonic acid, then small quantities of potash and oxide of iron, and, lastly, a trace of a most remarkable elementary body, iodine.

It seems a trifling and unimportant matter, this trace of the latter substance in sea water. The quantity is so infinitesimally small as scarcely to be recognized by chemical tests even after condensation by evaporation. Prior to the year 1812 this element was unknown. It was not found in plants, or rocks, or earths, or springs, in quantities appreciable to the chemistry of the last century, and even now we only know that a few atoms exist in the little watercress, and a few other aquatic plants, and in some springs and rocks, but from none of these sources could probably a single ounce be obtained. By the solvent power of water the minute quantities found upon the earth are taken up and deposited in the sea, and there the Almighty, foreseeing that this substance would be required in the arts to be cultivated by man, has provided a way by which it may be secured and appropriated to his purposes.

But before dwelling more particularly upon iodine, let us return to a brief consideration of the uses in sea water of some of the other soluble constituents. Everything in nature certainly has some palpable use. It is no accident or casual circumstance that the sea contains large quantities of the lime and magnesia salts. What stupendous results flow from this soluble carbonate of lime! Without it where could shell-fish procure their coverings, or the coral polyps the material for their curious structures? The shell of the clam, the oyster, the snail, the lobster, etc., is composed almost wholly of carbonate of lime; from what source do the fish obtain their calcareous coverings? Young oysters in two or three years acquire a size suited to be used as an article of human food. The little gelatinous speck floating in the water at birth has through some channel obtained two or three ounces of solid stone armor in the short space of thirty or forty months. It had no power to chisel it from limestone cliffs, and they are not always found in the vicinity of calcareous deposits. It has absorbed or drawn it from the water in which it moves; no other source supplies it. How immense are the beds of shell-fish upon the shores of the ocean! what a vast concentration of the lime, once held in solution, is effected by these feeble creatures, ranked among the lowest in the order of animate creation!

But still more wonderful is the work of the coral polyps. The geologist and the navigator will readily appreciate the extent to which the surface of the globe has been altered and modified, both in ancient and modern times, by the silent labors of myriads of these creatures, all engaged in the production of calcareous matter. The whole peninsula of Florida has been manufactured out of sea water by the little polyps. We are indebted to them for our marble houses, tombstones, and mantel-pieces. Powers's Greek Slave, pronounced by admirers of statuary to be "instinct with life," was probably once so, in an *actual* rather than poetical sense. The marble is made up of the relics of these animals, and if from comminution they are not apparent to the eye, the microscope will show them. It is probable that nearly if not quite all limestone rock, in whatever form it is found, is of animal origin, and produced from the waters of the sea.

We now understand how vast quantities of lime are removed from sea water by the agency of living organisms; it remains to notice the channels through which iodine is separated, and placed in our hands for use in medicine and the arts. Human industry and science could never separate this element from sea water in any considerable quantity, and the power denied to man has been bestowed upon a slimy, repulsive *weed*. It is fortunate for us that the deep-sea plants have had conferred upon them a strange appetite, and that the food they seek is in part the sparsely disseminated atoms of iodine. It is probable that this constituent of sea water is in some way connected with the well-being of submarine vegetation, and that it is indispensable to its growth.

Through what feeble agencies stupendous results are attained! The little polyps build reefs and islands; the sea-plants (which every wave tears from their rocky homes), with their millions of open mouths, suck from the surrounding waters and appropriate as food tons upon tons of substances, otherwise unobtainable, and without which one of the most beautiful and important arts could have no existence. Seaweed thus has the remarkable power of abstracting from water, iodine. Let us inquire by what process of chemical manipulation it is forced to disgorge its precious treasures.

All *deep-sea plants* are more or less rich in iodine; but the *Palmata digitata*, that leather-like and greasy weed, with long round stalk and wide branches, has it in greatest abundance. The Irish call it tangle or lieach, and it is found strewn along our shores in large quantities after storms. But even this holds but a very small quantity. Every ounce of iodine upon the shelves of the apothecary has required at least *four hundred pounds* of weeds in its production. About thirty tons of the wet plants give one ton of *kelp*, as the incinerated mass is called, and from this nine or ten pounds of iodine is obtained. This would seem to involve a prodigious amount of labor and expense, bringing a high price upon the products. But the price is exceedingly moderate, seldom ranging in the English market above three dollars per pound. It would never pay at such prices to manufacture if the weeds did not yield other valuable products, as potash and soda. Without stopping to consider in detail the production of these salts, it may be interesting to know that probably more than *four thousand tons* of potash and *two thousand* of soda were introduced into the English market the past year, through the burning of sea-plants upon the coasts of Scotland and Ireland. The entire products of iodine from all sources must reach nearly or quite five hundred thousand pounds. How great is the industrial value of that which seems the most repulsive and worthless of all

the products of nature! To what science are we indebted for opening up this great source of wealth? The reader's reply may be anticipated, — Chemistry.

The first work in the process is to collect the plants; they are then spread upon the ground and dried. Raked together in heaps, they are placed in rude kilns, made of beach stones, and burned. The red mass of ashes is stirred until it cools into a hard cake, called kelp, and is then ready for market and the interesting manipulations of the chemists.

The chemist breaks up the kelp into small pieces, puts it into immense tanks, pours on water, and leaches, until everything soluble is secured. He then evaporates the ley, and removes the different salts in the order of their solubility. First, sulphate of potash begins to crystallize, and that is removed while hot; as the liquor cools, the chloride of potassium begins to appear in beautiful white crystals, and that is removed. The ley is again boiled, and soon the soda salts appear, and they are removed; and now comes the iodine. If we commenced with sixteen hundred gallons of ley, we have reduced it to one hundred by evaporation and removal of the soda and potash salts; this holds the iodine in the form of iodate of soda and potassa. We must now free the iodine by taking up the soda and potassa (which it holds in combination) with sulphuric acid; accordingly, we add until it is saturated, and then we remove the yellow liquid to a style for sublimation. By the addition of heat the iodine is volatilized or rises in vapor, and distils over into earthen receptacles, where it is condensed, and the process ends.

How often at the sea-side do we notice the disgust with which visitors thrust aside the slimy weeds, left upon the beach by the receding tide. It is probable that most carry about with them the photograph of some dear friend which they regard as a precious keepsake; unconscious, indeed, are they of the connection which exists between the light picture carried in the bosom and the marine plants trodden beneath their feet; a connection so intimate that without the latter the former would probably be unknown. Iodine and its combinations form the basis of the photographic art; and this still resting undisturbed in the vegetable organisms, the splendid experiments of Daguerre would have been miserable failures.

NOTE. — The substance of the above was presented by the writer in some remarks made at a field meeting of the Essex Institute, a scientific body, at Salisbury beach, in August last.

[Translated for the Journal of Chemistry and Pharmacy.]

Gleanings from the French, German, and other Foreign Journals.

Chlorate of Potassa in Ovarian Diseases.

Although ovariotomy has now taken its place in practical surgery as a useful operation, whoever could replace it by any internal treatment would have a great claim upon the gratitude of humanity. Without giving the chlorate of potassa as a specific for that purpose, Mr. Craig, of Edinburgh, has employed it as an absorbent of the liquid with such results that in future ovariotomy should not be practised without first making a trial of this. Although it must be admitted that many cases are unaffected by its action, the success of which doubtless depends upon some unknown conditions of the encysted liquid or its envelope, the good results reported make it our duty to give this harmless treatment the benefit of the doubt. Four cases are quoted, where the disappearance of the cyst has been complete in two cases, incomplete in one, and uncertain in the fourth on account of the discontinuance of the medicine. The first case will suffice as an example.

Miss S., a young lady of good constitution, had a tumor of the size of the fœtus at the ninth month, in the left iliac region, movable and without adherences, which was first noticed five years since. During the last year she had tried several plans of treatment without amelioration, and had finally decided to submit to ovariotomy, when the death of her physician was perhaps the means of saving her life. From this time she was put upon a saturated solution of the chlorate of potassa, a dessert spoonful three times a day. After two or three weeks of this treatment a sensible amelioration was noticed; the tumor gradually diminished, and after ten or twelve months of the same treatment entirely disappeared, as well as the malaise and all the inherent symptoms.

The second case is equally concise and conclusive. Without doubt more detailed accounts of the cases would be useful in the diagnosis, but it is sufficient that such an inoffensive medicine should even appear to have been favorable in a cyst, or any tumor of the ovary, to warrant it a trial. — *Gazette des Hôpitaux*, July 12, 1866.

Decoction of Nettles in Passive Hemorrhage.

Guided without doubt by the indication of the syrup of nettles, signalized in some treatises on materia medica, Dr. Benavente has employed the decoction (℥i. to Oi.), several teacupsful a day, in the treatment of hemorrhages. It has succeeded in two cases of passive menorrhagia and four of symptomatic metronhagia, when ergot, tannin, and opium had failed. It has also shown itself efficacious in six cases of hemoptysis and one of obstinate epistaxis. Dr. Gallego has employed it according to the popular usage at Almaden. Several other Spanish physicians also bear witness to its efficacy. The exciting properties of the nettle having been well proved, it is easy to foresee its action and to understand its indications. In all passive hemorrhages it is useful. It is in exciting the whole organism that it succeeds as a febrifuge. Other stimuli would succeed in the same way. Nevertheless, by its intense action, it may offer some peculiar advantages, which only an experimental and comparative study can decide. — *Siglo Medico*, 1866.

The Treatment of Anemia.

We take from a remarkable article, by M. Potain, in the "Dictionnaire Encyclopedique des Sciences Medicales," the following considerations upon the treatment of anemia.

Among anemias a distinction should be made of — 1st, those which require no treatment; 2d, those for which hygienic means suffice; and, 3d, those which require therapeutic aid.

1st. Many anemias pass away in a short time without medical intervention. These are the anemias which follow hemorrhages or acute diseases of short duration, or the primitive anemia of recent date of which the cause has ceased to act.

2d. The rôle of hygiene becomes more important when the causes of the anemia depend upon it; as, for instance, an insufficient alimentation, bad teeth, forced inaction or excessive physical exertion, prolonged nursing, etc.

3d. Medical treatment becomes necessary in all profound and persistent anemias. When, in secondary anemias, the primitive disease persists, it is to this that the treatment should be addressed. It is necessary in the first place to arrest hemorrhages, suppress flows, cure uterine affections, combat dyspepsia, and treat syphilis.

It becomes necessary to recur to the special and direct treatment of anemia in the following cases: — 1st, When the primitive disease, having disappeared, has left behind it a persistent anemia; 2d. If, whilst still existing, it is beyond the resources of medicine; 3d. When the anemia has come on under the influence of causes which cannot be removed or modified, or when it is so profound or of such old standing that a simple change of regime or hygienic means are insufficient. The agents available for this treatment are iron, manganese, arsenic, chloride of sodium, ox blood, grape sugar, bitter or neurosthenic tonics, hydrotherapy, mineral waters, and aerotherapy.

With us iron is above all the antianemics, but its manner of action is as yet uncertain. According to some authorities it simply replaces the quantity of this metal lurking in the blood; according to others it attains this end only by a very indirect route, — either in absorbing the acid sulphohydric gas, which precipitates the iron of the food in the digestive canal, thus entirely removing it from absorption (Hannon); or in exciting the digestion of the digestive liquids and the absorption of the chyle by its action upon the mucus of these organs (Cl. Bernard); or in re-establishing throughout the whole economy the weakened tone of the vascular system (Richter); or in awakening the energy of the vegetative functions and the plastic force in the entire organism (Trousseau and Pidoux). Ferruginous preparations are indicated in cases where there is a diminution of red globules or an excess of the watery constituents of the blood, and practice, in accordance with theory, shows that their action in such cases is generally very favorable and very rapid. The indications are more doubtful in cases where there is rather a diminution in the mass of blood than a change in its constituents, — in every case, in short, in which nutrition is difficult.

Iron should be given with care to individuals possessing but a small supply of blood. According to M. Trousseau, the imminence of pulmonary consumption is an absolute contra-indication to the ferruginous treatment, which he considers hastens the development of the tubercles. Although, upon the other side, a great many physicians assure us that they have treated the anemia of consumptives to advantage by this medication, the observations reported by M. Millet in support of M. Trousseau should cause us to use the greatest reserve. On the contrary, in chronic diseases which impoverish the blood and produce hydremia without impairing the general nutrition to such an extent, iron can render the most incontestable services. Manganese has been proposed as a precedaneum to iron, because these two metals exist together in the blood, and for the same reason M. Petrequin has advised their simultaneous administration, assuring us that success might be attained in this manner where iron alone had failed. Some facts appear favorable to this plan of treatment, but the particular indications have not as yet been properly decided. Common salt used with food in large quantities appears to stimulate the nutrition and render the blood richer in globules. As it appears to act only in increasing the absorption so that the pulse rises perceptibly, it doubtless deserves the preference to iron in cases of true anemia with insufficient nutrition and tendency to cachexia.

Grape sugar in large doses is advised in chlorotic anemia by Maak of Kiel, who takes the idea from the theories of Lehmann the chemist, that is, that an insufficiency of the hepatic sugar is the immediate cause of chlorosis. M. Bouchut recommends arsenic in the anemia of young children. To end the list of agents constituting the internal medication, the various preparations of cinchona and the mineral waters should be mentioned.

The external treatment has consisted principally of mineral-water baths. The effect of all these is an excitation of the functions of the skin and of the peripheric circulation. The effect of the particular spring is addressed to some diathesis, known or suspected.

Hydrotherapy acts in the cure of anemia through the activity which it gives to the circulation, and because it awakens powerfully the action of the digestive functions. In the case of individuals too feeble to support shower-baths, lotions and friction with moistened cloths render incontestable services. Dry friction, the champooing acting in the same manner, can be joined with these or made use of alone. Sea-bathing, finally, combines the action of cold and percussion with a strong mineralization.

The attempt has been made to treat anemia by aeropathy, that is to say, by making patients breathe an atmosphere modified in its physical or chemical qualities; such as compressed air (Demarquay), pure oxygen, or air artificially charged with this gas (Tubarie et Pravaz), etc.

To these different plans of treatment must be added transfusion. Experience has shown that this is especially useful in the anemia consequent upon an abundant hemorrhage; but in secondary anemias, in those dependent upon exhausting suppuration for example, the results have never been good.

INDICATIONS AND CONTRA-INDICATIONS.

The choice among the preceding methods of treatment should be guided by the following considerations; — 1st. The form of anemia; the ferruginous being the best suited to hydremia, and that by reconstituent tonics to true anemia. 2d. The condition of the digestive organs, and their ability to support this or that medicament. 3d. The condition of the nervous system, the great excitability of which is an important contra-indication to certain means,

especially sea bathing, and the deficient energy of which compels extreme care in the exercise of the physical powers. 4th. The predominance of certain symptoms (palpitation, syncope, dyspepsia, neuralgia, etc.), which often demand a special treatment. 5th. Accompanying diseases which might (*a*) require the principal attention in treatment (habitual hemorrhage, for instance); (*b*) render more urgent and necessary an active treatment of the anemia (nervous disorders developed by the influence of the anemic condition); (*c*) exclude certain agents, such as iron, in tuberculous anemia, gymnastics and sea-bathing in cardiac and some uterine affections, tonics and agents which excite the stomach in cancer of that organ, etc. Hemorrhages furnish in addition some special indications. It is always advantageous to moderate them; but when they are old and very abundant there is some danger in suddenly suppressing them, even in the case of anemic persons (Nelaton). Those which anemia appears to increase, such as mehorrhegia in chlorotic women, is always benefited by a ferruginous treatment. On the contrary, in some cases, especially in those where there is a hemorrhagic diathesis, the excitement of the iron makes the loss of blood greater, and thus increases the anemia it was designed to diminish.— *Gazette des Hôpiteaux*, July 14, 1866.

Laudanum in Washes for the Eye.

There is hardly a painful affection of the eyes which is not treated by a collyrium containing laudanum. It is wrong to combine laudanum, as is usually done, with the astringents serving as the bases of the washes, such as sulphate of copper, sulphate of zinc, etc. In this case the first effect is an irritation, followed by an increased secretion of tears, which carries off the laudanum before its action is felt. Combined with the nitrate of silver, it is not only useless but dangerous, as in reducing a part of the salt it destroys the virtue of the collyrium, and prevents recurrence to other treatment. When employed alone in a very feeble solution too little laudanum is absorbed. In a stronger solution it acts as a stimulant, and causes an abundant flow of tears. In a still stronger solution, not the opium contained, but the wine, acts as a stimulant. We must conclude, then, that opiated collyria should not be prescribed, as they have no soothing effect, and can be only injurious in weakening the action of the astringents with which they are associated.—*Journal de Médecine de Bordeaux*, 1866.

Sub-Cutaneous Injections of Morphine in Cordee.

After an ineffectual trial of all the usual methods to relieve the suffering in a very painful case of cordée, M. Scarenzio had the idea of giving a sub-cutaneous injection of the muriate of morphine (gr. iv. ss. to the ℥) in the perineal region. The following night the patient slept well, evidently not from the general narcotic effect, as he got up several times to pass water.

On the second day no injection was given, in order to see if the pain would return. It did, in reality, return, but less intense. A new injection was then given, after which the erections were no longer painful, and the patient was soon cured of his gonorrhœa.— *Giornale della Mallatie Veneree.*

Cayenne Pepper as a Specific in Hemorrhoids.

Marchand has made very favorable observations on the use of Cayenne pepper in the different stages of hemorrhoids.

A case of a man aged fifty, who, in consequence of sedentary habits of life, had suffered long from bleeding piles, and had tried in vain many remedies, but with no success, —and now, two years after the commencement of this remedy, no blood has appeared.

In another case of a young man aged twenty, the blood has disappeared entirely after an application of this remedy for four days; and when the disease reappeared after a few months it was quickly suppressed, and since that time, nearly a year, the patient has entirely prevented the return by the use of some sixteen grains per week.

Similar results have been experienced by a lady suffering from the same disease, and the same treatment has been made in the case of another lady, and with equally satisfactory results.

The capsicum seems to effect a radical cure of the disease by not favoring, but suppressing, the bleeding, and very probably by energetically increasing the circulation of the blood in hemorrhoided veins.

Marchand orders the drug in dose per day of one drachm, to be taken with the meals, and, after the disappearance of the disease, to be continued in the diminished dose of from one scruple to half a drachm each week, for a considerable time.

Cod Liver Oil made Palatable.

Dr. Ludoric Rouland has succeeded in disguising the taste of cod liver oil, thus rendering its administration practicable to patients who could not otherwise support it. The following is the formula:—

Cod liver oil, ...	℥ iij.
Alcohol (40°), ...	℥ ij.
Essence of mint, ...	ʒ i. ss.

Of this emulsion a dessert spoonful three times a day may be taken. The quantities of the ingredients may be slightly altered to suit the taste of the patient.— *Abeille Médicale.*

A Substitute for Food.

M. Rossi writes to the *Roman Corrispondenza Scientifica*, that by the use of the erythroxylon coca of Peru men may live in robust health several days without taking food! M. Rossi declares that after taking a decoction of the leaves of the plant he felt neither hunger nor thirst for forty-eight hours.

Local Anæsthesia from the Cold of Rapid Evaporation and Spray-Producing Instruments, for the "Pulverization of Fluids."

BY WM. PROCTER, JR.

The medical journals of recent date have contained several notices of the production of local anæsthesia for surgical and other purposes, where the avoidance of pain was desirable. According to Dr. Page (Boston Med. and Surg. Journal, May 24, 1866), the possible use of cold for the production of local anæsthesia was first announced by Dr. James Arnott, of England, in November, 1847, after which Mr. Nunnelly, Prof. Simpson, and M. Velpeau, of Paris (in 1850), had employed it. In the United States, Dr. J. Mason Warren appears to have applied it in removing a nævus at the Massachusetts General Hospital, in June, 1852, and subsequently by other surgeons. The difficulty in employing cold, in a practical manner, so as to continue and regulate it, rendered this method ineligible in many cases.

In 1862, Dr. B. W. Richardson, of London, was attracted to Dr. Arnott's use of cold, and he commenced experimenting with the view of getting a practical means of producing local anæsthesia. As early as 1858, M. Girons exhibited before the Academy of Medicine at Paris an instrument for atomizing fluids, by means of which the escape of compressed air forced a fine stream of medicated fluid against an oblique metal plate or tube, so as to convert the fluid into fine spray. After this Dr. Bergson, of Berlin, suggested the little instrument known as the Bergson tube, and which has been so extensively applied as a parlor curiosity for perfuming the atmosphere. This consists of two glass tubes with capillary extremities, so connected together that one is vertical and the other horizontal, their orifices being so arranged in position that a current of air blown through the horizontal tube passes across the extremity of the vertical tube, and causes an upward current by suction. If now the inferior end of the vertical tube be placed in a vial containing an odorous fluid, and a strong current of air be blown through the horizontal tube, the air is drawn out of the former, which causes the fluid to rise to the orifice, and, under the influence of the current of air, to be converted into an exceedingly fine spray or mist, which readily mingles with the air and odorizes it. Various other forms of apparatus, involving the principle of the Bergson tube, have been suggested, among which is that of Dr. Siegle, in which a current of steam, at a regulated temperature and pressure, takes the place of air; and that of Dr. Andrew Clark, of London, who uses a gum-elastic tube, attached to the horizontal tube of Bergson's apparatus, and containing two hollow gum-elastic balls, one of which acts as a reservoir for air, and is surrounded by netting to prevent its expansion beyond a certain degree; the other ball is constructed like the ordinary gum syringe ball, with two valves, so that simple compression and release will force a current of air into the upper ball, from which it gradually escapes with a force proportioned to the condensation of the air. By means of these instruments a current of spray or "pulverized fluid" may be directed against any part of the body requiring this form of medication, with the greatest ease, especially to the eyes, ears, gums, etc. It has long been well known that rapid evaporation produces a reduction of temperature, and the cold produced by the action of the Bergson tube was soon observed. Dr. Richardson, in searching for a means of applying cold, saw the applicability of this principle to his purposes, and devised the following arrangement, whereby ether and other volatile fluids may be rapidly vaporized and directed to any desirable point. It consists of a graduated bottle for holding the ether; in the mouth of this, and passing through a good cork, is a double glass tube, so arranged that the inner and smaller tube shall reach the bottom of the bottle and upwards nearly to the mouth of the outer tube. The latter is pierced horizontally, just above the cork, by a smaller tube, by means of which it is attached to a hand bellows by a gum tube. The outer tube is also perforated by a small hole communicating with the interior of the bottle. When a current of air is forced horizontally into the larger tube it impinges against the opposite side, compressing the air in the bottle, and thus forcing the ether to rise in the small inner tube, whilst the main body of the air takes a vertical direction and escapes above with great force, carrying with it the ether, which is thus very rapidly vaporized, producing extreme cold. By altering the size of the opening of the inner tube by movable jets, and by having two apertures for the entrance of air, and two pairs of bellows, the operator can control the proportion of ether and air, and can readily produce a cold of six degrees below the zero of Fahrenheit. Dr. Richardson remarks (Med. Times and Gaz., Feb. 3, 1866): "By this simple apparatus, at any temperature of the day and at any season, the surgeon has thus in his hands a means for producing cold even six degrees below zero; and by directing the spray upon a half-inch test tube, containing water, he can produce a column of ice in two minutes at most. Further, by this modification of Siegle's (Bergson's) apparatus, he can distribute fluids in the form of spray into any of the cavities of the body—into the bladder, for instance, by means of a spray catheter, or into the uterus by a uterine spray catheter."

When the ether spray thus produced is directed upon the outer skin, the skin is rendered insensible within a minute; but the effects do not end here. So soon as the skin is divided the ether begins to exert on the nervous filaments the double action of cold and of etherization; so that the narcotism can be extended deeply to any desired extent. Pure rectified ether used in this manner is entirely negative; it causes no irritation, and may be applied to a deep wound, as I shall show, without any danger. I have applied it to the mucous membrane of my own eye, after first chilling the ball with the lid closed."

Dr. Richardson's paper then details several surgical cases wherein his method had been successfully employed (see Amer. Jour. Med. Sci., April, 1866, page 513), and continues: "These results are so interesting that I make no apology for bringing them before my medical brethren. I wish it to be distinctly understood, that at the present moment I only introduce the method here described for the production of superficial local anæsthesia. It is, I believe, applicable to a large number of minor operations, for which the more dangerous agent, chloroform, is now commonly employed—I mean such operations as tooth extraction, tying nævus, tying piles, incising carbuncles, opening abscesses, putting in sutures, removing small tumors, removing the toe nail, dividing tendons, operating for fistula, removing cancer of the lip, and other similar

minor operations." Dr. Richardson expresses the opinion that much more may be expected from this mode of producing anæsthesia, and thinks that even a limb might be amputated if some fluid of negative qualities and low boiling point can be obtained from the hydrocarbon series (a suggestion which appears to have been realized, so far as the fluid is concerned, in the so-called rhigolene of Dr. Bigelow); see page 363 of this number. He also entertains the hope that a way will be discovered to join the agency of bodies like morphia, atropia, &c., with ether in this method so as to narcotize the parts. "Reaction from anæsthesia is in no degree painful, and hemorrhage is almost entirely controlled during the anæsthesia."

Dr. Calvin H. Page, in the paper before quoted, speaks of an atomizer of his own invention, which differs from the instrument of Dr. Richardson, the tubes being horizontal and parallel for about three inches, but not concentric; and he esteems it well adapted to operating in the mouth. The points of the tubes approach each other at right angles, and the fluid-bearing tube bends at right angles and descends into the bottle of ether or other fluid used. With ether it produced a cold of 4°, and with rhigolene 16° in one minute. Dr. Page believes the latter fluid to be better adapted for operations of the mouth than ether. He had used it with success in certain minor surgical operations. The greatest difficulty attending its use is the fact of its boiling below the ordinary temperature in summer, and its great inflammability. The reader is referred to an article on spray-producing instruments, figured and described by the editor of the "Medical Record," N.Y., for June 1st, 1866.

It is not impossible that the atomizer, as a means of refrigeration, may be advantageously applied in some pharmaceutical and chemical operations on a small scale, where it is desirable to have a low temperature for a short time; for instance, in making suppositories, where a difficulty occurs in separating them from the moulds, a few moments' action of a Bergson's tube with ether or rhigolene would cause the necessary shrinkage; or in testing oils by reduced temperature. — *Journal of Pharmacy.*

Pepsine.

In one case of hysterical vomiting, and two of nausea preventing a due quantity of food being taken by hysterical persons, this remedy, Pepsine, has appeared to enable the patient to swallow meat. The mere nutriment thus imbibed has improved the appetite for future meals; and the valerian and salt sponge-baths afterward administered seemed to have a more rapid effect than without it. The rational explanation of its good influence is, that both in hysteria and anemia the secretion of gastric juice is apt to be irregular and deficient, and that the morbid processes here act, as is so often the case, in a circle; the non-secretion of gastric juice still further starving the blood and aggravating the hysteria and anemia, and that further aggravation again diminishing the secretion. But once breaking the magic chain, and enabling even a single meal to be well digested, begins a march toward health which it is comparatively easy to guide afterward.

Closely connected with the last-named complaints is, in the female sex, atonic gastralgia. Indeed, I may say it is practically identical. At the same time that the gastric juice is imperfectly secreted, the muscles of the stomach refuse to perform the peristaltic motions with sufficient activity. Hence not only is the alimentary mass a greater inconvenience than it ought to be, but it actually lies longer than usual in the first portion of the canal, as may be found on percussion of the epigastrium. Atonic gastralgia is a common consequence, in the educated classes, of excessive mental and sedentary labor. Where this is very great, I have found pepsine of some use; but in the slighter cases, which more frequently come before us, I have not seen any apparent benefit accrue from it. A change of habits is here the only permanent remedy, and of drugs strychnine is the most efficacious. I believe M. Boudault prepares a powder in which strychnine is combined with pepsine and lactic acid. I presume it is for cases of this sort that it is intended, but I have not tried the combination.

In a case of diarrhœa and mucous vomiting occurring in an old victim of atonic gout, the stools became more natural and less frequent, and strength was regained, on taking pepsine and mutton-chops, instead of opium and acetate of lead.

As cases of acute disease have a habit of getting well of themselves, they are not, of course, such good tests of the essential benefit derived from remedies; and it is only by comparisons on a large scale that one could speak of fever and pneumonia being benefited by pepsine. There seemed, however, in those alluded to, an immediate improvement to take place in the appearance of the tongue and of the evacuations; and doubtless the amelioration in the alimentary canal thus made evident would tend to lessen the mortality of these diseases.

On the whole, then, I cannot but conclude that we have in artificial pepsine a valuable and safe remedy, and an important aid to rational medicine. — *Dr. Chambers.*

Journal of Chemistry and Pharmacy.

BOSTON, NOVEMBER 1, 1866.

☞ We hope the many friends who have sent us letters concerning the Journal will excuse us, as we have been unable to reply by mail. As many as *fifty* in a single day have been received, each containing kind words of commendation, and also advance pay for the paper. The amounts are credited on our books, and the paper will be sent regularly. If any one fails to receive a number, he will please inform us promptly. See extracts from letters on last page.

☞ The back numbers of the Journal can now be supplied to all new subscribers. We have had the type of the first or July issue reset, and another edition printed. This makes the third edition of that number, amounting in all to *sixteen thousand*. The edition of the present number is sixteen thousand, and more physicians and druggists will probably read it than any other publication of the kind in the country.

☞ We have again to ask *all* who receive the present number of this Journal, and have not acknowledged the reception of former numbers, to do so at once. It is not necessary to send advance payment, as, according to our terms, that may be deferred until the end of the year. It may not be sent then, unless the patron is *fully satisfied* that it has been worth the small subscription price of fifty cents. Please write us when it is received, and it will be sent regularly.

☞ Much room in this number is given up to articles translated from recent German, French, and Italian publications. We intend to keep our readers informed of what is transpiring abroad in medical, chemical, and pharmaceutical matters; but we shall not in future devote quite so much space to this department.

Extra Pharmacopœial Preparations.

The issue of the *Medical and Surgical Journal* of this city, Sept. 27th, contained an article under this head, by the editors, in which those who prepare and those who use unofficinal remedies, are made the subjects of severe animadversion.

The *Journal*, in its editorial, gives the number of articles contained in the U.S. Pharmacopœia, and intimates that the number is large enough, and that it is the duty of physicians to adhere strictly to officinal articles. The logic of the gentlemen appears rather weak, and, when carried out, impracticable; and, furthermore, it is fatal to the prompt benefit of progress in medicine. If improvements and discoveries were made, there would be a perfect standstill in respect to their use in the interim between the revisions of the Pharmacopœia. As this does not usually occur oftener than once in about ten years, the benefits of progress would be made available by jumps, with a ten years' dead halt between. Progress in the discovery of new medicinal agents and new combinations being gradual and constant, we think all "live" physicians will be likely to avail themselves promptly of the aids which advancing chemistry and pharmacy offer, notwithstanding the *Journal's* opinion. What intelligent physician does not know that some of the most valuable curative agents are not recognized in our Pharmacopœia? Among others perhaps equally important, are the hypophosphite salts. The proofs of their value in certain affections are perfectly conclusive; and now shall a physician be debarred from their employment because for some reason or other they have not been made officinal?

Dr. Brown, of the Albany City Hospital, in a communication to the *B. M. & S. Journal*, speaking of the hypophosphites, remarks: —

"Without protracting the discussion further, have I not said enough to warrant the conclusion that the hypophosphites are worthy a more prominent place than the appendix to the U. S. Dispensatory? In the class of diseases to which they seem so well adapted, I believe they will disappoint the practitioner in fewer instances than more pretentious remedies that come to us labelled *officinal*."

All respectable chemical manufacturing houses, both in this country and in Europe, prepare very many extra pharmacopœial articles, and physicians of the highest skill and reputation in all parts of the world use them largely in their practice. During the past ten years we have felt it to be a part of our duty, as operative chemists, to watch carefully for all improvements made in rendering medicinal substances pleasant and attractive, for all new agents suggested, and to prepare and place them in the hands of the profession for trial.

It has been mainly through our efforts that such valuable agents as citrate of iron and strychnine, Monsel's per sulphate of iron, oxalate of cerium, hypophosphite salts, elixir bark and iron, permanganate of potassa, ammonia ferric alum, Dr. Pudduck's "iodide of lime," bromide potassium, &c., &c., have been introduced to the physicians of this country. Some of these we were the first to suggest and prepare, and evidence in our possession leads us to believe that few physicians who have made fair trial of these agents would be willing to relinquish their use. No greater service can be rendered the medical profession than to place in their hands remedies in an agreeable and attractive form. One of the greatest obstacles encountered is the aversion of patients to nauseous medicines, and we do not believe that physicians desire chemists and pharmaceutists to stop all efforts to improve the nature of remedies, and their combinations. It is the business of the latter to render all the aid possible to the former, so that their responsible labors may be made as pleasant and successful as possible. We shall refer to this subject again.

As regards the unjust attack made upon us by the *M. & S. Journal*, we have but little to say. The allusion to *this Journal* explains the cause. We are urged by several of its patrons, our friends, to refer to it in terms of severity such as is manifestly deserved; but this we shall not do. We have for many years entertained a high regard for the *M. & S. Journal*, and have aided in its support, both by contributing largely to its pages, and by making it known in the wide circle of our medical friends. Its corps of contributors is very able, and it has held an honorable position in medical literature. The publishers should see to it that its editorial supervision is judicious and competent, and that it is not thrust into wrong and undignified positions, by exhibitions of jealousy and foolish conceit.

Questions and Answers.

"Is good illuminating gas ever found issuing from the earth in any considerable quantity?" B. L.

It is, in numerous localities, both in this country and other quarters of the globe. The village of Fredonia, in New York, is stated to be lighted by the use of natural carburetted hydrogen gas, which pours from a cavity in rocks in that vicinity. We remember when crossing the Apennines in Italy, a few years since, we came upon a little dirty village on the Adriatic side, and found gas jets distributed through the streets. Not believing so poverty-stricken a place could have gas works, we made inquiries, and were guided to a ravine back of the town, where, through a hole bored in the rock, gas poured forth in great quantities. The pressure was sufficient to supply the jets, and afford the people a costless light throughout the year.

"In what particular does the sweet principle in the urine of diabetic patients differ from ordinary sugar?" DEXTER.

The sugar in ordinary use is cane sugar ($C'_{12} H_{11} O_{11}$); diabetic sugar is what is known as grape sugar ($C'_{12} H_{14} O_{14}$). It will be seen that it has in its composition three atoms more of hydrogen and oxygen than cane sugar, and therefore differs essentially from it. Glucose, or grape sugar, is less sweet, harder, and less soluble in water than that from cane. The influence of vital action in the system changes cane sugar into grape sometimes with great rapidity.

"Are you willing we should advertise some of your pharmaceutical preparations if we do so at our expense?" S. L. B. & Co., Druggists, Vt.

You will greatly oblige us by not advertising in any way. Our articles are intended to be dispensed under the patronage of physicians, and are not such as require newspaper notice. During the past ten years we have never paid a dollar for advertising any medicinal articles, except to one journal, and that the *Medical and Surgical Journal* of this city. When our preparations are purchased by others they become their property, and we cannot control the methods of sale. Several instances where parties have advertised have come to our knowledge, and doubtless there are others of which we have no cognizance. A gentleman who purchased largely of one preparation, the sarsaparilla with iodide of lime, advertised it at his own expense in some of the Western States, but at our special request has consented to withdraw those advertisements as soon as the present contracts expire. We hope no druggist or physician who purchases our preparations will allow them to be advertised in any journals except those of a medical or pharmaceutical character.

"At the explosion at the Watertown Arsenal, in September, the windows of the surrounding buildings were blown *outwards*. Will you explain this?" B.

The explanation which seems most reasonable is, that a column of air immediately over the place of the explosion was displaced or raised upwards, thus creating a partial vacuum, towards which the lower strata rushed at the instant of the explosion. The indoor air, thus relieved in part from restraint, would, by its elastic force, press the windows outwards.

"Is the protoxide of iron thought to be any more efficient as a medicinal agent than other preparations of the metal, and is there any secret concerned in the manufacture of the so-called protected solution of the article?" E. R. B.

The researches of M. Bouchardat Quevenne, and others, and the experience of many physicians, go to show that the protoxide, or some of the proto-salts, are more prompt and efficient medicines than other forms of the metal. There is a proprietary article which is made from a secret formula, although its character is clearly understood by many. We published in the *B. M. & S. Journal* in August, 1859, a method of preparing the proto-acetate, the salt we prefer to all others. This we protect from change by sugar, and the evidence in its use for many years proves it to be of great excellence.

NEW HAMPSHIRE MEDICAL COLLEGE.—Through Prof. Smith we learn that this venerable and excellent institution is in a very flourishing condition. Many of its graduates and its past and present professors are among the most distinguished men in the country. We wish the institution continued prosperity. A quarter of a century has rolled by since we were students within its walls. Prof. Peaslee, now in Europe, still continues to occupy one of the chairs, and Prof. Crosby remains at the head of the department of surgery. Roby, who was an interesting lecturer, has departed this life. In looking around and recalling the names of fellow-students, we find death has made sad gaps in the circle. But little more than half remain of those we knew, who, in 1842, gathered with us around the operating table of Prof. Crosby. And so we move on.

AMERICAN PHARMACEUTICAL ASSOCIATION.—This body held its fourteenth annual meeting at Detroit, Michigan, commencing August 14th. Our business engagements were such that we could not attend, but we find in the *American Journal of Pharmacy* a full account of its proceedings. There were present from the Massachusetts College of Pharmacy, Henry W. Lincoln, George F. H. Markoe, and John Butterworth, of this city, and R. R. Kent and Charles A. Tuffts. Frederick Stearns, of Detroit, was chosen president for the present year,—a most excellent selection. President Lincoln, upon retiring, delivered an address, which is spoken of in terms of high commendation by those who were so fortunate as to hear it.

The meeting was attended, as usual, by those veterans in pharmaceutical science, Dr. Squibb, and Profs. Proctor and Parish of Philadelphia. The papers and suggestions of these gentlemen add much to the importance and usefulness of the meetings, and we hope the day is very far distant when we shall be deprived of the results of their labors. The attendance of members we judge was not quite as large as usual. This may be owing in part to the presence of cholera in many of the Western cities. The convention adjourned to meet in New York next year.

Worthless Drugs.

We have long felt that much of the apparent want of success on the part of physicians in the treatment of disease was due to the worthless character of the agents which are employed. The demand is for cheap articles, without much regard to quality. Having recently, while absent, had occasion to need a small quantity of glycerine for external use in a case of abrasion of the skin, we searched in vain through the shops, in a city of twelve thousand inhabitants, for a pure article; not a drop such as was proper to use could be found. This we apprehend is the case as regards many articles which enter into prescriptions: they are either inert or positively injurious. Physicians cannot be too careful as regards the character of remedial agents.

Costly Medicines.

The alkaloidal principle of many vegetable substances is so sparsely disseminated through them, and the difficulties of their isolation so great, that there are quite a number which are very costly. Among them is *Narcine*, one of the alkaloids of opium, which is now attracting considerable attention. This is worth very much more than its weight in gold. We furnish it to the trade in little ten-grain phials, and the druggist dispenses it in the form of pills or powders, as the physician may direct. Each dose, of one-fourth or one-half a grain, would cost about twenty-five cents, probably, as received from the druggist. If much were required, the medicine would cost more than the fees of the medical attendant. It is used in cases of nervous wakefulness and to relieve pain. We have experimented with it to a considerable extent, and have found that it produces quiet and refreshing sleep, without any unpleasant after consequences. It does not constipate like morphine, but has rather the opposite effect. It would be a boon to suffering humanity if nature had supplied it in larger quantities, so that its cost would have been moderate.

A New Truss.

Dr. Howard Sargent, Chester Park, in this city, has shown us a new truss which he has recently devised, and which appears to be a decided improvement upon anything which has hitherto been suggested. It consists of a wide elastic strap with proper adjustments, and the pad, or substance to cover the hernial ring, is constructed of *sponge*. This affords great ease and comfort to the patient, and tends to promote a rapid cure. Dr. S. informs us that he has tried it upon six cases of rupture in children, with the most satisfactory results. We are certain that physicians will be glad to know of any improvements in this form of instrument, as the kinds now in use, with the steel spring and hard pad, are far from being satisfactory. Dr. S. has left at our office a few of the new trusses, which he is desirous should be tried by physicians, who will communicate to him the results of their trials. We will furnish them upon application.

Chemical Examination of Urine.

The service which chemistry is capable of rendering to medicine is fully recognized by physicians, and, to a considerable extent, its aid is summoned in determining the nature of disease. It must be confessed, however, that there are far too few who invoke assistance from this quarter, and that the healing art suffers some opprobrium in consequence. The probable reason why so few physicians employ chemical testings as an aid in diagnosis is, that they regard such labor difficult, and that only professional chemists are able to obtain reliable results. Such impressions are certainly in part erroneous. Nothing, for instance, is more simple or easily understood than the work of testing urine, and this constitutes one of the most important auxiliaries in diagnosis which the physician can call to his aid. During the past twenty-five years, the writer's services have been constantly solicited in the examination of urine, blood, and other of the more important animal products, both healthy and morbid, and in a large number of these instances the work could have been easily and readily performed by those who entrusted to him the service.

With the view of offering aid to our readers in this important department of chemical investigation, we have concluded to arrange, in a brief and comprehensive way, some plain directions for analyzing or testing urine.

As regards apparatus, but very little is required. A dozen test tubes of medium size, two or three watch crystals, a spirit lamp, specific gravity apparatus,—these, with test paper, a few acids and alkalies, and the outfit is sufficiently complete. The whole may be purchased for about three dollars. It is presumed that all intelligent physicians possess a microscope adapted to medical purposes. If any, however, have not this indispensable instrument, they should, without delay, procure one. The cost may not exceed fifty dollars for one of adequate power, but if this sum seems large, they can procure for a very few dollars some one of the little devices which modern ingenuity and skill have provided, and which

answer admirably many of the purposes of more costly instruments. A friend a short time since called my attention to a little affair not larger than a lady's thimble, and costing but one dollar, which afforded a power, if we mistake not, of forty diameters, and was so constructed as to serve an excellent purpose for medical investigation. A more particular description of this may be given at a subsequent time.

In examining the urinary secretion, there are certain physical indications which awaken suspicion, and lead to a desire to institute chemical tests. The liquid has some peculiarity of appearance or color, or seems abnormal in the sedimentary deposit, or its specific gravity is conjectured to be too high or too low. If it is suspected to be diabetic, the first step is to ascertain its specific gravity. This may be done by the urinometer, a little instrument constructed on the principle of the hydrometer. Its cost is about one dollar, and it can be procured of apparatus dealers in all large cities. Healthy urine varies in specific gravity from 1003 to 1030, depending upon the food taken, and the time of day at which it is passed. The urine selected for examination should be that passed after a night's rest, and if found to be somewhere between 1015 and 1025, no positive morbid condition is indicated. If however, it is found ranging between 1025 and 1045 it is probably *diabetic*. While a moderately low specific gravity is no positive proof of the absence of sugar, a high specific gravity is one of the most certain indications of its presence. If the urine under examination is of high specific gravity, and if, after standing, a white scum forms resembling flour, and if about a teaspoonful mixed with half the quantity of liquor potassa and boiled in a test tube over a spirit lamp assumes a *brownish tint*, it may be pretty safely concluded that it is diabetic. To render it still more certain, fill a test tube one-third full of the urine, and then add of a solution of blue vitriol (sulphate of copper) a drop or two, just enough to give it a very pale blue tint; now add of liquor potassa enough to fill the test tube half full, and heat it over the spirit lamp until it boils. If sugar is present, a *reddish* or *yellowish brown* precipitate will be found; if no sugar is present, the precipitate will be *black*. If the physician entertains strong suspicions that he has a diabetic patient, he should, before deciding, institute the chemical tests, even when the density of the urine is not found abnormal. If the urine is suspected to contain *albumen* (Bright's disease), fill a test tube one-third full, and gently boil it over the lamp. If albumen is present it will coagulate and form a more or less dense white precipitate. If the albumen is present only in minute quantity, it may cause merely a delicate opalescence, or when in larger quantity it may separate in curdy flakes, and if very abundant may cause the liquid to gelatinize and become nearly solid.

The physician, however, must not conclude that his patient has Bright's disease because of the formation of a white precipitate upon boiling the urine, as an excess of earthy phosphates will produce this appearance when no albumen is present. To prevent the possibility of error, he should test another portion of the urine by dropping in a few drops of dilute nitric acid. If this affords a milkiness which remains, and if the boiling also gives like results, he may be certain of the presence of albumen.

If urine is suspected to contain too much *urea*, place a drop on a slip of glass, and add to it a drop of pure nitric acid. Rhomboidal crystals will form in a few moments if urea is present in large excess. If none form which are visible to the naked eye, use the microscope, and if, after standing in a cool place half an hour, but few are revealed by it, it may be concluded there is no excess of urea.

If urine contains *uric acid* in excess, it usually has rather a high color, either deep amber or reddish brown. It promptly reddens litmus paper. As it cools after boiling, a crystalline sediment forms of a decided red color. Place a little of this sediment on a slip of glass, and examine with a microscope; if single or groups of well-defined crystals are seen, they are those of uric acid. Warm the urine containing the sediment, and uric acid, if present, *will not* dissolve. Add a few drops of liquor potassa to the sediment; uric acid *dissolves* in contact with this. This acid is present in minute quantities in healthy urine; with a little experimenting the physician can readily judge of its presence in abnormal quantities. This point it is important to know, as in certain diseases such knowledge is a valuable assistant to the physician in diagnosis.

(TO BE CONTINUED.)

Dr. Gould.

The death of Dr. A. A. Gould, which occurred Sept. 15th, will be deeply felt among his professional and other friends in this city, and among scientific men throughout the country. In addition to the care of a large practice, Dr. Gould had published a number of works illustrating his favorite studies: A translation of Lamarck's Genera of Shells, ditto of Gall's Works, ditto of Roston on Diagnosis, Invertebrate Animals of Massachusetts (not printed), Principles of Zoölogy (in connection with Prof. Agassiz), Mollusca of the U. S. Exploring Expedition, completion and editing of Dr. Binney's posthumous work on the Mollusca of the U. S. (the two last in press). At the time of his death he was preparing a report on the Insects of Massachusetts at the request of the State Legislature. Dr. Gould received his degree in medicine in 1830, and was sixty-one years old at the time of his death.

Elixir Bark and Iron.

Dr. Hibbard, of Indiana, states in the Cincinnati Journal of Medicine, that he examined our Elixir of Bark and Iron, and was unable to find a protosalt of iron in it. Afterwards he employed Dr. Weist, a chemist, to examine it, and he writes to Dr. Hibbard that "he has carefully examined several specimens of the preparation, and finds them to contain a protosalt and a sesquioxide salt of iron in varying quantities, the quantity of the one or the other salt probably depending upon the age or exposure of the particular specimen examined." This result led us to examine several packages which have been standing in our laboratory *four years*, and we found them *entirely unchanged*. The protosalt was hardly influenced by time and exposure, and the integrity of the article was perfect. This we consider a very remarkable test, and conclusive of its unchangeable character.

The Elixir of Bark and Iron so long prepared by us, and so well known, always contains the protosalt of iron in proper quantity, and if Dr. Hibbard failed to detect it, he either experimented with a spurious article, of which there are many, or he was singularly unskilful in his manipulations. It is a very simple matter to test for protoxide of iron, and we give directions for doing it upon every label. A few drops of solution of ferri cyanide of potassium let fall into a wineglass of the elixir should afford a dark-blue reaction if a protosalt is present. Physicians can try this for themselves, and need not rely upon Dr. Hibbard or any one else for the facts in the case.

TINCTURA OPII DEODORATUM. — Prof. Wood makes the following observations in the new edition of the U. S. Dispensatory, page 1406, regarding the name of this preparation: —

"The name, Tincture, we think unfortunate, as the preparation is really *not a tincture*, the alcohol being used in no degree as a menstruum, but only in reference to its preservative influence. We should have preferred *Infusum* Opii Deodoratum, or some title expressive of the fact that it is effectively a watery solution of opium, deprived of the odorous and other injurious ingredients of the drug."

We entirely coincide in the views as expressed by Prof. Wood that it is "not a tincture," and therefore should not be designated as such. We have labelled the article as prepared by us, "*Infusion*." This gives not only the *correct* name, but it will prevent mistakes in confounding it with laudanum, or the true tincture of opium.

PEPSINE WINE. — Pepsine dissolved in pure sherry wine is a favorite method of administering the remedy in England. We can furnish this article in packages holding one pint, and also in quarts. Dr. Chambers's observations in this number, regarding its great value in some forms of derangement of the digestive functions, will be read with interest.

SYRUP OF COPAIBA AND SYRUP OF CUBEBS IN DIPHTHERIA AND CROUP, AS USED BY M. TRIDEAU. — The following is the recipe for the syrup: —

Take of Copaiba, two troy ounces and a half.
Gum Arabic, in powder, five drachms.
Water, twelve and a half drachms.
Essence of Peppermint, sixteen drops.
Syrup of Sugar, twelve and a half troy ounces.

Emulsionize the copaiba with the water and gum, then add the essence, and lastly the syrup, and mix. For adults half a table-spoonful of the syrup of copaiba every two hours; besides a table-spoonful of simple syrup used as the vehicle for fifteen grains of powdered cubebs recently powdered, given also every two hours in the intervals of the dosing with copaiba.

In serious cases the doses of cubebs may be carried to six drachms in twenty-four hours, and for children three drachms.

It sometimes happens, after twenty-four hours' use, the copaiba will not be tolerated by the stomach; when it should be temporarily suspended. Two or three drops of laudanum in every ounce of syrup corrects this difficulty to a great extent. This medication was employed by Dr. Trideau in the prevalence of a serious epidemic in the department of Mayenne, with great success. — *Repertoire de Pharmacie*, March, 1866, p. 357.

MESSRS. J. R. NICHOLS & CO.

I take the liberty of sending you a recipe for a cough and alterative pill, which I have used for thirty years with advantage: —

℞	Pulv. opii, ...	grs. 40
	Subm. hydrag., . . .	grs. 60
	Pulv. ipecac., ...	grs. 30
	Ext. hyosciami, . . .	grs. 60

Mix, if necessary, with syrup of ginger, and make pills No. 120. Yours, &c.

EBENEZER WOODWARD, M. D.,
Quincy, Mass.

Many of the affections of the mouth, such as toothache, caries, ulcers, looseness of the teeth, inflammation and bleeding of the gums, fetid breath, fungus growths or swellings of the tongue and gums, are effectually prevented or cured by the application of the following wash:

℞	Peppermint, ...	3 pts.
	Sage, ...	2 "
	Red sandal-wood powd. . .	4 "
	Alcohol, ...	40 "
	Water, ...	160 "

Rancid Butter for Cooking.

Many persons sneer at the common notion that butter too rancid to be eaten raw upon bread may be used without objection in cooking; but this notion, like many other popular ideas, is more in accordance with the truth of the matter than the imperfect knowledge which ridicules it.

All fats are compounds of acids with glycerine. Butter is a mixture of several fats, and one of them, constituting, however, only a small portion of its mass, is butyrine; this is a compound of butyric acid with glycerine. Butyrine, like other fats, is a neutral substance, but when it is decomposed — in other words, when the butyric acid is separated from the glycerine with which it is combined — we then have the two substances, the acid and the glycerine, exhibiting each its peculiar properties. Butyric is a very powerful acid, caustic and sour, and having that peculiar strong odor which is characteristic of rancid butter. One of the early steps in the decay of butter is the decomposition of the butyrine, which is made manifest by the odor of the butyric acid set free, and by the sour and biting taste of this acid.

Now, at a temperature of 315 degrees, butyric acid is evaporated; hence it is only necessary to raise the temperature of the butter to this point in order to drive off the acid which makes it rancid, and to leave the remainder perfectly sweet. If rancid butter is mixed in cake, a portion of the butyric acid will be absorbed by the water in the cake, and it may not be all expelled by the heat in baking; but if the butter is used for frying in an open pan, it is pretty certain that the butyric acid will all be evaporated. With a knowledge of the properties of butyric acid, a skilful cook ought to be able to use rancid butter in such ways as to retain none of the rancidity in the cooked articles. — *Scientific American.*

MESSRS. J. R. NICHOLS & CO.

In return for your kindness in sending me the Journal, I send you the following recipe, which has been thoroughly tried, and found admirably adapted to carry off bile where in excess, and stimulate secretion of the same in constipated and torpid bilious habits: —

℞ Podophyllin, irisin,	. .	ea. ℈j.
Pulv. rad. Zinziber,	. .	ʒ ss.
Ext. juglans cinere.	. .	ʒj.

M.; f. pil. No. 30. Dose, one or two at bedtime.

A sure and effectual evacuator of the bile, and what may well be called *one of the best* bilious pills. Where calomel is not indicated or desirable, it is the best substitute.

G. H. ATWOOD, M. D., Woodbury, Ct.

NEW AND VALUABLE CEMENT. — Take iron sponge, triturate finely, and mix with sand, moistened with a weak solution of muriatic acid. The iron is oxidized by the acidulated water, and the silex forms with the oxide silicate of iron, which possesses great tenacity, and is not affected by atmospheric changes, or by acid or alkaline liquids at a boiling temperature. This cement will unite, into a solid mass, stones, pebbles, &c., forming conglomerates impervious to moisture, and capable of being moulded into statues, bas-reliefs, &c. — *Intellectual Observer.*

SOAP OF NAPLES — *Liquid.* — Take twelve pounds of good soap and cut into small pieces; melt it in two or three quarts of rose and orange flower water. To keep it liquid, add to it two pounds of oil of flowers; melt well, and boil a little; pass the mixture through a thick cloth, and perfume it like soap in cake, in the same proportion. If you have not the oil of flowers when your soap is melted, you could add to it two quarts of good essence of soap, which you allow to incorporate with the soap; quarter of an hour after pass the whole, and perfume.

TO EFFACE WRITING. — Solutions of cyanide of potassium and oxalic acid. Wash with a camel's-hair pencil, dipped alternately in these solutions.

The Uses of Sulphurous Acid Gas.

We alluded to Dr. Dewar's experiments with sulphurous acid gas, as a disinfectant, in our last number. Our experience with this agent has been very great, and we think the gas should never be introduced into popular use. It cannot be used with safety, however valuable it may be.

For many months Dr. Dewar, of Kirkcaldy, has been engaged in impressing upon the government, the public, and the profession, the importance of employing the fumes of sulphur in the prevention and cure of disease, and quite recently he has extended their use in a different and scarcely less important direction, — the preservation of animal food. Without accepting his views of the nature of disease — pointing, as he seems to indicate, to the origin of all disease from cryptogamic spores — as at all correct, we may nevertheless state that he has arrived at several interesting and remarkable practical results. Dr. Dewar's experiments were at first initiated in connection with cattle plague, and his method of fumigating byres is to take a chafer two-thirds full of red cinders, place a crucible in them, and in it a piece of sulphur stick the length of one's thumb, which is sufficient for a byre containing six cattle. If ordinary attention be paid to ventilation, the attendant may shut himself in along with the cattle during the process, not only without detriment, but, as we shall presently see, with occasionally unlooked-for benefit. This process may be repeated four times a day, and the result has been that, when this system has been thoroughly and determinedly practised, there has been no case of death among the cattle from any epidemic cause whatever. Nor has this been the sole result. Ringworm, angle-berries (*molluscum*), mange, and lice, have disappeared; and a horse which had been a few times unintentionally fumigated was unexpectedly cured of obstinate grease of the heels. Nay, more, in a large dairy, which for thirty years had maintained a notorious character for mortality from pleuropneumonia, and the present tenant of which had for eight years past never been one whole month free from this disease amongst his cattle up to the 1st of November last, and had buried as many as sixteen cows during the preceding twelve months, the last of them only three days before he began to fumigate, this disease has since then ceased to be observed, and the cows have remained perfectly healthy. These facts are extremely remarkable, and of themselves would compel a further investigation of the influence of sulphurous acid fumes; but what we have further to relate is still more extraordinary, and could scarcely be believed but upon the testimony of an upright and honorable medical man, such as we know Dr. Dewar to be. For not only were chilblains and chapped hands found to disappear from the hands of the attendants upon those cattle which were regularly fumigated, but in the case of a groom of Dr. Dewar, supposed to be dying from phthisis, and who was employed to fumigate certain cattle, the most extraordinary results were attained; for within one week the night sweats had ceased, his cough gradually abated, the expectoration diminished, and he gained nearly two stone within four months, and though now dependent for existence upon one lung or little more, he looks nearly as strong and is as able for ordinary stable work as he was previous to his illness.

This case has been observed by Professor Sir J. Y. Simpson, by Dr. Halliday Douglas, and by other medical men who are conversant with the facts. Indeed, so remarkable and encouraging have the results obtained in this and in several other similar cases appeared to Dr. Halliday Douglas, that he had determined to construct a chamber for the purpose of employing sulphur fumigation in connection with the Chalmers Hospital, that he may have an opportunity of personally investigating the matter and testing the results. It is truly somewhat singular, and peculiarly illustrative of the circular — or shall we rather say spiral — manner in which medicine moves, or, if you will, progresses, though its progression is limited, and as yet not well defined, that Hahnemann was led by his theory of disease to propound sulphur as the most important remedy in tuberculosis, while Dr. Dewar, from the success of sulphur in its treatment, has been apparently led to deduce its origin from cryptogamic sporules — a closely similar theory. With theories, however, there is at present no need of troubling ourselves; the practical results are sufficiently striking to ensure for this treatment a more careful and extensive trial. In diphtheria and various other complaints sulphur fumigation has proved immediately and strikingly beneficial; and in at least one instance it has almost instantly cut short an outbreak of hospital gangrene in the wards of our Edinburgh Infirmary, and, properly employed, it may possibly prove capable of limiting the spread of cholera, fever, and other contagious diseases. For the disinfection of inanimate material the addition of a little nitre to the sulphur, and the combination of these fumes with the steam of boiling water, improvises a disinfectant at once the most powerful, most searching, and most efficacious which can be obtained, utterly destructive at once of any latent contagion, and of every form of insect life. But we have not yet exhausted all the strange properties of sulphur fumigations: it is not only productive of animal health while in life, but it also prevents putrefaction after death. In some recent experiments (in June weather) in regard to this, a sheep's head was kept quite fresh and sweet for thirteen days; a boiled crab — well known to be a peculiarly perishable edible — was quite sound after eight days; haddocks, after being smoked two or three times, were found to be quite fresh at the end of eight days. The process is equally applicable to every other form of animal food, which merely requires to be fumigated three or four times a day in a chamber closed as much as possible against the admission of fresh air. At a convivial entertainment recently given by Dr. Dewar, the company were entertained with viands thus preserved, and one and all expressed their perfect satisfaction with the success of the process, as evinced by the satisfactory condition of the food presented to them.

How novel and strictly original Dr. Dewar's views are as to the pleasantly tonic virtues of sulphur fumigations, may be learned from a statement in the most recent work on Materia Medica, Dr. Scoresby-Jackson's "Note-Book," where he states that in sulphur fumigations "great care must be taken to protect the respiratory organs from the fumes by closing the apparatus round the neck;" and yet how inconsistent these ordinary views are with popular experience may be learned from the popular idea of the great benefit to be derived from new flannel, that is, flannel thoroughly impregnated with sulphur fumes, and also with the fact that in woollen mills, in certain departments of them, the workmen live from year's end to year's end in an atmosphere thoroughly impregnated with sulphurous acid gas. Unquestionably a laborious and tedious accumulation of experience in regard to the positive influence of sulphur fumes upon the health may be anticipated by an inquiry into the ordinary condition of such workmen; and we shall feel obliged if any of our readers shall be kind enough to contribute any information on this head, similar to that which was contributed to the "Monthly Journal," by Dr. Thompson, of Perth, in regard to the influence of an atmosphere charged with oil. It would indeed prove singular if, after all, the benefit supposed to be derived from oil was solely due to sulphur. — *London Pharm. Jour.*, August, 1866.

Patent Hair Restoratives.

The manufacture and sale of hair restoratives has always been a favorite with a certain class of public benefactors, whose disinterested labors have resulted in the foundation of many a fortune. We lately came across the specifications of an old English patent which will, perhaps, be interesting at a time like the present, when alcohol and bear's grease command such fabulous prices.

This patent was for "an apparatus for improving and restoring the human hair," introducing a new feature in this line. By the plan of this inventor combs and brushes are to be constructed of different metals, so that when in use electric currents are given off; "thereby the skin is caused to be stimulated and a healthy action ensues, restoring the hair to its original color, and generally improving its appearance." The same effect may be produced by having the articles formed partly of metal, having batteries connected therewith when in use. As the patent claim long since expired, the above method is open to any enterprising individual wishing to experiment. — *Scientific American.*

COMMENDATORY LETTERS.

From a large number of letters received from physicians, in which the Journal is spoken of in terms of commendation, the following are presented: —

I hope you will continue to publish the Journal, as I give it a decided preference to every other of the kind which has fallen under my observation. L. M. S., M. D., Berlin, Ct., Oct. 12, '66.

I think the Journal the most valuable publication for the cost I have ever seen. It presents to the physician interesting and valuable information which he requires in his daily practice, &c., &c.
W. L., M. D., Portsmouth, N. H., Oct. 7.

I find in your Journal much information which is valuable and instructive. Continue to send to my address.
A. W. B., M. D., Mystic Bridge, Ct.

I have read your Journal with much pleasure and profit, and regard it as a desideratum in medical literature.
A. D., M. D., Portland, Me., Oct. 6, 1866.

Permit me to say that my expectations of the value of the Journal are more than realized. It just fills a place in chemical and medical literature which has too long remained empty.
J. B. A., M. D., Sanbornton, N. H.

Have seen your Journal, and I am very much pleased with it. Send it to my address. C. B., M. D., Meriden, Ct.

The contents, both original and selected, are of great value to physicians as well as chemists and druggists.
J. DeW., M. D., Providence, R. I.

I would express the gratification that I feel, that you are meeting one of the requirements of druggists in sending out so valuable a paper. G. W. G., Lewiston, Me.

Your Journal is just the publication wanted. You have started well; go ahead. H. N. M., Wilmot, N. H.

I am much pleased with the Journal. Send it regularly.
G. H. P., M. D., St. Albans, Vt.

Allow me to say that I am much pleased with your Journal, and hope it will meet with the encouragement it deserves.
J. S., M. D., Jamaica Plain, Mass.

I beg to say that I have been looking for the second number of your Journal, so interesting and instructive, for some time.
S. T., M. D., Andover, Mass.

I am very much pleased with the paper, every square being full of life and light. Do not fail to send it to me.
I. V. T., M. D., Stetson, Me.

I mark my approbation of your Journal by remitting the sub scription for the year. J. T. W., M. D., Hartford, Ct.

Your Journal is a great addition to our medical and chemical literature, and our physicians with myself in this section value it highly. D. T. K., M. D., South Macon, Ill.

Have perused your Journal with great pleasure. Send us a copy.
Drs. O. & E., Odin, Ill.

I take pleasure in expressing my appreciation of the value and interesting character of your Journal. The first number was worth far more than the subscription price for the year.
C. L. I., M. D., New Haven, Ct.

Maintain the present high standard of the Journal, and you will make many friends among physicians.
G. S. D., M. D., Winchendon, Mass.

Have received No. 2 of the Journal. Please forward No. 1, as I wish to receive *each* and *every* number. Success to the Journal; it deserves it. R. W., M. D., Marcelline, Ill.

I have perused both numbers of your Journal with great interest, and I am sorry that it is not published semi-monthly instead of bi-monthly. P. A. C., M. D., Mansfield, Ohio.

I received the second number of your Journal, and called the next day at your office and subscribed for the cheapest and most useful medical publication I have met with. I wish it success.
H. S., M. D., Boston, Mass.

We need a journal like yours to "post us up," not only in the *new* agents, but *new combinations* of the *old*. I wish you much success. T. W., M. D., Hillsboro', Ill.

Your "bi-monthly" contains a great deal of valuable information for the medical profession, and I take the liberty to inclose $1.00, as I consider the numbers already received worth the fifty cents; the other fifty cents is for what is to come, and the stern face you set against quackery of all sorts. All in all, the Journal is a *good* thing. H. H. Hill, M. D., Augusta, Me.

Taking the first two numbers of your Journal as specimens, it cannot fail to give the highest satisfaction.
E. K. B., M. D., Sharon, Vt.

BOSTON JOURNAL
OF
CHEMISTRY AND PHARMACY.

VOLUME I. Boston, January 1, 1867. NUMBER IV.

THE
Journal of Chemistry and Pharmacy
IS PUBLISHED BI-MONTHLY AT
150 Congress Street, Boston,
BY JAS. R. NICHOLS & CO.
TERMS, FIFTY CENTS PER ANNUM.

All letters and communications should be addressed "Office of Journal of Chemistry and Pharmacy," Boston, Mass.

Celestial Chemistry.

We find reported in the *London Chemical News*, a lecture by Wm. Higgins, F. R. S., on "Spectrum Analysis as applied to the Heavenly Bodies," in which some most interesting statements are made regarding the color of the stars, their variable brightness, and their sudden appearance and disappearance in the heavens. We presume that many of our readers are aware that *chemists* are now studying the heavenly bodies with as much industry and zeal as astronomers, and that, through the wonderful results of *spectrum analysis*, the chemical nature of the materials of which the stellar worlds are constructed, is beginning to be understood.

Immediately upon the appearance in Europe, five or six years ago, of the papers of Bunsen and Kirchoff, describing the nature and results of their experiments in spectrum analysis, we gave directions to the late Mr. Fitts, of New York, the well-known optician, to construct the apparatus as described by them; and we believe our instrument was the first in practical use in this country. The new world of wonder and delight which was opened to us by this apparatus, it is impossible to describe. This method of chemical analysis became at once popular, and has since been pursued with much assiduity and skill, and progress in chemical research has been greatly promoted.

In a future number of the *Journal* we intend to present a popular description of the apparatus for spectrum analysis, and the methods and results of its employment. Our paper is intended to interest and instruct those who have but little time or opportunity for deep research, or profound investigation, but who wish to be informed of the discoveries and results of the labors of the great scientific explorers; therefore, our statements must be plain and comprehensive. We have room only for Mr. Higgins's statements regarding

TEMPORARY STARS:

"With the variable stars, modern opinion would associate the remarkable phenomena of the so-called new stars, which occasionally, but at long intervals, have suddenly appeared in the sky. But in no case has a permanently bright star been added to the heavens. The splendor of all these objects was temporary only, though whether they died out or still exist as extremely faint stars is uncertain. In the case of the two modern temporary stars, that seen by Mr. Hind in 1845, and the bright star recently observed in Corona, though they have lost their ephermal glory, still continue as stars of the tenth and eleventh magnitudes.

"The old theories respecting these strange objects must be rejected. We cannot believe with Tycho Brahe that objects so ephemeral are new creations, nor with Riccioli that they are stars, brilliant on one side only, which have been suddenly turned round by the Deity. The theory that they have suddenly darted towards us with a velocity greater than that of light, from a region of remote invisibility, will not now find supporters.

"On May 12th last, a star of the second magnitude suddenly burst forth in the constellation of the Northern Crown. Thanks to the kindness of the first discoverer of this phenomenon, Mr. Birmingham, of Tuam, I was enabled, conjointly with Dr. Miller, to examine the spectrum of this star on May 16th, when it had not fallen much below the third magnitude.

"The spectrum of this star consists of two distinct spectra. One of these is formed by four bright lines. The other spectrum is analogous to the spectra of the sun and stars.

"These two spectra represent two distinct sources of light. Each spectrum is formed by the decomposition of light, which is independent of the light which gives birth to the other spectrum.

"The continuous spectrum crowded with groups of dark lines shows that there exists a photosphere of incandescent solid or liquid matter. Further, that there is an atmosphere of cooler vapors which give rise by absorption to the group of dark lines.

"So far, the constitution of this object is analogous to that of the sun and stars, but in addition there is the second spectrum, which consists of bright lines. There is therefore a second and distinct source of light, and this must be, as the character of the spectrum shows, luminous gas. Now the two principal of the bright lines of this spectrum inform us, by their position, that one of the luminous gases is hydrogen. The great brightness of these lines shows that the luminous gas is hotter than the photosphere. These facts, taken in connection with the suddenness of the outburst of light in the star, and its immediate very rapid decline in brightness, from the second down to the eighth magnitude in twelve days, suggested to us the startling speculation that the star has become suddenly enwrapped in the flames of burning hydrogen. In consequence, it may be, of some great convulsion, enormous quantities of gas were set free. A large part of this gas consisted of hydrogen which was burning about the star in combination with some other element. This flaming gas emitted the light represented by the spectrum of bright lines. The spectrum of the other part of the star's light may show that this fierce gaseous conflagration had heated to a more vivid incandescence the solid matter of the photosphere. As the free hydrogen became exhausted the flames gradually abated, the photosphere became less vivid, and the star waned down to its former brightness.

"We must not forget that light, though a swift messenger, requires time to pass from the star to us. The great physical convulsion which is new to us is already an event of the past with respect to the star itself. For years the star has existed under the new conditions which followed this fiery catastrophe."

How amazing and startling the contemplation of the fact of worlds wrapped in actual flames, enveloped in a vast ocean of burning hydrogen! Mr. H. thinks no new stars have been added to the heavens.

In this connection we are led to present the conclusions of Professor Hinrichs of the Iowa University, regarding the ultimate constitution of matter, as presented in an able article in the last issue of *Silliman's Journal*. The results of his investigations in the department of spectrum analysis lead to the conclusion that there is but one primary element, the "element of elements," and that our sixty or more are resolvable into one. He thinks that spectrum analysis in its demonstrations leads to this view, and that the old chemical axiom respecting a multiplicity of distinct simple bodies is being shaken. Whatever the new method of analysis may accomplish in this direction, it is quite certain that it establishes the truth of the unity of matter throughout the vast universe. It proves that the countless worlds that roll through space are made up of precisely the same materials as our own planet. What we call sodium, potassium, iron, zinc, nickle, etc., and hydrogen, oxygen, etc., exist upon, or enter into the structure of planetary bodies and the fixed stars, and spectral research reveals no new elements in any part of the universe. All the results of modern scientific investigation point in one direction, and that is towards the great principle of *simplicity* in all the works of the Omnipotent Mind. Professor H. concludes as follows:

"It is now about twelve years since we first started the hypothesis of one primary matter as the element of elements, not in the shape of a philosophical idea, but as a physical hypothesis, *making it the basis of a theoretical, mechanical deduction of the properties of the elements.* Our first communications met with no favor: nevertheless we have continued to develop the consequences of this hypothesis.

"It seems as if spectral analysis has shaken the axiom of the elementary nature of the so-called chemical elements in minds formerly adverse to questioning that axiom. Believing the scientific public now more apt to give a hearing to our theory, we intend to publish a series of articles, giving the properties of the chemical elements as functions of their atomic weight, this expressed as in the few instances given in §30. We hope to prove, that *the unity of matter is as real as the unity of force* — both being the creative work of *one* all-pervading Being."

Communicated to Journal of Chemistry and Pharmacy.

Use of Sulphurous Acid Gas in a Small-pox Hospital.

Portsmouth, Ohio, Nov. 20th, 1866.

In the month of May last, small pox appeared as an epidemic in our city, but was for some time confined to that portion of the city inhabited by the negroes and the lower class of whites. In order to confine it as much as possible, and prevent its spread throughout the entire city, a pest-house was provided, and every case of the malady was diligently sought out by the Board of Health, and sent thither. In all instances where it made its appearance in one or more members of a family, the entire family, (including infants in many cases,) was sent to the pest-house. I was appointed physician in charge. My attention having been called some time previously to the subject of "sulphurous acid fumigation," I determined at once to make the test. I began very gently at first, fearing that its inhalation might prove injurious; but, finding that *all* bore it well, I increased both in the frequency and amount of my fumigation, until, at every operation, I had given the hospital building what I called a *thorough* and *complete* cleansing.

In the commencement I fumed but one room or ward at a time, first moving all the patients out; but as the number of patients increased, I found this impossible,

and began, as before stated, very gently; but each day's experience proved to my mind more conclusively that, if any danger in its use existed, it was very trifling. The result of this process was, that of all the persons brought to the hospital upon the hypothesis, that because they had been exposed to the disease they would surely have it, not one of the entire number had the *slightest symptoms* of variola. Nor is this the only important fact connected with the subject. The disease appeared to be very much modified. In the worst cases of the confluent form, the pustules filled and dried rapidly, and the crust came away easily and quickly, leaving the skin almost entirely free from the marks of its violence. Many cases of the severest form of the disease, when convalescent, might have been seen without an eschar pitted beneath the surface. In addition to these facts, I may say that the mortality list was so trifling as scarcely to deserve attention, — only one in 37, or less than .03. My reason for making these statements is mainly to give my evidence from actual experience, — that the inhalation of *sulphurous acid gas*, to a reasonable extent, in a closed room, is not prejudicial to good health, as opposed to those who believe it to be not only deleterious, but absolutely dangerous to human life. Yours truly,

JNO. A. LAIR, M. D.

Rhigolene,

A PETROLEUM NAPHTHA FOR PRODUCING ANÆSTHESIA BY FREEZING.

BY HENRY J. BIGELOW, M.D.,

Professor of Surgery in the Massachusetts Medical College.

The above name is proposed as convenient to designate a petroleum naphtha boiling at 70° F., one of the most volatile liquids obtained by the distillation of petroleum, and which has been applied to the production of cold by evaporation. It is a hydrocarbon, wholly destitute of oxygen, and is the lightest of all known liquids, having a specific gravity of 0.625. It has been shown that petroleum, vaporized and carefully condensed at different temperatures, offers a regular series of products which present more material differences than that of their degree of volatility, and that the present product is probably a combination of some of the known products of petroleum with those volatile and gaseous ones not yet fully examined, and to which this fluid owes its volatility. A few of these combinations are already known in trade, as benzoline, kerosene, kerosolene, gasolene, etc., all of them naphthas, but varying with different manufacturers. I procured, in 1861, a quantity of kerosolene of four different densities, and found the lightest of them, the boiling point of which was about 90°, to be an efficient anæsthetic by inhalation. When it was learned here that Mr. Richardson, of London, had produced a useful anæsthesia by freezing through the agency of ether vapor, reducing the temperature to 6° below zero, F., it occurred to me that a very volatile product of petroleum might be more sure to congeal the tissues, besides being far less expensive, than ether. Mr. Merrill having, at my request, manufactured a liquid of which the boiling point was 70° F., it proved that the mercury was easily depressed by this agent to 19° below zero, and that the skin could be with certainty frozen hard in five or ten seconds. A lower temperature might doubtless be produced, were it not for the ice which surrounds the bulb of the thermometer. This result may be approximately effected by the common and familiar "spray producer," the concentric tubes of Mr. Richardson not being absolutely necessary to congeal the tissues with the rhigolene, as in his experiments with common ether. I have for convenience used a glass phial, through the cork of which passes a metal tube for the fluid, the air-tube being outside, and bent at its extremity so as to meet the fluid-tube at right angles, at some distance from the neck of the bottle. Air is not admitted to the bottle, as in Mr. Richardson's apparatus, the vapor of the rhigolene generated by the warmth of the hand applied externally being sufficient to prevent a vacuum and to insure its free delivery; 15° below zero is easily produced by this apparatns. The bottle, when not in use, should be kept tightly corked, a precaution by no means superfluous, as the liquid readily loses its more volatile parts by evaporation, leaving a denser and consequently less efficient residue. In this, and in several more expensive forms of apparatus in metal, both with and without the concentric tubes, I have found the sizes of 72 and 78 of Stubs's steel wire gauge to work well for the air and fluid orifices respectively; and it may be added that metal points reduced to sharp edges are preferable to glass, which, by its non-conducting properties, allows the orifices to become obstructed by frozen aqueous vapor.

Freezing by rhigolene is far more sure than by ether, as suggested by Mr. Richardson, inasmuch as common ether, boiling only at about 96° instead of 70°, often fails to produce an adequate degree of cold. The rhigolene is more convenient and more easily controlled than the freezing mixtures hitherto employed. Being quick in its action, inexpensive and comparatively odorless, it will supersede general or local anæsthesia by ether or chloroform for small operations and in private houses. The opening of felons and other abscesses, the removal of small tumors, small incisions, excisions and evulsions, and perhaps the extraction of teeth, may be thus effected with admirable ease and certainty; and for these purposes surgeons will use it, as also, perhaps, for the relief of neuralgia, chronic rheumatism, etc., and as a styptic, and for the destruction by freezing of erectile and other growths. But for large operations it is obviously less convenient than general anæsthesia, and will never supersede it. Applied to the skin, a first degree of congelation is evanescent; if protracted longer, it is followed by redness and desquamation, which may be possibly averted by the local bleeding of an incision; but if continued or used on a large scale, the dangers of frost-bite and mortification must be imminent.

It may be superfluous to add that both the liquid and the vapor of rhigolene are highly inflammable.

[Translated for the Journal of Chemistry and Pharmacy.]

Gleanings from the French, German, and other Foreign Journals.

ACCIDENTS FOLLOWING THE USE OF CANTHARIDES. — At a late meeting of the French "Société Médicale des Hopitaux," M. Guibout presented a small, olive-shaped body, composed of fatty and conjunctive tissue, rendered by the urethra of a patient to whom had been applied three successive fly-blisters. During the discussion, several cases were cited in which dangerous accidents had attended the absorption of the cantharides after repeated vesication. Camphor, sprinkled over the blister, and administered internally, appears to afford the only safeguard against these accidents.

In the cholera epidemic of 1866, in Paris, the premonitory diarrhœa has been lacking in nearly fifty per cent. of the cases.

SUB-CUTANEOUS INJECTIONS OF STRYCHNINE IN AMAUROSIS. — A young girl, twenty-two years old, of good constitution, and menstruating regularly, but subject to sick-headaches, had noticed for several months a gradual failing of her sight; in addition to this, she had a periodical, divergent strabismus. Dr. Spaeth, having found nothing abnormal with the ophthalmoscope, made the diagnosis of incomplete functional paralysis of the retina, without any appreciable organic alteration. Local blood-letting, purgatives, and pediluvia having been tried without success, hypodemic injections of strychnine were administered, and at the end of the third week the sight was completely restored. — *Wurtemb. Cor. Blatt*, 1866.

M. Thuny, and MM. Coste and Gerbe, in giving an account of some experiments to determine the law of the sexes, say that the sex is determined by the maturity of the ovum at the moment of fecundation. In accordance with this rule, fecundation taking place early in the period of heat, produced female offspring; later, male. If these observers are right, fecundation at the commencement of the menstrual period will produce males; and later, females.

ACETIC ACID IN CANCER. — At a late meeting of the London Pathological Society there was a discussion upon the treatment of cancer by the injection of acetic acid, more or less diluted, into the diseased tissues. Dr. Broadbent having remarked that in microscopic preparations the cancer cells were destroyed by acetic acid, thought that the same result might be obtained upon the living subject. Several cases were mentioned by other members confirming the theory of Dr. Broadbent. In those reported by Dr. Moore the acid was diluted by three parts of water and injected in different directions from the same opening in the tumors. M. Gueniot, of Paris, has also been experimenting successfully with a paste composed of tan, acetic acid, saffron, and lycopodium, applied to callouses, warts, corns, and canceroidal growths, but doubts its efficacy in scirrous, encephaloid, fibro-plastic, or other tumors.

GOLD AND SILVER LEAF ON SPECTACLES. — In a note to the last meeting of the French Academie des Sciences, M. Melsens advocates the use of gilded or silvered spectacles in cases of photophobia. The light transmitted is said to be much less trying to the eyes, while the impression of objects is very distinct.

THE CITRATE OF CAFFEIN. — M. Koschlakoff, of St. Petersburg, draws the following conclusions from an experiment with the Citrate of Caffein (or thein), upon a patient suffering from parenchymatous nephritis and hypertrophy of the heart:

1. The Citrate of Caffein was in this case a laxative and diuretic.
2. Its diuretic action depends upon the increase of arterial pressure.
3. Under the influence of Caffein the contractions of the heart are less frequent.
4. It increases rapidly the quantity of the urine.

Gaz. Med. de Strasbourg.

M. Demarquay, of the French Academie des Sciences, has been making some experiments upon the absorption by wounds of substances soluble in water, and the effect of the condition of the wound upon the rapidity of absorption. From a large denuded surface this takes place in from four to eight minutes; in the serum of a blister from ten to twenty minutes is necessary; while a fresh wound requires from an hour down to fifteen minutes. These facts lead to the inquiry whether the septic element of erysipelas and puerperal fever may not be absorbed by the wound itself. Some of the phenomena referred to phlebitis in cases of purulent infection may perhaps be explained by the rôle played by absorption. These experiments should lead us to watch the effects of the absorption of substances injected into diseased cavities, such as abscesses, cysts, etc. — *Gas. des Hop. Nov.*, 1866.

TETANUS TREATED BY AMMONIA IN LARGE DOSES. — In the majority of the cases in which tetanus has terminated favorably, the appearance of an abundant perspiration has appeared to be the turning point. From this time the muscles have gradually relaxed. This fact furnishes important indications for treatment which have not been neglected, and several physicians had experimented with ammonia, which suggests itself the first among the drugs capable of producing perspiration. More recently, Dr. MacAuliffe has resumed these experiments, and in his thesis gives some interesting results. In three cases, where blood-letting was also employed, the most favorable results were obtained. The following is the formula:

℞ Aquæ, ... ℥ xx.
Ammonia, ... ℥ ss.
Sucie, ... ʒ i.
M. ʒ iii. every half hour.

The portion to be renewed every day. — *Gaz. des. Hop.*

At the meeting of the Vermont Association, Dr. S. W. Thayer remarked on the non-prevalence of dysentery in his particular locality, but he had seen many cases outside of it. He used mercurial preparations in its treatment, in this way: — ℞. Sach. lactis, ʒ i.; hyd. cum creta, ℈ss.; ipecac, ℈ss. Divide into thirty powders, one to be taken every two or four hours, according to urgency of symptoms. For the tenesmus he uses and strongly recommended the chlorate of potash injection, as follows: — ℞. Mucilag. gum acaciæ, ℥ ij.; potas. chlorat., ʒ i.; inf. opii, gtt. xl. Misce, for a single injection.

On Alcohol.

BY THOMAS KING CHAMBERS, M. D.

The following lecture upon alcohol, given at St. Mary's Hospital, London, by Dr. Chambers, affords a good specimen of the interesting, racy style of this remarkable man. He possesses the power of investing the most abstruse medical topics with the interest of a romance, and no more sensible and accurate views have ever been presented for the consideration of physicians. We have read and re-read his "Renewal of Life," and it is still the book we oftenest take down from its place in our medical library.

I have often given you at the bedside reasons for administering or withholding alcohol in special cases; but I have been cautious about reducing these reasons to general rules without going into the subject more fully than is possible in the wards.

As you are well aware, extreme opinions may be, and have been, held about this indubitably powerful reagent. Dr. Brown (the author of the Brunonian theory) persuaded himself that it was a panacea for all human ills, and a direct prolonger of human life; but by dint of frequent experimenting, and lecturing with a bottle of brandy by his side, he soon succeeded in giving a practical refutation to his own words by ruining his health and shortening his existence. Others, again, would persuade us that it is a pure poison, whose degree of antagonism to life is in a direct ratio to the quantity used. I shall take for granted that your experience in the hospital has not made you advocates of either opinion; but that you, by this time, have seen, or seemed to see, it in many cases saving and prolonging life, in many saving and prolonging health, in many others destroying and shortening both, and, again, often conceded by indulgent doctors as an innocent luxury likely to do neither good nor harm.

The best guide to the effects to be expected from a reagent on a diseased body is the intelligent observations of its effects on a healthy body; and I think that alcohol is no exception, but that a knowledge of its physiological action leads directly to its therapeutical application.

The experiments of Rudolf Masing, since repeated and confirmed by MM. Lallemand, Perrin, and Duroy, have taught us that alcohol passes through the body unaltered in chemical constitution, and does not, so far as we know, leave any of its substance behind. It remains in the body for some hours, and during that time exerts an influence for good or for evil.

It is not strictly an "aliment;" but if it aids the appropriation of aliment, it may be looked upon as an "accessory food" in health, and as a "medicine" in disease.

What is the nature of the influence which it exerts? What is its action upon life? It is usually defined as a "stimulus to the nervous system;" and so long as "stimulus" is held to mean only something which makes one feel comfortable, we may be satisfied with the explanation; while upon the nervous system all experimenters, from the first patriarch downward, will agree that it acts. But if led by the etymology we infer that it directly augments the developed force of the nervous function, we shall fall into the error of poor Dr. Brown.

Let us be a little more particular in our inquiries, and then I do not think we shall be able to trace any direct increase of force to alcohol, even in the smallest doses, or for the minutest periods of time. The sort of researches of which those detailed are an example, show pretty clearly that its continuous use (*i. e.* in small divided doses) does not add power to vitality, and I think we shall not fail to come to the same conclusion from observations made upon its more immediate effects.

In a series of experiments, conducted with another object, Dr. Edward Smith has recorded very minutely the sensations experienced after brandy, by a temperate man, with a fasting stomach.

What are the first effects noticed there? Increased life? Increased function? No—lessened consciousness, lessened sensibility to light, to sound, and to touch.

Then there comes a peculiar sensation of stiffness with swelling of the skin, which is noticed particularly in the upper lip and cheeks, evidently due to arrested sensation and motion. These are very unlike spurs to extra exertion.

In a patient lately under my care the same peculiar sensation of stiffness, and also the objective phenomena of rigidity of skin without loss of sensation, were produced by the pressure of diseased bone on the fifth nerve inside the skull. If we call this symptom a partial paralysis from partial obliteration of nervous function (to which I suppose nobody will demur), we must call the effects of alcohol also a partial obliteration of nervous function, for the phenomena are strictly identical.

Dr. Smith further records among the "early effects" of alcohol a relaxation of the dartos and other muscles connected with the reproductive system, for which Ovid elegantly, and Shakspeare coarsely, blame the later and more obvious influences of drink. The sphincter also of the bladder was relaxed, and to this the observer lays the increased micturition during indulgence.

The pulse also is quickened. At first blush you might be disposed to view this as an indication of an increase of nervous force. But do not be hasty. Observe with Dr. Bedford Brown the circulation in the cerebrum, during an operation on the skull, when the pulse was quickened by chloroform; and you will see the heaving and bulging of the brain quieted, the surface becoming pale, and the hemorrhage arrested. The quickening of the pulse must therefore have been contemporaneous with diminished force of the heart's beat.

Again, observe that in disease those patients especially exhibit the phenomenon of quickened pulse whose hearts are most enfeebled.

No—it would appear that in motion of an entirely involuntary character, quickness indicates diminution and not increase of force.

It is unnecessary to go through the symptoms of advanced intoxication by alcohol; all observations agree that large doses immediately, and small doses more remotely, depress the nervous centres, and that in cases of absolute poisoning the cause of death is a cessation of the muscular respiratory movements. What I wish particularly to mark is, that the primary as well as the secondary action is a diminution of vitality in the nervous system.

Life and warmth are so closely connected together in scientific as well as in popular notions that perhaps the most striking evidence of diminished vitality is the lessened capacity to generate heat. We have this evidence in the case of alcohol. MM. Dumeril and Demarquay published in 1848 their observation that intoxicated dogs exhibited a great loss of temperature, and Dr. Boecker and Dr. Hammond find the same result from even moderate doses of spirits. This accords with and explains the experience of Dr. Rae, that alcoholic drinks give no satisfaction to Arctic voyagers, and of Dr. Hayes (surgeon and commander in U. S. second Grinnell Expedition), that they actually lessen the power of resisting cold. The "warming of the stomach" which tipplers speak of with delight is in fact a mere fallacy of insensibility to external influences. We may I think fairly come to the conclusion, that alcohol is primarily and essentially a lessener of the power of the nervous system.*

How then can it be a restorative? How can that which lowers one of the chief manifestations of life be a renewer of life?

In this way: in lowering the power of the nervous system, it lowers its action on destructive metamorphosis, and thus it saves the substance of the body. We know that the exercise of nervous functions, bodily or mental, increases destructive metamorphosis, and that when either bodily or mental action is in excess, there is an arrest of the constructive appropriation of food by the stomach. Our own personal experience, without the aid of Shakspeare, teaches us that passion and emotion as well as overstrained muscular labor put a stop to digestion and appetite. Well, then, anything which sensibly or insensibly interposes between this sensible or insensible nervous action and the digestive viscera must tend to restore that balance of the two in which healthy life consists. Thus Dr. Hammond, having placed himself on an insufficient allowance of food, found his mental and bodily powers deficient—the balance was overthrown. He afterward took a small quantity of alcohol with each meal, and then, without any increase of diet, he gained weight of body, and his mind was more vigorous. On the other hand, if he added alcohol to a full diet, the blunting of the mental powers was very perceptible, and there was feverishness of body. We cannot doubt that the essential action of the alcohol was identical in both cases, but in the first the blunting of the nerve force was requisite for perfect life, in the second it was not wanted, and was therefore injurious.

The effect of small wholesome doses upon the mind is to blunt the sensibility to the slight half-felt corporeal pains which the want of balance had produced. It removes the chains of the corruptible body from the soul. Hence a freedom and brightening of the intellect. But it is only the moderate man that can enjoy this luxury; the attempt to drown a care too tall for a shallow bowl, or to soothe a pain too sharp to be forgotten, induces an excess. Then the scale is inclined too much the other way; the influence of the nervous system on the body is *over*-blunted, and the just degree of its action requisite to perfect health is arrested.

In truth this balance is not easy to adjust. And therefore it is lucky for us that alcohol passes so freely out of the body, as Dr. Percy, Mr. Masing, and the French physiologists who have repeated their experiments, have shown to be the case. It is lucky for us also that any slight harm it may have done during its sojourn is set right by a reaction of increased metamorphosis or evacuation, of which an example has been given in the experiments detailed at the beginning of this lecture.

Thus do I interpret the effects of alcohol; and taking this interpretation as a basis, I would deduce therefrom the following clinical rules for its administration:—

1. Give alcohol whenever you find the nervous system is exhausting itself and the body by an activity in excess of the other bodily functions.

Examples:

In delirious fever, especially in typh-fever. Here the high specific gravity of the urine is a warrant to you of the great amount of destructive metamorphosis going on, and the failing strength shows how low the constructive life is. Continue the alcohol as long as the tongue is dry, and the mind raves instead of sleeping, and the hands tremble.

In pneumonia, in surgical injuries, in erysipelas, &c., under the same regulations. Here, however, our path is not so clear nor so well enlightened by physiology; we must feel our way by actual observation of the effects produced on the patient under our eye.

The power of resistance to some poisons, such as malaria, seems increased by alcohol. Thus aguish and neuralgic cases, in their Protean forms, bear well and are benefited by it in very considerable quantities. Strangely enough, these patients on recovery cannot stand it, and usually of their own accord leave off the habit of taking it. So that we need not fear that we shall make them tipplers by administering the remedy.

After violent shocks produced by mental emotion, or extreme bodily labor. It may be doubted whether the prejudice felt against serving out spirits to soldiers or sailors before a battle is justifiable; the courage or apparent strength given may be tinsel, but the power of resistance to wounds, mental and bodily, is something real.

Where the patient has been accustomed to excess. It will not do to let the body have to endure the natural reaction and the disease at the same time. The reaction must be postponed to a more convenient opportunity, when the body is ready for it.

2. Give it, increase it, leave it off under the guidance of the appetite for food. As long as a sick person takes and digests food better with alcohol than without, so long it is doing good. Beyond that we have no evidence.

3. When the marked feature of the disease consists in retention of effete matters which ought to be discharged, abstain from the use of alcohol altogether.

Examples:

In Uræmia I have always found any effects which could be traced to alcohol to be of an injurious character; under its employment the giddiness, the blunted intellect, the faintings, the tendency to coma, all increase, the urine sometimes becomes more scanty, always of lighter spe-

* We may call it an "anæsthetic," if it is allowed us to extend a little the application of the term, and to let it include all reagents which tend to interrupt the connection between the material and immaterial of our being, between force and visible nerve, whether our memories are conscious of the interruption or not. It is only when taken in considerable doses that our direct feelings note the anæsthetic action of alcohol. Its action on the involuntary nervous system, more important in a physiological point of view, is anterior to that, but can be traced only by inference.

cific gravity; and I cannot say that even the dropsy, for which the alcohol is most usually administered, is often benefited.

Jaundice also seems to be aggravated by alcohol.

The uric acid diathesis also presents an objection to the use of alcohol; but there are exceptional complicated cases which appear to receive benefit from occasional doses.

4. Divide the daily allowance into two or three doses only, giving enough at once to produce a decided effect. The action of frequent small divided drams is illustrated by the experiments I have detailed — it is to produce the greatest amount of harm of which the alcohol is capable, combined with the least amount of good.

In fever I usually order three doses a day, and find even that division not always advisable, and that the patients do better with two larger doses.

The shape in which alcohol is administered is in many cases not a matter of choice. The mighty force of the purse-strings often restricts us to the coarsest compounds. New whisky and gin and British brandy are better than nothing, but let us not forget that they contain a very hurtful, nay almost poisonous ingredient, fusel oil, which is abundant in direct proportion to the youth and low price of the article. Age changes this into more wholesome as well as more agreeable ethers. Any of the full-bodied wines are better for acute cases than spirits. Port perhaps exhibits in its commoner varieties more of the good qualities that a wine should have than the produce of other grapes. I mean to say that second and third rate port, or even sham port, is a wholesomer beverage than second and third rate and sham articles with other names. But if the expense is no object, thoroughly good champagne exhilarates more, is easier digested, and does the good without the harm better than any of its rivals. Of course a high price must be paid for a genuine specimen of a wine so restricted in quantity.

Ozone.

Dr. Daubeny read a paper before the London Chemical Society, Nov. 15, "on ozone," which embodied the results of an extensive series of experiments and meteorological observations made at Torquay and Oxford. The tests employed to indicate the presence of ozone were the iodide of potassium and starch paper of Schönbein, and the moistened sulphate of manganese paper. The first, if protected from the light, was considered as furnishing the most reliable indications, although it was known to assume a blue tint by the action of free acids, chlorine, etc.; the second reagent indicated the ozone by the formation of brown hydrated peroxide of manganese. The apparatus employed consisted of a glass U tube screened from the light, and connected with a Johnson's aspirator, and also with an intermediate wash bottle and gas meter. The volume of air drawn over the paper in the U tube was registered, and the resulting tint compared with a standard scale of coloration to indicate the amount of ozone. Thus measured, Dr. Daubeny found in the three winter months, commencing with January, 1864-5-6, at Torquay, that the south-west and westerly winds were most fully charged with ozone, whilst the north wind showed least; on the contrary, at Oxford, during the summer months of the same years, the easterly winds were most charged with ozone, and the north-westerly least. These indications clearly pointed to the influence of the sea in augmenting the amount of ozone at Torquay, whilst the more central inland position of Oxford caused the difference between the maximum and minimum indications to be much less apparent than at the seaside. The author then enumerated the various circumstances under which ozone is supposed to be generated, such as in the electro-decomposition of water, the action of sulphuric acid upon permanganate of potash, etc. His own experiments coincided with those of Dr. Gilbert in pronouncing the absence of ozone from the oxygen given off from plants exposed to sunshine whilst immersed in water. Dr. Daubeny then recounted the results of an examination of the air exhaled by growing plants, and found, in thirty-two instances out of fifty-seven plants experimented upon, sensibly larger amounts of ozone than in the surrounding atmosphere, and he was led thereby to consider that the generation of ozone in the process of vegetation was one of the appointed means of nature for the purification of the air, and that not only were plants useful in restoring the equilibrium of the atmosphere, but that they took an active part in the destruction of pernicious organic compounds given off either in the process of decay or by the waste of animal organisms. There was more ozone found near the sea than at inland localities, a greater amount in the country than in towns, and, lastly, more outside a building than in its inhabited rooms. The author referred to his previous researches (*Phil. Trans.*, 1834) as indicating the now commonly received view in reference to the part played by oxygen in the grand economy of nature, and now urged the necessity of seeking for more accurate tests and wider information before making specific statements or recording observations in the form of meteorological tables.

Journal of Chemistry and Pharmacy.

BOSTON, JANUARY 1, 1867.

☞ The conduct of the Journal is in the hands of our senior partner, Jas. R. Nichols, M. D.; and as he is frequently absent from the city, communications and other matters relating to the Journal, requiring early attention, should be addressed to the business firm, 150 Congress street. J. R. N. & Co.

☞ There is manifested among our patrons a strong desire to have the Journal published oftener than once in two months. We take pleasure in saying, that at the close of the present volume, in July, we shall make it a monthly publication, and by enlarging and improving, render it more useful and instructive to the medical profession and to druggists.

☞ Those wishing for the back numbers of the Journal will please make early application, as there remain of the editions of the first number (*sixteen thousand in all*) but about one thousand. It has been *twice* in type, and we cannot reset again, unless the number called for is quite large.

☞ Very many physicians are sending us advance pay for the Journal. They will please regard the reception of the paper as evidence that the amount has reached us, and placed to their credit.

Oxygenized Air.

Several correspondents inquire if we can inform them as regards "oxygenized air," — what are its peculiarities, what its medical value, etc. In reply we have to say that the subject of "oxygenized air" is a most interesting and comprehensive one. Whether it be regarded physically, chemically, or in its sanitary relations, it presents topics of thought of the highest interest to the race. The oxygenized air to which we allude is that which is furnished in the largest measure without money and without price, and which to obtain in all its purity and abundance we have only to step out of doors, or climb a hill in the country. This oxygenized air is no factitious mixture, and has never passed under the hands of empirics, or been tampered with by charlatans. This is the only air fit to breathe into the lungs of man or beast. The oxygen in this air is so admirably blended and diluted with nitrogen that it cannot be improved. Twenty-one of the former to seventy-nine of the latter constitute the normal mixture, or present precisely the proper balance of gases; and if any one proposes to improve upon it by changing its proportions, he should only excite our pity for his ignorance, or indignation for his presumption.

But we suppose the inquiry of our correspondents has reference to the "oxygenized air" so extensively advertised as a remedial agent, etc. Whether this is the nitrous oxide, or a mixture of nitrogen with oxygen in excess, or whether it is some common vapor or gas, we do not know. Indeed it matters little if it be one or the other, — the whole thing is absurd and empirical. In our opinion the *thing* is only a new phase of a very old device. A year or two ago it was all magnetic rings and bracelets; next the inhalation of all conceivable decoctions from all conceivable kinds of pots and phials; now a new kind of air is got up for credulous people to inhale. What will come next we can only know by patient waiting.

We notice recently that a more enterprising adventurer advertises "*super* oxygenized air." He will probably be superseded soon by a *super-super* competitor.

Rhigolene.

This highly volatile hydrocarbon, named rhigolene, by Dr. Henry J. Bigelow of this city, is in many respects a very remarkable liquid. It is the lightest of all known liquids, having a specific gravity of 0.625. A little of it turned into the hand produces a hissing sound, like water upon a hot iron. It almost instantly vanishes into vapor. A few grains of sand dropped into a bottle will give rise to streams of vapor, passing up from the bottom, making a very pretty experiment. It has but little odor, is cleanly, and, upon the whole, we regard it as the best and cheapest liquid for local freezing, yet suggested. An ounce of it may be evaporated in a room, and the odor will scarcely be noticed. We have presented Dr. Bigelow's paper upon the subject, read before the Boston Society for Medical Improvement, in April last, to which we call attention. We can furnish to the trade and profession pure *rhigolene*, in pound packages, and in cans holding five gallons.

Sulphurous Acid Gas. — We call attention to Dr. Lair's communication, in another column, regarding the use of sulphurous acid gas as a disinfectant. It is an important and interesting paper. Our views regarding the safety of the gas have been fully expressed, and we are pleased to learn that it was used with success in the instance as stated. In the hands of careful, judicious physicians, it may do no injury; but it should not be introduced into popular use.

☞ It will afford us much gratification and aid, if our medical, chemical, and pharmaceutical friends will furnish for our Journal such interesting articles, or useful items, as many of them are abundantly able to prepare. The formulas of various long-tried preparations which have been sent to us have been well received by our readers, and the gentlemen furnishing them will accept our thanks for their kindness. Let communications or suggestions be short and practical, and much interest and useful knowledge may be imparted. Writers in our columns will remember that they are in communication with a large number of readers, and what is done should be well done.

Hasheesh Candy. — The *Medical and Surgical Journal* of this city, several weeks since, devoted considerable space to this article, showing its positively dangerous character, and stating that two instances of severe illness had come under the observation of one of the editors, in consequence of its use. It is surprising that any one can be led to purchase a compound of this nature; but it is still more surprising that any one knowing the nature of *cannabis indica* could be led to form from it a confection for popular use. Its dangerous character should be made known everywhere.

The Oxides of the Metals.

Observing recently in a meadow the wide diffusion of the oxide of the metal, iron, resulting probably from the decomposition of iron pyrites, and that the water of the brooks was freely used by a large herd of cattle, the thought came up, that of all the metallic oxides that of iron is almost the only harmless one. If the oxides of copper or lead were as widely diffused the result would be most disastrous. The daily absorption into the system of even minute quantities of most of the metals is followed by consequences of a fearful kind. So, too, of the carbonates, and other salts. If carbonate of baryta were as abundant as carbonate of lime, animated life would probably fail before its deadly influence. The wise adjustment of substances with regard to their sanitary influence upon men and animals is a matter which can hardly be overlooked by an observing mind.

☞ The brief article upon coal ashes in our first number has called out the following from a gentleman of much intelligence in this city. The ashes from anthracite coals contain usually less than five per cent. of soluble substances, and hence cannot afford much food for plants. The physical effects of these ashes upon close, tenacious soils, is often excellent, and they may be worth preserving.

Anthracite Coal Ashes.

To the Editor of the Boston Journal of Chemistry and Pharmacy:

An article on ashes in your first number induces me to offer to your readers a suggestion in relation to the use of hard-coal ashes in connection with the contents of vaults and drains, with which they should be mixed, and which are thus rendered inoffensive, and, at the same time, much more useful as fertilizers.

I have myself made the experiment, and understand it has been done at the State Almshouse in Monson, and on an extensive farm at Dedham, the proprietor of which assured me that he valued his anthracite at half the price of wood ashes.

It will be found, I think, upon trial, that these ashes are more valuable than has been supposed, and that all we can save should be used as I have suggested. W.

Boston, Oct. 31, 1866.

Dr. Sargent's New Truss.

The brief notice we gave of this truss in our last number has awakened a very great interest among physicians, and every mail brings inquiries concerning it.

It has been impossible to send a specimen to one in twenty of those who have made request for one. The trial has been extended enough to show that it is the most excellent truss yet devised, and that it is calculated to afford great comfort to the afflicted, and to promote cure in curable cases. The pad is of sponge, and the whole arrangement is novel, and constructed on correct principles.

Dr. Sargent's arrangements for their manufacture have been completed, but they will not be ready for delivery until the middle or last of January. In our next issue we shall give a full description of the truss, with engravings.

☞ The following letter comes to us from Olneyville, R. I. We hope our venerable friend will live to read many numbers of the Journal. Eighty-three years old, and "not too old to learn!" It is pleasing to meet with instances of this kind:

GENTLEMEN: Here are fifty cents for your "Journal of Chemistry and Pharmacy" for one year from date. I have not much time to read journals, *but I am not too old to learn.* Yours,

JAMES KELLY, M. D.
Born Nov. 29, 1783.

Questions and Answers.

"What is Chlorodyne?" DRUGGIST.

It is a preparation first devised by Dr. Brown, an English physician. Its composition has given rise to much controversy, as it is a secret preparation but imperfectly understood. It is said to act as a hypnotic or sedative, and to possess unusual efficacy. It is strictly an empirical compound, and therefore worthy of but little attention.

"Does sunshine extinguish fire?" L. M.

This is a matter which has provoked considerable discussion among scientific men. We remember of listening to a paper upon this question by Prof. La Conte, of Georgia, at the Montreal meeting of the American Scientific Association, in which he proved that it *did not* extinguish fire. Prof. Horsford, of Cambridge, has recently taken up the subject, and he arrives at conclusions not very dissimilar.

"Is there a mineral called *Getite?* If there is, what is its composition?" MINERAL.

Getite is nothing more than a beautiful crystallized specimen of red oxide of iron. It is found in England in several localities, and doubtless exists in this country; but we cannot designate any place where it can be procured.

"Is carbolic acid soluble in water?" M——s.

Distilled water takes up about five per cent. of the pure acid. The solution is best prepared during the manufacture of the acid. With improved facilities for its production, chemists are enabled to reduce the prices much below those of a few months since. For therapeutic employment, the absolutely pure crystals or solutions are requisite; for common disinfecting purposes, the cheap crystals or crude solutions, which are very cheap, will answer every purpose. The chemically pure solution, as furnished by us, may be employed according to the following directions: —

For Disinfecting Purposes. For disinfecting night-vessels, and all fecal matters, urine, pig-stys, stables, cesspools, etc., dilute with four parts of water, and sprinkle over the offensive substances, or around the premises.

For Preserving Corpses. Use the solution full strength; apply with a sponge, and sprinkle over the clothes.

For Destroying Contagion in Sick-rooms. Dilute with four parts of water, and sprinkle around the room. Carbolic acid is the *only safe* disinfectant that *destroys* contagious emanations.

For Cleansing Ulcers and Bad Sores. Dilute with three parts of water, and apply with soft sponge. It causes smarting, but it soon passes away.

For the Itch. Dilute with four parts of water, and apply with a sponge over the whole body once or twice. Sprinkle it over the clothing to destroy the spores.

For Killing Insects on Plants. One part of solution to six of water. Sprinkle over the plants, so that it will come in contact with the insects; in five or ten minutes syringe well with pure water.

"I notice beautiful white crystals in your solution of bi-sulphite of soda. Is this correct?" DRUGGIST.

During the cold weather some crystals of bi-sulphite will form, as the solution contains fifty per cent. of the pure salt. Before dispensing, warm the bottle to redissolve them, so as to maintain perfect uniformity in the solution.

Periodicals and Books Received.

The forty-fourth annual catalogue of the Berkshire Medical College has been received. The institution appears to be in a very prosperous condition, and graduates twenty young men the present year. The faculty is composed of able men, and the facilities for acquiring a thorough medical education at the Old Berkshire Institution are most excellent. We have also received the transactions of the New York State Homœopathic Medical Society, and the proceedings of the Connecticut State Medical Association. The collection of papers upon medical subjects embraced in this volume are of a very high order, and we advise our medical friends in distant States to procure a copy, if possible. Dr. Chas. L. Ives, of New Haven, communicates several papers of unusual interest and importance.

☞ The continuation of the article upon Chemical Examination of Urine, commenced in our last number, is crowded out in this for want of room. It will appear in our next issue. The *microscope* alluded to in the article, we have made arrangements to furnish at one dollar, the manufacturer's price. It is an exceedingly neat and powerful little instrument, and is well worth the price. By remitting to us $1.00 we will send it by mail, or other conveyance, as directed.

Preparing Meat for Food.

BY ARTHUR HILL HASSALL, M. D.

This invention has for its object improvements in the preparation of meat for food. For this purpose the inventor selects the leanest joints or parts of beef, or of any other kind of meat; these he first deprives of all bone, tendon, and visible fat, and the red part or flesh is then cut into pieces of about an inch or so in diameter. These are then passed through a sausage or mincing machine, by the knives of which they are cut into small pieces, and minced. The minced meat is then spread in very thin layers upon perforated trays, by preference of galvanized iron; this spreading is effected either by hand labor, or it may be by a spreading apparatus attached to the mouth of the sausage machine. The trays when spread are transferred either to a drying-closet heated by means of steam or to a hot-air room or chamber (heated by flues passing through it), in either of which the meat becomes deprived of the greater portion of its water, and assumes a crisp and friable condition. Special care is taken that the meat is dried at a temperature below the coagulating point of albumen. The meat thus dried is then ground in a mill or under millstones of suitable construction, after which it is passed either through sieves or a flour-dressing machine, a very fine "flour of meat" being thus obtained. This powder is now subjected to a further drying process, whereby the whole, or nearly the whole, of the water of the meat is dissipated. By preference, dry the greater portion, say about two-thirds of the powder, at a temperature below the coagulating point of albumen, and dry the remainder at a high temperature, say at about 160° Fahrenheit; the two portions are subsequently mixed together. By thus drying a portion of the powder at a higher temperature, a superior flavor is imparted to the powder than if the whole of the powder were dried at a low temperature. For some purposes, however, the whole of the powder may at the second drying be dried at the low or high temperature; when intended to be used for biscuits at the low temperature, and when for lozenges at the high. Part of the ground meat will not after the first grinding be passed through the sieves or dressing machines. This has to be ground a second and even a third time, whereby other quantities of the flour are obtained, but there is still a residue which remains in the sieve. This is of a fibrous character, and consists for the most part of gelatine, and is derived from the membranous or gelatinous portions of the meat. This is ground in a mill suitably adapted for reducing fibre, or is subjected to a temperature much above the coagulating point of albumen, whereby it is rendered more friable, so that it admits of being ground and sieved, the powder being added to the flour of meat previously obtained. Finally, the bones are crushed, and these as well as the tendons are boiled and digested, so as to remove the gelatine contained in them, and which is subsequently recovered in the manner usually practised by gelatine manufacturers, and which, when reduced by grinding and sieving to a fine powder, is added to the flour of meat. Vegetables, such as turnips, carrots, celery, onions, and herbs, are dried also at low temperatures, and for the most part below the coagulating point of albumen, and they are then, like the meat powder itself, ground and passed through fine sieves, a "flour of vegetables" being thus obtained. If the flour of meat is intended to be used for the preparation of beef tea, add to

it a little salt; if intended for soups, add all the requisite vegetables and flavorings prepared as above, and reduced to a fine powder, similar to that of the meat itself, so that the cook has nothing more to do but to add the requisite quantity of water, and simmer for a few minutes, when the soup is ready for use. The flour of meat is also suitable for being used in the preparation of a meat cocoa, also in the manufacture of meat biscuits, and also, when mixed with a farinaceous matter, for a food for invalids.

By the above-described method of preparing meat there is obtained a material capable of prolonged preservation; it utilizes the beef or other meat which is usually thrown away in the preparation by the ordinary method of beef-tea, broths, and soups; it also reduces the meat to such a condition that the beef-teas and soups made with it are infinitely more nourishing than those made in the usual manner; and, lastly, it reduces the meat to such a state as that no mastication is required, and it can be readily consumed by persons with defective teeth, and by invalids generally.—*London Chemical News*, Nov. 9th.

From Proceedings of Connecticut Medical Society.

Tartarized Antimony and Opium in Typhus Fever.

Read before the New Haven County Meeting, April, 1866.

BY WORTHINGTON HOOKER, M. D.

Having witnessed the use of tartarized antimony and opium, after the method of Dr. Graves, of Dublin, in a case of typhus fever upon which I attended, in connection with Dr. C. A. Lindsley, I was led to examine the reports which Dr. Graves gives of his practice, and will lay some of the results of that examination, very briefly, before you, together with the case itself that suggested it.

Medical men have been accustomed to think of tartarized antimony as applicable only to asthenic febrile conditions, because its action is usually of so depressing a character; but the practice of Dr. Graves shows that there are febrile conditions most decidedly asthenic, in which not only is it applicable, but it is curative to a degree surpassing anything which appears in its ordinary use. It is so generally, however, in connection with opium, the action of this latter remedy being essentially modified by it. But this is by no means always so, for in some of the cases reported by Dr. Graves, the tartarized antimony was used alone, with most decided beneficial results.

The circumstances under which the peculiar practice of Dr. Graves is applicable, may be seen from the following extract from one of his lectures:—

"I wish you clearly to understand, that after the headache and cerebral excitement, which accompanied the very commencement of the fever, had been subdued, or had ceased, after sleep and calm had returned, and had continued for many days, then a new order of things commenced, subsultus, watchfulness, muttering, raving, involuntary discharges, etc.,—all denoted great derangement of the nervous system; but still there was no proof that this derangement depended on cerebral congestion. After a few, or after many days, however, unequivocal symptoms of the latter set in; the face and eyes became suffused and flushed; the pupils manifested a tendency to become contracted, and occasionally convulsions took place; the patient became totally sleepless. When the latter and dangerous period of the fever was accompanied by the former nervous part of symptoms *alone*, they yielded to wine, water, porter, and opiates; but when the symptoms indicating cerebral congestion were superadded, then it was that the case assumed so great and striking a similarity, so far as the functions of the nervous system were concerned, to the well-known variety of delirium tremens, accompanied by cerebral congestion, to that variety of delirium tremens, in fact, which only can be successfully treated by the judicious but bold exhibition of tartar emetic, combined with laudanum."

This treatment was applied at an advanced stage of the disease,—in only one instance, I think, before the latter part of the second week, which, in true typhus, is quite an advanced period. It was after whatever that might be sthenic in the cases had passed by, when the pulse had become very quick and feeble, and all those symptoms were present which are considered as calling for tonics, stimulants, and a sustaining diet. I quote some of the notices of the pulse in the different cases:—weak and rapid—140, quick and steady,—obliterated by the slighest pressure—not to be counted, and scarcely felt—110, oppressed, unequal, and weak—130 and jerking—108 and wiry—144.

The cases treated were all of a decided character. I give, as a specimen, a summary of the symptoms of one case, at the time when the treatment by tartar emetic and opium was commenced. Patient so unmanageable as to require the strait-waistcoat; obstinately silent; refusing to put out tongue; countenance morose and haggard, at times ferocious; eyes glazed and slightly suffused; extremities cold and livid; body hot; maculæ over whole surface; pulse 132, small and wiry; respiration 42 and irregular; tongue dry and dark brown in centre; fæces and urine discharged involuntarily. There was given, every half hour, half an ounce of a mixture consisting of eight ounces of water, four grains of tartar emetic, and two scruples of laudanum. Three hours after, (at mid-day,) he grew worse, becoming exceedingly violent, with alternate screaming and laughter, the expression of the countenance being exaggerated by constant rolling of the eyeballs and frequent squinting; the carotids now beating violently, though the pulse at the wrist was still wiry. The medicine was now ordered in double doses.

He was gradually quieted, and in the evening, after he had taken in all four and a half grains of tartar emetic, with only twenty-three drops of laudanum, he lapsed into a tranquil sleep, with free perspiration. After this the medicine was given, not at regular intervals, as before, but according as the symptoms required it. The next day he was quiet, answering questions rationally, though somewhat confused; pulse 96, respiration 30, and in a few days was fairly convalescent.

All the facts seem to show that, under the circumstances, although opium is generally an important adjuvant in allaying the cerebral excitement, it is only an adjuvant, and the effect results chiefly from the tartarized antimony. This is shown, not only by the fact that in most of the cases the amount of laudanum used was not large, and in some very small, but also by the very significant fact that, in some of the cases, the tartar emetic was used alone. Indeed, farther observations are required to decide whether the tartar emetic is not competent alone to effect the object in a much larger proportion of cases, for there is not observable any very marked difference between the cases in which it was given alone, and those in which the laudanum was given with it, so far as we can judge from the reports of them. There needs to be, indeed, a rigid investigation of the whole of this interesting subject. The point maintained by Dr. Graves, that so far as the cerebral excitement is purely nervous, opiates are required, and so far as it depends upon cerebral congestion, tartar emetic is called for, is by no means established. And then, the distinctions which can be made between these two conditions have not been well defined, much less have they been proved.

I conclude with a brief report of the case which suggested the examination of the cases of Dr. Graves.

A. M., aged 22, unmarried. Oct. 15. In the third week of typhus fever. During the early part of the disease, the restlessness was easily controlled and sleep procured by morphine. But for the past 60 hours there had been no sleep, and his condition was as follows:—Pulse irregular, from 120 to 140, tongue dry and tremulous, much sordes, subsultus tendinum constant and great, extreme nervous agitation, continual delirious talking, frequent attempts to rise and get off the bed, reaching in the air after imaginary objects, intense heat of head, in spite of application of ice, extremities disposed to be cold, capillary circulation very feeble. In the consultation, in which Dr. Daggett joined us, it was decided to give the following:—

℞.	Tart. Antimon.,	.	gr.ij.
	Morphine Sulph.,	.	gr.j.
	Aquæ,	. . .	℥viij.
	m.		

Half an ounce to be taken every half hour till sleep is produced. Give also milk punch and animal broths, as before, freely. Five hours after the medicine was commenced, he became quiet, and went to sleep. It was given afterwards as it was required, being gradually lessened in frequency, and on Friday, (Oct. 20,) he took it only every 4th hour. He had been gradually improving up to that time. But on Friday evening there was an increase of fever, the head and skin generally being hot, the pulse quick, more delirium, and return of the subsultus tendinum. A drachm of a solution of morphine (one grain to the ounce) was directed to be given every hour, till sleep was procured. On Saturday (21st) was better in all respects, pulse 100. But on Sunday (22d). was worse, although the morphine had been given freely; tongue red and dry, more delirium, sleeplessness, pulse 128, skin hot. Had been taking, for twelve hours, two grains of quinine every fourth hour, which was directed to be continued. The tartar emetic was now resumed with the morphine, thus:—

℞	Tart. Antimon.,	.	gr.ij.
	Morphine Sulph.,	.	gr.j.
	Aq. Camphor,	.	℥iv.
	m.		

A dessert spoonful of this was given every second hour. After three or four doses, fell into a quiet sleep, with pulse at 90. The next morning he was rational, and from that time gradually recovered.

This case is decidedly confirmatory of the value of Dr. Graves' practice, and especially as the morphine, when given alone, failed to do what the combination of morphine and tartar emetic accomplished at *two* different periods of the case. It is to be regretted that Dr. Graves has given us only his successful cases, merely acknowledging the fact that the practice sometimes failed in his hands. In order to get at the exact truth, we need to have all the facts, the unfavorable as well as the favorable. Still, enough is proved by the cases which he has narrated to show, that tartar emetic, both alone and in connection with opium, stands preëminent as a remedy for certain conditions of typhus fever.

It cannot be said that in the 26 cases reported by Dr. Graves, and in the case under Dr. Lindsley's care, the recoveries occurred without influence from the remedies used, merely by the recuperative power of nature; for the symptoms were of the gravest character, and such as are commonly followed by death, and the essential remedy, the tartar emetic, must, in the quantities employed, have produced a very decided effect, either for good or for ill. The results were not only too decided, but too uniform, to make it proper to refer them to anything but the medicine. Besides, in Dr. Lindsley's case, and in some of the cases of Dr. Graves, the test of a second application of the remedy was tried. The modus operandi of the tartar emetic in tranquillizing cerebral excitement in these cases is not at all clear. It is plain, however, that it is not to be explained by any reference to the ordinary palpable effects of the remedy, but it seems in some respects to be inconsistent with them, though undoubtedly it is not so. Much remains yet to be observed in regard to it; not so much in seeking its explanation, as in marking definitely the conditions that call for the use of the remedy, and in noting the circumstances that modify its action, so that it may be applied in each case in the best manner.

Metals.

In this connection, in a late article, the *Mechanics' Magazine* makes the following pertinent remarks:

"We have no general definition of a metal to show us what constitutes any substance metallic or non-metallic. This is very odd, as metals are considered to form such a distinct class from other substances. Besides, chemistry is held to be such a marvellously exact science. Still, the most learned in chemistry are not agreed as to what substances are metals. Some say 'silicium,' which is its name as a metal; others say 'silicon,' which is its name as a non-metallic substance. Then, some take into the list of metals arsenic and tellurium, and others reject them. There apparently is no property yet discovered that is common to the whole list of fifty-two metals. Some even go so far as to consider that a metal may be a compound of two gases, nitrogen and hydrogen. In fact, it is altogether uncertain what constitutes a metal, and what does not. The word metal, apparently, is just a name, without any distinctive and well-ascertained properties attached to it or understood by it. It is hardly in agreement with the pretensions of our chemists that there should be such looseness and uncertainty about the application of a name, and a name of such importance, which represents such a common class of substances."

Spontaneous Ignition.

The spontaneous ignition of pyrotechnical compositions made with chlorate of potass is indeed a very serious subject as regards the safety of both life and property. I know not if any reliable observations have been made in the matter, but the following facts were noted by myself some years ago, and may throw some light upon the probable origin of various terrible fires which have occurred on the premises of firework-makers in London. Mixtures of the three ingredients — nitrate of strontia (or barytes), sulphur, and chlorate of potash — if made up at once from *freshly* and strongly desiccated materials, are certain to take fire spontaneously within a few hours, especially if placed in a rather damp situation. The action, which I twice had the patience to watch for and witness, begins with the evolution of an orange-colored gas; afterwards a liquefaction is set up at several points in the mass; a hissing noise and a more rapid disengagement of the gaseous matter comes on, and the composition takes fire. It is a curious thing that the addition of a small proportion of sulphuret of antimony at once prevents the occurrence of these phenomena; whether charcoal has the same effect I am not quite sure. Moreover, if such compositions, being damp, are, in order to dry them, placed too near the source of heat, the same phenomena will take place even when antimony is used in their composition. Also, compositions to produce a purple flame, if made with black oxide of copper, are almost sure, sooner or later, to take fire of themselves at uncertain periods, whether kept in a damp or dry place. The carbonate should always be used in preference. — *London Chemical News.*

MESSRS. JAMES R. NICHOLS & Co.

The following prescription has been used with the happiest results in dyspepsia, bilious disorders, and constipation. It has one peculiarity not common with many compounds, — its effects are intensified by continued use, so that in many cases, after using the medicine for a few days according to the directions, one powder at bed-time proves a decided laxative.

℞ Podophyllin, . . . gr. ij.
Bismuth sub. nit., . . } ea. gr. xxx.
Quinnæ sulphat, . . }

M.; f. 30 powders. Dose, one powder three times a day, before eating.

C. L. PIERCE, M. D.

Ashburnham, Mass.

I send you the formula for a pill, which I have used with satisfaction for several years, as an alterative in cases where mercurials are contra-indicated or objected to by the patient.

℞ Extract of Colocynth Com., . ʒj.
Leptandrin, ... ℈ij.
Resina Podophylli, . . grs. xv.

M.; f. pil. No. 30. Dose, one or two at bed-time.

I venture to send a formula which some of your readers may be inclined to use in cases of dyspepsia and constipation. The medicine is pleasant to the eye, but frightfully bitter to the taste. I have found it very useful.

℞. Cinchoniæ Sulphatis, . . . gr. 30
Ferri sulphat exsiccat, . . . gr. 60
Strychniæ, ... gr. 1½

M.; div. in pulv. No. 30. One to be taken immediately after each meal.

H. D. DIDAMA, M. D.

Salina, N. Y.

TOOTH-POWDER.

℞ Good English magnesia,	186	grs.
Quinia bark,	186	"
Powdered Rhathany,	38¾	"
Tobacco leaves in powder not prepared,	34¾	"
Fat,	20¼	"

The whole is well porphyrized, passed through a fine silk sieve, and aromatized with peppermint and rose oils.

Fire Lighting in Olden Times.

The refrain of an old ditty, the text of which we cannot recall, had a bit of advice which would not be appreciated now-a-days; it was —

Fire upon the mountains,
Run, boys, run!

Why and in what direction should they run? Evidently to the mountains, not, as Lot did, to escape fire, but to get it. Why? Because fire was precious and scarce; as precious as that which fabled Prometheus stole from heaven, and more precious than diamonds, which light, but do not heat.

How many who read this issue of the *Scientific American*, in this year of our Lord 1866, can remember when the preservation of the hearth fire was a duty as exacting and necessary as that of the virgins in the times of Roman greatness, who were intrusted with the care of the altars raised to Vesta? Possibly many, but not all.

We confess to no "vigorous old age," yet we well remember when the last care of the housewife, after securing the door and trying every window, which duty she repeated three hundred and sixty-five times every year, was to carefully rake together the "live" coals, place the brands against the back-log, and cover all with the ashes. How she carried her tinder-box, steel, and flint into her room, always sure there was enough of "punk" or charred linen rags, called "tinder," to enable her to strike a light at call. How on a cold morning when —

"The roads were dumb with snow,"

we have gone with shovel to the nearest neighbor, or further, for a portion of the precious element which the gods deemed necessary for man in order to enable him to rise to their high estate. All this we remember.

In every house was a tin box, a round tin cup, rising some inch-and-a-half at the sides, in which was a quantity of "tinder." On that was a plain disk as a cover, and over all a lid which had on its upper surface a socket for a candle. A flint — a common gun flint, much more common then than now — and an old file. This was the fire-raising apparatus. The flint in the right hand, the steel in the left, its point raised above and pointing to the "tinder," a few strokes of the flint against the steel, and a faint spark is evoked from the tinder. To make that spark a generating blaze, a slip of dry pine wood, its end dipped in melted brimstone, sufficed. These splinters of sulphur-tipped shavings were the originators of the present lucifer match, and in our boyhood days we have spent many an hour in shaving them from the block, a labor which, as a pastime, would have been pleasant, but as a task was irksome.

After a while came the phosphorus matches, which, when dipped in a vial, ignited on exposure to the atmosphere. These were costly, and never came into general use, being shown as curiosities rather than employed as conveniences. Then came the present match, variously named as "loco-foco," "lucifer," and "friction" matches. The process of this manufacture has already been detailed in our columns. When these friction matches first came into use, they were subjected to great opposition from the press, on the score of the facilities they afforded incendiaries in prosecuting their nefarious work; and for many years, hundreds refused to use them. But their undoubted convenience and utility triumphed over all prejudices, and the friction match is now considered a necessity. There is no single article more extensively used, there being manufactured in this country alone one hundred millions daily. — *Scientific American.*

Coal.

Coal is not a material belonging exclusively to past geological periods, but is in process of formation now, as may be proved by an examination of the "brown coal," well known in Europe, and frequently met with here. Thin slices, which allow the light to pass through them, show to the naked eye the original vegetable structure. It is universally acknowledged that this "brown coal," or lignite, is an undeveloped coal, not yet subjected to the changes of years which would transform it into pure bituminous or anthracite coal. To be sure, time is required to change the disintegrated porous mass of vegetable fibres, roots, and tendrils, leaves and *lignum*, to hard, brilliant, laminated, or crystallized coal. But Nature works slowly. We find it difficult to understand her processes or to comprehend her infinite patience, which watches through unnumbered years and countless ages for the slow and gradual progression of her agencies. But it is certain that her transforming processes have not suffered an abatement of their original power by the discoveries of man. They still go on, and will as long as this globe and the universe endure.

A Very Singular Explosion.

The *Alta* gives an account of a very singular explosion that took place recently in San Francisco, on board the sloop *Sycamore*. The explosion of an ordinary brass ship's lamp, with such force as to shatter the cabin into kindling wood, kill the bearer of the lamps, and even drive pieces of the metal deep into the deck, accompanied by a noise like the report of a cannon, was something not easily to be explained on any theory based on the supposition that the contents of the lamp were simply coal oil or even camphene or benzine. On investigation of the circumstances, Coroner Harris has probably hit upon facts which will explain the whole matter. The story is a curious one. The men on board the sloop say that they went ashore at Red Rock some weeks since, and while at the Manganese mines, there located, obtained some fluid which they supposed to be oil. How they obtained it does not yet appear, but they state that some of it was placed in the coal-oil can, kept on board for filling the lamps. Shortly thereafter some one took the can to oil the axle of the truck used for hauling freight on board the vessel, and on the truck being used an explosion followed. It was then ascertained to the satisfaction of the men that the supposed oil was nitro-glycerine, which had been taken to Red Rock to be used in blasting in the mine. They thereupon turned the dangerous fluid overboard, and coming to this port again had the can filled with coal oil at a drug store. On examination of the body of Chas. Hunt, the coroner discovered that the hole in the abdomen, made by the entry of a piece of the lamp, was of small size, and appeared as if made by a sharp instrument. This appearance deceived Dr. Hastings, at the United States Marine Hospital, and caused him to suspect that a murder or homicide had been committed. On opening the body it was found that the brass wick tubes of the lamp only had penetrated the abdomen. They had passed through the lower part of the stomach, ranging upward and backward, and entered the liver, where a second explosion had taken place. The tubes were torn into minute shreds by this explosion, and the fragments flying in all directions cut the lower part of the liver into pieces hardly larger than a kernel of corn. The theory suggested by these facts is, that enough of the nitro-glycerine remained sticking to the sides of the can, when it was re-filled with coal oil, to produce the explosion. This floated on the surface of the coal oil or mingled with it, and found its way into the lamp, where it, in some manner, through friction in screwing down the tubes, a sudden jar, or heat from the burning wick, exploded with the terrible force and fatal result stated. Coroner Harris is determined to have the mystery fully cleared up, if possible, and has accordingly submitted the contents of the can to a chemist, who will analyze them and report on their character at the inquest.

On the Solution of Calculi in the Bladder and Kidneys. — A very interesting paper was read on the above subject by Dr. W. Roberts, of Manchester, at a meeting of the Royal Medical and Chirurgical Society. The treatment recommended is only applicable when the calculus is small and of the uric-acid kind, and when the urine is not alkaline from disease.

His treatment consists in the administration of large doses of acetate or citrate of potass, so as to keep the urine constantly of a certain degree of alkalinity. For weeks together, the patient may have his urine thus kept alkaline without injury. Dr. Roberts, in fact, considers the administration of alkalies in this way as harmless as the taking of so much sugar. The paper was remarkable as a methodical, scientific study; and, also, well indicates the immense service which we may anticipate that chemistry will one day render to medicine. The real value of the proposed remedy can of course only be decided by future experience. — *British Medical Journal.*

Carbolate of Lime.

Carbolic acid unites with lime, forming a carbolate, in which form it is well adapted for use as a cheap disinfectant and deodorizer. The crystallized acid and solution are prepared with great purity for medicinal and surgical uses, and therefore they are quite expensive. They may be used for disinfecting sick-rooms and night-vessels, for the destruction of parasites and insects on plants, etc., but for cleansing stables, barn-yards, cess-pools, and for destroying insects in orchards, etc., the carbolate of lime is the article needed.

We have made arrangements for the extensive manufacture of carbolate of lime, believing it to be the most valuable of all known disinfectants. Those who have read the articles upon carbolic acid published in the Journal will clearly understand its nature and value. The cost to the consumer is not greater than chloride of lime, so extensively used, and as a prompt and certain disinfectant it is far more valuable. The odor is not unpleasant to most people, resembling that of coal tar or creosote. We put it in packages of 10, 25, and 100 pounds, so as to make it convenient for druggists and consumers. The ten-pound packages cost $1.25 each, the larger ones less in proportion to quantity.

☞ Prof. H. Dussauce, of New Lebanon, N. Y., has been appointed commissioner to the Paris Exposition next year. He requests us to state that he wishes to communicate with exhibiters, as he desires, in connection with his position, to obtain authentic information concerning the exhibition any one may contemplate to make at Paris. This information is to be used in the report he will make upon the subject of American Industry. He may be addressed at New Lebanon, N. Y.

BOSTON JOURNAL

OF

CHEMISTRY AND PHARMACY.

VOLUME I. Boston, March 1, 1867. NUMBER V.

THE

Journal of Chemistry and Pharmacy

IS PUBLISHED BI-MONTHLY AT

150 Congress Street, Boston,

BY JAS. R. NICHOLS & CO.

TERMS, FIFTY CENTS PER ANNUM.

All letters and communications should be addressed "Office of Journal of Chemistry and Pharmacy," Boston, Mass.

Chemistry of a Kernel of Corn.

BY JAS. R. NICHOLS, M.D.

In considering the curious and interesting chemical nature of "corn," we shall use the term as applied to the wheat berry, as well as to the seeds of the maize plant. Among the ancients wheat was always designated as *corn;* and when we read of St. Paul's famous voyage in a "corn ship," we are to understand that the vessel was laden with Egyptian wheat. It is quite certain that neither the great apostle, nor the old Roman navigators, who held him a prisoner, ever saw a kernel of our Indian corn, — the maize plant being indigenous to the American continent.

The two grains are chemically constituted very much alike, and what may be said of one applies with almost equal correctness to the other. Both are made up of starch, dextrine, gum, sugar, gluten, albumen, phosphates of lime, magnesia, potassa, with silica and iron. Wheat contains about double the amount of lime and iron, considerable more phosphoric acid, but less magnesia and soda. Maize seeds are rich in a peculiar oil, which is nourishing, and highly conducive to the formation of adipose or fatty matter; hence the high utility of our corn in fattening animals.

What a remarkable combination of chemical substances are stored up in a kernel of corn! It may almost be said to be an apothecary shop in miniature; and the order and arrangement of the mineral elements and vegetable compounds, needed to render the comparison more apt, are not wanting. For some reason, nature places the most valuable substances nearest the air and sunlight, while the little cells of the interior are filled full of that material used to keep erect and tidy our collars or neckbands, starch. With a moistened cloth we can rub off from the kernel about three and a half per cent of woody or strawy material, of not much nutritive value, and then we come to a coating which holds nearly all the iron, potash, soda, lime, phosphoric acid, and the rich nitrogeneous ingredients. This wrapper is the store house, upon whose shelves are deposited the mineral and vegetable wealth of the berry. From whence come these chemical agents? by what superlative cunning were they grouped within the embrace of this covering?

They come of course from the soil, and, by the mysterious and silent power of vital force, they have been raised atom by atom from their low estate, and fitted to perform the high offices of nutrition in the animal organism. And should we not appropriate them to our use, as the most carefully adjusted of all materials designed for human aliment? Certainly we should. And do we? Unfortunately we cannot render an affirmative answer to the interrogatory. The sharp teeth of our burr mills drive ruthlessly through the rich wrapper of the kernel, and then the torn fragments pass to the bolt, and from that to the barn or stable; the animals obtain the nutritious gluten; the starch, in the form of fine flour, is set aside for household uses. But it is not designed to enlarge upon this point. Let us look at the chemical office these substances found in the kernel of corn subserve in the animal economy.

Starch is the wood or coal which, under the influence of oxygen, is to be consumed or burned to maintain animal warmth. It passes in as pure fuel, it is oxidized, and the ashes rejected through the respiratory organs. The warmth imparted by this combustion is necessary to the proper fulfilment of the functions of the body. Of these functions, those of digestion and assimilation are the most important. The digestive apparatus receives the gluten and the starch of the grain; the latter is pushed forward to be burned, the former enters the circulation, and out of its contained iron, potash, soda, magnesia, lime, nitrogen, etc., are manufactured all the important tissues and organs of the body. All of the iron is retained in the blood, and much of the soda and phosphoric acid; the lime goes to the bones, and the magnesia abruptly leaves the body, as it seems to be very plainly told that it is not wanted. Such, in brief, are the uses which the organic and inorganic constituents of a kernel of corn subserve in the chemistry of animal life.

The changes which they are made to undergo in the laboratory are almost equally interesting and important. Fecula, or starch, is a body of great interest, and is not found alone in corn. There is scarcely a plant, or part of a plant, which does not yield more or less of this substance. What a curious vegetable is the potato! Swollen or puffed out by the enormous distention of the cellular tissue in which the starch is contained, it seems almost ugly in its deformity. It is little less than a mass of pure starch.

If we separate the starch from the gluten in corn, and boil it a few minutes with weak sulphuric acid, it undergoes a remarkable change, and becomes as fluid and limpid as water; and if we withdraw the acid, and evaporate to dryness, we have a new body, a kind of gum called "dextrine." But if we do not interrupt the boiling when it becomes thin and clear, but continue it for several hours, and then withdraw the acid by chemical means, we have remaining a sirupy liquid, very sweet to the taste, which will, if allowed to evaporate, solidify to a mass of *grape sugar*. This is the method of changing corn into sirup and sugar, about which so much has recently been said. It is a process long understood, and practically of little value. What is most extraordinary in this process is the fact that the acid *undergoes no diminution* or *change*. It is *all* withdrawn in its original amount after the experiment; nothing is absorbed from the air, and no other substance but grape sugar generated. The play of chemical affinities lies between the amidine and the elements of water. grape sugar containing more oxygen and hydrogen, compared with the quantity of carbon, than the starch.

Nothing can be more striking than these changes. From the kernel of corn we obtain starch; this we change easily into gum, and, by the aid of one of the most powerful and destructive *acids*, transform it into sirup and sugar. A pound of corn starch may thus be made over into a little more than a pound of sugar of grapes. But this result can be accomplished in another way. Let us moisten the corn, place it in a warm room and allow it to germinate, just as do vegetables in a warm cellar. If in this condition it is dried, ground, and infused in water, a sweet liquid will be obtained, proving the presence of sugar. The change is produced, in this experiment, by the presence of *diastase*, a substance supposed to exist in malt or germinated grain, but which is imperfectly understood. The quantity of diastase necessary to effect this curious metamorphosis in corn starch is very small. We are now ready to consider another most extraordinary change which corn is capable of undergoing; that of being transformed into *whiskey* or alcohol.

If we take the sweet liquid obtained by the infusion of malted corn, and subject it to a temperature of 60° or 70° F., it soon becomes turbid and muddy, bubbles of gas are seen to arise from all parts of the liquid, the temperature rises, and there are signs of intense chemical action going on in it. After a while it slackens, and soon stops altogether. Examination shows that it has now completely lost its sweet taste, and acquired another quite distinct. An intoxicating liquid is formed, and if we place it in a still, we obtain a colorless, inflammable liquid, easily recognized as *alcohol*. By a peculiar arrangement of the condensing apparatus of the still, a portion of the grain oils and a large amount of water are allowed to go over with the alcohol, and this constitutes *whiskey*. This is an example of the change called "vinous fermentation." The influence of a ferment or decomposing azotized body upon sugar is strange, and quite incomprehensible. Through its agency, we may cause the highly organized kernel of corn to take another step downward towards a dead inorganic condition. We can transform the alcohol over into acetic acid or vinegar, or the sugar may be formed into one of the most curious organic acids — the lactic; or, still further, it is capable of being changed into manna, a substance supposed to resemble that upon which the Israelites subsisted in the wilderness.

As in these processes we follow the kernel of corn through the various changes, first into gum, then into sugar, then alcohol, then vinegar, and ultimately into carbonic acid and water, we obtain an imperfect idea of the marvels of vital chemistry. The mysteries of these reactions have been carefully studied, and in a measure unravelled, but the necessary brief limits of this article will hardly allow of their consideration. The chemistry of a kernel of corn is a comprehensive topic, and to be considered even in its outlines would require more space

than the pages of the Journal afford. The aim has been to group together a few of the most interesting points, and thus awaken a desire for a more complete and satisfactory investigation.

India Rubber Varnish.—That India rubber dissolved in various liquids yields a good varnish is well known; but in general they are too viscid for delicate purposes, and are only good for making stuffs waterproof. India rubber liquefied by heat, dissolved in oil or coal tar, or drying linseed oil, does not give a varnish of sufficient fluency or free from smell. Moreover, a considerable quantity of India rubber remains undissolved in a gelatinous state, suspended in the liquid, so that the solution is never clear. Dr. Bolly has recently published some remarks on the subject which may be useful. If India rubber be cut into small pieces and digested in sulphuret of carbon, a jelly will be formed; this must be treated with benzine, and thus a much greater proportion of caoutchouc will be dissolved than would be done by any other method. The liquid must be strained through a woollen cloth, and the sulphuret of carbon be drawn off by evaporation in a water bath; after which the remaining liquid may be diluted at will with benzine, and frequently shaking the bottle which contains it. The jelly thus formed will partly dissolve, yielding a liquid which is thicker than benzine, and may be obtained very clear by filtration and rest. The residue may be separated by straining, and will furnish an excellent waterproof composition. As for the liquid itself, it incorporates easily with all fixed or volatile oils. It dries very fast, and does not shine unless mixed with resinous varnishes. It is extremely flexible, may be spread in very thin layers, and remains unaltered under the influence of air and light. It may be employed to varnish geographical maps or prints, because it does not reflect light disagreeably as resinous varnishes do, and is not subject to crack or come off in scales. It may be used to fix black chalk or pencil drawings; and unsized paper, when covered with this varnish, may be written on with ink.—*Journ. Applied Chem., Nov.*, 1866.

Concerning the Treatment of Constipation and of Stoppage of the Bowels, with Special Reference to the Use of Atropia and of Galvanism.

By Dr. Alexander Fleming,
Senior Physician to the Queen's Hospital, Birmingham.

In the course of my practice, when I had occasion to prescribe atropia, I noticed frequently that, in from one to four days, a slight relaxation of the bowels took place. The stools were but little altered in character, and the intestinal secretion but slightly increased; still, the action of the bowels was decidedly easier, and, if constipation had existed, it was removed. Occasionally the purging was more marked. I believe that this effect is brought about by *increased* peristaltic action. The cause of this increased action may be direct stimulation of the muscular coat by the atropia carried to it with the blood; but other causes have been suggested to my mind from close observation of the effects of atropia on other parts of the body, more especially on the throat, stomach, and bladder. When this drug is exhibited in small and medicinal doses, it causes remarkable dryness of the throat and tongue; difficulty in, yet constant efforts at, swallowing. The changes in the act of micturition are remarkable and noteworthy. This is often hurried and frequent, sometimes interrupted, and occasionally there is slight strangury. I have seen a patient compelled to make water every five minutes. In the throat, the mucous secretion is obviously checked, the membrane is seen to be dry, and the surface is thus rendered more susceptible of irritation; hence the constant efforts of deglutition. I believe the effect of the drug on other mucous membranes to be of the same nature; and, in the bladder, this arrest of the mucous secretion results in irregular and frequent micturition. According to this view, its action on the bowels is easily explained. The mucous secretion being checked, the irritation caused by the contents of the intestinal canal, when its surface is thus unprotected, provokes more prompt and vigorous contractile action.

Secondly, atropia constricts the smaller arteries; and we can understand that a gut, dormant and paralyzed by distension, is the subject of passive congestion, the continuance of which will contribute to maintain its state of inertia. Atropia, acting on the arteries, checks the supply blood to the bowel, relieves the congested muscle, and thus facilitates its return to healthy action. This *modus operandi* is analogous to the well-known effect of blood-letting or leeches, in relieving the congestion of, and unloading, an inflamed intestine.

Accepting these views of the *mode of action* of atropia on the bowels, we at once perceive its advantage over the ordinary irritant purges in the treatment not only of simple constipation, but especially of the more serious and alarming cases of intestinal obstruction from impacted fæces. The ordinary irritant purges provoke increased secretion and peristaltic action of the gut *above* the obstruction; this may succeed in propelling the accumulation forward; but should it fail in doing so, we have inverted action and vomiting, with the further risks of enteritis, and general, and it may be fatal, exhaustion of the patient. Atropia, on the contrary, operates through the blood on the entire canal; acts directly on that part of the gut which is distended by the accumulation, and so paralyzed. Deprived, by the drying qualities of the drug, of its natural coating of mucus, the mass more readily provokes irritation; the natural contractile action is re-established; and the bowel is more or less quickly relieved of its contents.

There is another circumstance connected with atropia, which distinguishes its operation from that of common purgatives: its action is not followed by reaction; its relaxing power is not succeeded by a disposition to constipation. On the contrary, the improved action of the bowels is, comparatively speaking, sustained.

The powder and extract of the crude drug belladonna have been employed successfully in constipation by Bretonneau, Trousseau, Fleury, Drs. Brinton, Routh, Fuller, Leared, and others; and a most interesting paper on the Use of Belladonna in Intestinal Obstruction was read at the Bristol meeting of our Association in 1863.

The cause of constipation, and the conditions under which it occurs, vary infinitely; each case requiring separate consideration, especially as regards the hygienic and dietetic treatment.

It is not my intention to enter now into the question of the regimen and diet of constipation; but, to prevent any misconception as to my view of their value, let me state distinctly, that I assign to them the first place in importance as curative means, and regard medicinal agents in the light only of valuable auxiliaries. At the same time, the error should be avoided of underrating the value of medicines. In former times, they were relied on too exclusively; of late, under the influence of hydropathy and homœopathy, their importance has been most unwisely neglected. It is the function of the philosophical therapeutist to recognize the respective value of all remedial agents, whether hygienic, dietetic, or medicinal, and to assign to each their relative importance.

This truth is forcibly illustrated in the disease now under consideration; for while in the more simple forms of constipation, regimen and diet are often equal to the cure, many examples of a more obstinate nature have occurred to me, where these means alone have signally failed to give relief, but where recovery has ensued when the treatment I shall now describe has been strictly followed.

In cases of *simple constipation* I have exhibited atropia in various forms, both in pill and in solution; but my later experience has led me to the adoption of a plan of treatment, of which the following is an outline.

The subjoined draught is given the first thing in the morning and the last thing at night, on an empty stomach.

℞ Magnesiæ sulphatis ʒj; acidi sulphurici aromat. ♏x; tinct. aurantii ʒj; aquæ ad ℥j. M.

Ten minims (containing one sixtieth of a grain) of a solution * of atropia are added to the draught at bed time; and the dose is increased nightly by two minims, until a very slight degree of the earlier physiological effects of the drug—dry throat, wide pupil, and dim sight—is produced. This is attained with much precision and safety; but it may be necessary to give thirty, forty, or even fifty minims, according to the strength of the patient, before this result is attained. The dose should then be somewhat diminished, and continued at the reduced quantity for two or three weeks, as circumstances may indicate. I then discontinue the drug gradually; and finally replace it with strychnia, giving five minims of a solution † in both morning and evening draughts for a week or two; or the strychnia may be given alone as soon as the saline draught can be dispensed with. This commonly suffices to restore the normal tone of the bowel, and completes the medicinal treatment.

When constipation is neglected, the fæces accumulating gradually distend the bowel, and finally deprive the muscular coat of its irritability and contractility, and we have established one of the most frequent forms of *obstruction* of the bowels. (The observations in the present paper refer to this form only.)

If, after a moderate use of the ordinary purgatives by the mouth and in the form of enemata, the obstruction shows no disposition to yield, and the patient suffers from pain and distension of the belly, with (it may be) nausea and vomiting, I prohibit entirely the use of the more powerful cathartics, the exhibition of which increases the vomiting and irritation, and may provoke inflammation. I desire the patient to be confined to liquid food; viz., milk and beef tea alternately every four hours. If there be much vomiting, I direct the milk to be mixed with one third of Carrara water, and the quantity of food at each meal to be very small, until the irritability of the stomach has subsided. The following draught is prescribed every four hours before each meal.

℞ Magnesiæ sulphatis ʒj; solutionis atropiæ (author) ♏ iv; acidi sulphurici diluti ♏ x; aquæ. ad ℥j. M. Fiat haustus.

Should there be much spasmodic pain, I add half a drachm of chloric ether, prepared by distillation, to each dose. This draught is, for the most part, readily borne by the stomach; promotes gently the action of the bowels; and softens their contents. The atropia favors, in the manner already indicated, the contractile power of the gut. In using atropia in the manner specified, the patient *must* be seen twice daily; for, as a slight degree of the physiological action of the drug should be induced, the dose should be increased, diminished, or omitted, according to the effect observed. If pain and indications of approaching inflammation be present, warm fomentations to the belly are demanded; on the other hand, if these symptoms be absent, the general purpose of the medication is promoted by frictious two or three times a day with warm liniments; the rubbing to be so applied as to promote the normal course of the intestinal contents.

In a considerable proportion of cases, this treatment alone affords the desired relief; in other and more obstinate examples, we have to conjoin the use of aperient enemata. These should be used two or three times daily; and be introduced by means of the rectum-tube as high as possible into the bowel. When ordinary injections fail, ice-cold water sometimes succeeds; and it is well to bear this in mind.

In inserting the tube for any distance into the rectum, much annoyance is often experienced by its doubling upon itself. I have overcome this difficulty by the use of a stilette within the tube. Should an impediment, such as a fold of membrane, obstruct the passage, the withdrawal of the stilette for an inch or two allows the flexible tube to adapt itself to sinuosities of the intestine, and facilitates its further introduction. I have had the tube marked off in inches, to indicate precisely the extent of insertion. The higher it can be passed with safety, the more efficient is the injection.

* The solution of atropia which I use is made thus:—Atropia, 1 grain; distilled water, 5 drachms. Dissolve *thoroughly* with the aid of a few drops of diluted muriatic acid, and add of rectified spirit sufficient to make ten drachms. This solution keeps well, and is of uniform strength. The tincture and extract of belladonna, however carefully prepared, vary much in power. I have found the tincture of one chemist seven times the strength of the same preparation from another and equally respectable chemist; and the extract is even more uncertain. The internal, and at the same time efficient use of these preparations is for this reason very unsafe. The solution is so proportioned that ten minims, containing one sixtieth of a grain of atropia, is the commencing dose for the adult.

† The solution of strychnia which I use is made thus:—Strychnia, 2 grains; distilled water, 5 drachms. Dissolve the strychnia *thoroughly* with the help of a little diluted muriatic acid, and add of rectified spirit sufficient to make ten drachms. This solution has the same advantages over the powder, extract, and tincture of nux vomica, that the solution of atropia has over the tincture and extract of belladonna. It is uniform in strength, passes readily into the circulation, and the dose can be apportioned with accuracy. The ordinary commencing daily dose is ten minims, and contains one thirtieth of a grain of strychnia.

Between the enemata, galvanism should be applied to the bowels. This agent should be conducted through the rectum, and passed, as nearly as may be possible, through the paralyzed gut; care being taken to employ it gently, but repeatedly, our object being rather to restore the action of the bowel by small but successive doses of the stimulus, instead of attempting to dislodge the impacted contents by one powerful application of the galvanic current.

Employed in this manner, the galvanism is infinitely more efficient than when passed in the ordinary mode from the back to the belly. It gives rise, however, to acute suffering; and, unless it be used gently, as I have directed, tends to exhaust the patient.

The following is the apparatus I employ. Through a rectum-tube, twenty inches long, a copper wire is passed with a brass button at the distal extremity; a hole being drilled at the opposite end for the reception of one of the wires of the galvano-magnetic machine. The tube being passed into the rectum, the current is completed by applying to the abdominal walls the excitor of the other wire. This excitor — which is sometimes a sponge, sometimes a cylinder of metal, and at other times an olive-shaped metallic button covered with leather — should be moved along the course of the distended bowel, and its position constantly shifted; the skin of the belly being kept moist with salt water.

When the current is gentle, its application may be continued for half an hour at a time, and from time to time a sharper shock may be transmitted; the force of the current, and its duration, being carefully adapted to the strength of the patient.

I use Duchenne's galvano-magnetic machine, as with it the current can be usefully modified in various ways.

I have employed galvanism by the rectum in the manner indicated, in intestinal obstruction, since 1857.

Such is the outline of the treatment of intestinal obstruction from impacted fæces, which I can say with confidence has furnished very satisfactory results.

In conclusion, it may not be superfluous to add that, in the diagnosis of the cause of stoppage of the bowels, we may often be at fault and treat as a case of simple accumulation, some one or other of the many forms of insuperable obstruction. It is satisfactory to know that the medicines here recommended may do good, and can do no harm in such a case; but the suspicion of error in diagnosis obviously enjoins much caution in the use of galvanism. This was well shown in a case of complete obstruction in an elderly female, which I saw in consultation with Mr. Hoskins of this town. The usual treatment had been judiciously employed. Atropia was then administered, and most efficiently, so far as regards its physiological action. Galvanism was also carefully used. The obstruction was insuperable, and finally proved fatal. The patient, however, lived for a week after the use of these measures, in comparative ease; showing that no harm had resulted from their employment. A *post mortem* examination was not obtained.

For the better illustration of the nature of the results furnished by the treatment described above, I subjoin histories in detail of five cases.

Case 1. *Severe Constipation of three years' standing; Colic, Vomiting, and serious Exhaustion; Failure of ordinary Methods of Treatment; Use of Atropia; Recovery.* —The patient, a young lady, aged 18, came under my care in September, 1861. She was then suffering from almost constant spasms of the bowels, causing intense agony, aggravated after every attempt to take the simplest food; the vomiting and retching were incessant. There was no fever nor tenderness of the belly. She was very weak, confined to bed; the countenance was pale; the pulse was feeble, but not frequent; and the case wore an aspect of much anxiety.

History.—Three years previously to the time of my seeing this patient, she had suffered from prolonged and most obstinate constipation, brought on by gross neglect of the bowels at school. The stomach became irritable, rejecting many articles of food; and the least imprudence in diet brought on spasmodic attacks of pain in the belly, and vomiting. After repeated but unsuccessful attempts to obtain relief under medical treatment in various places, her friends placed her at Malvern, under the water-cure. She derived no permanent benefit; though, from the strict attention to diet, her general health was improved, and the attacks for a time were not quite so frequent. They returned, however, shortly, with redoubled violence, accompanied by excessive flatulence, twisting of the bowels, and severe suffering. The irritation of the stomach increased, until the simplest food produced so much pain that she was, as she expressed it, "terrified to eat."

After a careful examination of the case, in which I had the valuable assistance of Professor Simpson of Edinburgh, it was concluded that there was no inflammation, but that the peristaltic action of the bowels was perverted; in the smaller intestines it was abnormally active, leading to severe spasmodic contortions and heaving of the belly; while the colon was unduly distended, and more or less completely paralyzed. There was then no absolute obstruction, but a constant tendency to constipation.

Acting on this diagnosis, the treatment of constipation described in this paper was adopted. The patient was restricted to a milk diet. Atropism was fully induced; blisters were repeatedly applied to the belly; and aperient enemata were administered from time to time. Under this medication, which occupied about a fortnight, the colon was gradually unloaded of its accumulated contents, and the vomiting and spasms quickly subsided. The stomach became tolerant of food, the normal appetite returned, and the patient rapidly regained flesh and strength.

The cure was absolutely permanent. The stomach was delicate for some months; but, with a moderate attention to diet, the patient continued well. There was no return of constipation or spasms of the bowels. The young lady is now in the enjoyment of excellent health in all respects.

I have no hesitation in describing this as a remarkable case. The relation between the physiological action of atropia and the improvement of the symptoms was unequivocal; lastly, the short duration of the treatment, and the completeness of the cure, contrasted very strikingly with the lengthened and unsuccessful efforts at relief which had been made at previous times in the earlier history of the case.

Case 2.—*Stoppage of the Bowels from Fæcal Accumulation; Colic; Stercoraceous Vomiting; Failure of Ordinary Treatment; Atropism on the thirteenth day; Recovery.* —(This case occurred in the practice of Dr. Spencer Thompson of Burton-on-Trent, to whom I am indebted for the following notes.) L. R., aged 45, married, a thin, spare, delicate woman, was seized on the night of October 20th, 1863, with severe twisting pain in the bowels, incessant vomiting, and complete constipation. The bowels had been opened on the previous day. Within twenty-four hours the vomiting became stercoraceous; and continued so, with intermissions, for thirteen days of the sixteen during which the obstruction lasted. During the latter half of the period of the attack, there was much tympanitic distension and tenderness, but there never were any positive signs of peritoneal inflammation.

The remedies resorted to were at first bismuth, prussic acid, opium, and chloroform, to subdue the irritable condition of the stomach; counter-irritants of the belly; and a persevering use of every variety of purgative injection.

No relief was obtained. On the thirteenth day of the attack, one drachm of the following mixture was directed to be taken every hour.

℞ Solutionis atropiæ (Fleming) ♏xv; acidi hydrocyanici diluti ♏xv; aquæ ℥ij. M.

Soon after the above was commenced, the stomach became quiet, and retained the medicine, as well as small quantities of beef-tea and brandy and water. In forty-eight hours, the atropism being now manifest, the obstruction showed signs of yielding, and the bowels were gradually completely relieved; and, on the sixteenth day from the commencement of the attack, all signs of obstruction were removed. Mrs. R. gradually recovered, and is now (April, 1864) in her usual health, having had no return or even threatening of the disease since. The catamenia, which were irregular for some months previous to the attack, have since been quite normal.

Case 3.—*Obstruction from Fæcal Masses; Constant Sickness and Vomiting; Use of Salines, Atropia, and Galvanism; Gradual breaking down and Removal of the Accumulations; Recovery.*—S. L., aged 50, when placed under my care, was suffering from severe tormina, constant retching and vomiting, and obstruction of seven days' standing. The pulse was frequent and feeble, the countenance anxious, and the skin covered with perspiration. Three distinct tumors were to be felt in the belly; one in the upper part of the ascending colon; one at the corner, between the ascending and transverse colons; and the third in the transverse colon itself. These were movable, and presented the other features of fæcal masses. They differed in hardness, the central one being much the hardest of the three. The diet, saline draughts, atropia, aperient injections with the rectum-tube, and, after several days, galvanism, were employed as indicated in my paper. The vomiting rapidly ceased, and the patient was soon able to take food well. In three days the bowels began to act, and continued to do so two or three times daily; the evacuations were small in quantity and fluid. The tumors in the belly gradually decreased in size, and finally were dispersed.

In the discharges, the gritty and insoluble components of the fæculent concretions were readily distinguished; they were composed of small pieces of bone, undigested tendon, etc. The patient was an old dyspeptic, through whose stomach the harder portions of the food were apt to pass undissolved.

Galvanism in this case was used daily, but very gently, for a fortnight, and was passed through the colon in the neighborhood of the swellings. When the galvanic current was powerful, the suffering was acute, and could not have been maintained without risk of undue exhaustion. Therefore the utmost care was required in its administration; and no attempt was made to secure the immediate expulsion of the fæcal masses.

In the third week of the treatment, the intestinal canal was clear of obstruction; and the patient, though very weak, was convalescent. He made a good recovery.

Case 4.—*Simple Constipation of long standing, in a Healthy Subject; Failure of Dietetic and Ordinary Modes of Cure; Use of Atropia; Recovery.*—J. J., aged 27, a strong healthy young man, living in the country, applied to me in April, 1862, on account of constipation. His bowels had for years been obstinate, and for eighteen months he was obliged to take aperient medicines daily; otherwise he would pass three or four days without going to the closet, and would then suffer much pain at stool. So long as he continued taking aperients, his appetite and general health were good. He had several times been under medical care, with temporary advantage; and had endeavored to rectify the evil by diet and exercise, but unsuccessfully.

I directed him to sponge with salt once daily, in the morning; to rub the belly vigorously; to take abundant exercise (without fatigue); to omit from the diet, tea, coffee, and stimulants, with the exception of a glass and a half of claret mixed with water to dinner; to take cocoa to breakfast, porridge to supper, and vegetables and fruit in moderation. The medicinal part of the treatment consisted of the saline draughts and atropia, as indicated in this paper. A moderate degree of atropism was induced. The improvement was slow, but very marked. In three weeks he was able to discontinue his medicines, but has ever since persevered more or less closely with the regimen and diet. It is now eighteen months ago; and he has not during that time, except at rare intervals, been troubled with constipation.

Case 5.—*Obstruction; Slight Stricture; Fæcal Accumulation; Severe Tormina, Sickness, and Vomiting; Salines, Atropia, and Enemata; Recovery.*—(I saw this patient, whose case I will relate very briefly, in October of last year, in consultation with Mr. Ross Jordan.) W. C., aged 35, had suffered for five days from obstruction, severe tormina, and incessant retching and vomiting. There were tenderness, distension, with dull percussion in the left iliac region. There was obvious accumulation in the descending colon. Salines, atropia, and enemata, were employed, with the result of gradually unloading the bowel, and restoring the healthy character of the evacuations, with the exception that the stools continued to be slightly flattened.

It appears that a year ago he had sought advice, on account of indigestion, from a quack, who gave him four doses of some drug (probably lobelia), which purged him very severely, causing much pain, and discharge of blood and mucus. Since then, the bowels have continued to trouble him; and the symptoms point to a slight constriction—the consequence, probably, of inflammation—about the sigmoid flexure.—*British Medical Journal.*

"Camphor Ice."—This is the popular name given to a preparation much used during the winter season as an application to chapped and abraded skin. Many pharmaceutists make a *specialty* of it, and find a large sale for the various combinations sold under this name. The following formula yields an elegant preparation, besides the merit of being economical and readily made:—

℞	Powdered Camphor	℥ ii
	White wax	ʒ iv
	English oil lavender	ʒ ii
	Benzoated suet	℔ i

Melt the suet and wax together, and when nearly cool add the camphor and oil of lavender, and pour into moulds of convenient shape and size. Glycerine and other substances are sometimes added with a view of increasing its efficiency and adding to its popularity.—W. C. Bakes: *Journal of Pharmacy.*

"Perfumed," or "Flower-Scented" Glycerine is among the "*winter requisites*" sold by many pharmaceutists. This is conveniently and readily prepared by triturating any of the *extracts*, such as heliotrope, millefleur, jasmine, etc., with carbonate of magnesia, in the manner directed for the medicated waters. The perfumed water thus obtained is mixed with an equal bulk of glycerine.—*Id.*

Communicated to the Journal of Chemistry and Pharmacy.

Decoction of Nettles.

Messrs James R. Nichols & Co.:—In the November number of the Journal, you speak of the decoction of Nettles, in Passive Hemorrhages; you do not speak of the particular species used. I have employed the dwarf nettle, or *artica areus*, also the bull nettle, or *artica diocia*, for fifteen or twenty years. Latterly, I have not been able to obtain either of those species, consequently I have been compelled to use the common nettle, growing in this country; the botanic name I do not now recollect. It grows from four to six feet high, the stalk has four square leaflets, opposite and alternate. The dwarf and bull nettle grow in all the Southern States, but I have never been able to find either of those species in this State. The dwarf nettle is the pleasantest, but no more efficient than the bull nettle.

I have used all these kinds in Passive Hemorrhages, with perfect success, for fifteen or twenty years. I use the saturated tincture. I have used it in Purpura Hemorragia with perfect success. Also in diseases of the mouth and neck of the uterus, and found it to relieve the pain in those cases better than any other anodyne. I have treated several cases of Hemorrhage of the stomach, one case in particular, a man seventy years old, stomach burnt out with bad whiskey, extremities cold and pulseless to the elbows. After the use of all other remedies at hand, in twelve hours the circulation was established, and the bleedings stopped. I gave him a teaspoonful every half hour of the tincture in a little sugar and water to make it palatable. When I have been without the tincture, I have taken the herb, pounded it and obtained the juice. In epistaxis it acts like a charm. William B. Johnson, M. D., of Marion, Alabama, brought it to my notice.

The dwarf and bull nettles grow in all the Southern States, but I have not been able to find either of them in any of the Northern States. I shall make an effort to obtain the seed next season, and raise them for my own use.

Galway, N. Y. J. C. Crocker, M. D.

Arrangement of Substances in Drug Stores.

Messrs. J. R. Nichols & Co.:—The common alphabetical arrangement of chemicals reminds me of a little matter which I have observed. In the apothecaries' stores of Europe, especially in Austria, Prussia, and other interior countries, all articles on the shelves and in the drawers are arranged most carefully, alphabetically, so that any one, the least acquainted with chemistry and pharmacy, can find, with ease, any article, just as looking for it in a well arranged index. Would it not be well to suggest to the apothecaries here the superiority of such an arrangement, if for nothing more than to introduce a more scientific system in a business which ought to be regarded a little more than a mere trade? And to the tyro, or apprentice, it would impart especially a feeling of a higher respect for his calling and future position. In our apothecaries' stores, the salts are kept between the roots; here is a bottle with an oil amongst herbs; here a carbonate in a drawer between radices; and here a radix between sulphates! It *looks* ridiculous, anyhow. When we call at a store for a chloride, or any salt not *too* common, the druggist will read over the labels of all his boxes and bottles, before he finds whether he has got the article or not!

Another important difference in this matter lies in the fact, that any boy who applies for apprenticeship in an apothecary store in Europe must pass an examination *in Latin*, at least, if not also in Greek. With this, he studies chemistry during his apprenticeship.

Newburyport, Mass. C. M.

How to make a Cheap and Good Ink.—Take 1-4 lb. extract of Logwood; 1 gall. clear, soft water, heat it to the boiling point, in a perfectly clean iron kettle; skim well; stir; then add 90 grains bichromate of potash; 15 grains prussiate of potash, dissolved in half a pint of hot water; stir well for three minutes; take off and strain. The above will make one gallon of the best ink which I have ever used. H. F. T.

Messrs. J. R. Nichols & Co.:—

I send you the formula for a pill, which I have used with the happiest results for several years, in dyspepsia. And for the removal of nausea and vomiting which attend on dyspepsia, you cannot find its equal.

℞	Extract Gentian, . .	ʒj.
	Bismuth sub. nit., . .	ʒj.
	Sulph. Quinine. . .	
	Piperine, . . .	aa ʒss.

M. Fiat. Pill. No. 30. Dose, one pill three times a day, after each meal.

Moses H. Perkins, M. D.

Columbia, Ct.

How the Nebulæ were Formed.—Astronomers tell us that the solar system is rapidly moving in space, making a great revolution, occupying billions of years for its completion, around the star Alcyon in the Pleiades. Is it not reasonable to suppose that, at some time, there should be a great astral winter; and again, after the lapse of billions of years, an astral summer, with a temperature many degrees higher than that required to gassify all matter, or resolve it into nebulæ? When in this state, the opposing forces, gravity and heat, would balance each other, and matter would be in a state of quiescence. But the mass is moving to a colder region, and gravity begins to act, contracting and drawing the molecules to a common centre.

Terra Alba.—The extent to which this fine white earth is employed in adulterating pulverized sugar, confectionery, flour, prepared cocoa, spices, milk, etc., is incalculable. Dishonesty gives the law to many a traffic and manufacture in these days, and compels those who would rather be honest (so they imagine) to "do as others do." A chalky taste in the delicate white cracker, a tastelessness in bread, a whity scum in the teacup from a spoonful of snowy sugar, with many another uncomprehended indication, betray the presence of the ever-present adulterator. Two thirds their weight of terra alba has been obtained from lozenges. This comparatively new ingredient is imported from Ireland, and that largely, costing only about one dollar and a quarter per cwt.

Micro-Photo-Sculptures.—Some very curious applications of this photo-medallion process are described in the *Photographic News*. They consist in what are termed "Micro-Photo-Sculptures," or enlarged images in bas relief of microscopic objects, the material being plaster of Paris. Nothing can exceed the delicacy, sharpness, and perfect rendering of these reliefs, which give, practically, an enlarged model of the original object. The tongue of a cricket is the most perfect of those before us; the tongue of a fly is also exceedingly good; a flea is from a somewhat imperfect negative, and lacks crispness; but this is in nowise due to the process. The perfection of the modelling depends, of course, on the perfection of the definition in the negative; and the amount of relief, other things being equal, on the intensity of the negative, although this may be considerably modified by management in the manipulation. Those before us are on round tablets, about three inches in diameter, the amount of relief resembling the thickness of a skeleton leaf. The result is exceedingly beautiful, and it is probable that the principle upon which they are produced will find other applications. It is only necessary to remark that it is imperative that the subject to be produced should be semi-transparent, and admit of being photographed by transmitted light, so as to secure the relations of form in a relief so produced.

Journal of Chemistry and Pharmacy.

BOSTON, MARCH 1, 1867.

The Journal.—We find upon examination of our files, that nearly *two thousand letters, highly commendatory of the Journal*, have reached us since the first number was issued, in July last. These voluntary testimonials come from all parts of the country, and many of them from physicians of the highest distinction. They are open for inspection to any of our friends who may wish to see them. We believe this is quite unparalelled in the history of chemical or medical literature.

To Correspondents.—It is hoped our patrons and correspondents will not regard us as inattentive, or indifferent to their wishes, if we are unable to respond to their communications. We have upon our hands, besides the *Journal*, a large chemical manufacturing business, and many other exacting labors, which require every moment of our time, and every particle of our strength. All the kind words received, and inquiries made, are duly appreciated and regarded, and responses will be made so far as we are able.

☞ We make no apology for presenting to our readers the extended paper upon the treatment of constipation by atropia and galvanism. No affection comes oftener under the attention of the medical man than obstructions in the alimentary canal, and few are so difficult of successful treatment. Any new light which can be thrown upon the subject will be thankfully received.

Be Careful of Stoves and Furnaces.

The season of the year has arrived when the most danger is to be apprehended from the escape of deleterious gases into dwellings, from stoves and furnaces. As the spring opens, the draught of chimneys and flues is sensibly diminished, owing to the accumulation of soot and ashes in the passages, and from the approach of mild foggy weather. Let all our readers carefully examine their stoves and flues, and remove the accumulations of waste material, that the smoke and gases may have free exit into the outside atmosphere. The health of thousands is seriously impaired every year by breathing the gases escaping from stoves, and many have lost their lives from this source. The saddest sight we ever looked upon was one quiet Sunday morning in March, a few years ago, when we were called to the house of a neighbor, to view the lifeless bodies of the father and mother of a family, lying in bed precisely as they sunk into repose the night before. During the night coal gas escaped from a furnace in the cellar, and from thence into the chambers, and the whole family narrowly escaped from passing to that sleep which knows no waking. As it was, the father and mother lost their lives.

Several of the products of combustion are of a deleterious nature, particularly carbonic oxide and carbonic acid. Anthracite and bituminous coals contain considerable sul-

phur, which partially oxidizes during combustion and forms sulphurous acid gas, and this is very suffocating and injurious when breathed into the lungs. Sulphurous acid (SO) always escapes along with the other gases from burning coals.

It was supposed formerly that carbonic acid (CO^2) was a poisonous product, but it is now known not to be, but is, nevertheless, fatal to human life, when inhaled, as it operates to exclude oxygen from the respiratory apparatus. A person can be *drowned* in CO^2, as well as in HO, or water.

But carbonic oxide (CO) is a destructive poison, and certainly and rapidly fatal to animal existence even when largely diluted with air. When coals are burned slowly and imperfectly, large quantities of this gas are formed, and if it escapes into rooms, even in minute amounts, headache, vertigo, lassitude, are sure to result.

Physicians in searching for the causes of ill-health in patients should not overlook the fruitful sources connected with the apparatus for household warmth. Examine the stoves, we say. Is the draught good? Are the dampers properly adjusted? Is the ventilation of rooms such as it should be? Look well to the stoves and furnaces.

The Petit Microscope.—All of these beautiful little instruments in our hands were sold within one week after the last number of the *Journal* was published. We supposed our stock was large enough to meet all demands. The lenses are made in France, and *one thousand* were ordered six weeks since. As soon as received we will promptly fill all orders on our books. Those who wish for them will please inclose one dollar, and they will be promptly forwarded.

The *Atomizer* advertised in the last number was constructed with the view of furnishing physicians a practical and durable instrument at a *low price.* It is constructed with a rubber bulb and brass jet, and, we believe, gives general satisfaction. The instruments are entirely out of our line of business, and we only supply them to meet the wishes and convenience of our medical friends. The cost of manufacture is but a trifle less than the price put upon them.

Beer or Ale.

Beer used as a medicine is often found to be of much service; used as a beverage in moderate quantities, it is not objectionable, or at least it is less so than most forms of fermented liquors. A practical method of domestic brewing on a small scale is a matter of much interest to many of our readers, and therefore we present one which is essentially like that pursued at Knowsly Hall, seat of the Earl of Derby, England. A few years since it was our privilege to visit this estate, and by invitation of Col. Hornby, nephew of the Earl, we dined at the Hall. Prominent among the beverages at the table was the most excellent beer, brewed upon the premises. The following is the method pursued in its production, simple forms of apparatus being supplied. The quantities are reduced to meet the wants of small households.

A common alcohol barrel may form the mash-tun, for which purpose one end may be taken out, and converted into a false bottom by letting it rest upon a hoop nailed around the lower part of the barrel. Make a strainer of this by perforating it with a large number of gimlet holes. Fix a stop-cock at the lower end of the barrel. Elevate this cask, so that under the stop-cock another alcohol barrel may be placed, with the head out. A farmer's kettle, or the copper wash-boiler used for laundry purposes, may be used for heating the mash liquors.

Boil fifteen gallons of water and pour into the mash-tun or upper barrel, and add to it five gallons of cold water. This will make the temperature about 170° F.

Have ready two and a half bushels of good malt, and shake it into the water, stirring it constantly with a stick This stirring or washing must be continued for a half hour, having a cloth over the barrel so as to leave but a small space at the side for the stirrer to pass through.

Let it rest quiet for an hour, then turn the stop cock a little way, holding under it a bowl, so as to catch the first flow of wort to be returned to the barrel. As soon as it runs clear the cock may be opened to the full. But a few gallons will flow, as the malt will absorb much of the water. When it almost stops flowing, add to the malt in the upper barrel very gently, twenty gallons of almost boiling water. The rich clear wort will be driven down before this, and the whole amount received in the lower barrel will be twenty-three gallons. This is to be baled into the boiler, and boiled for twenty minutes with three and a half pounds of fresh mild hops, then strained back into the lower barrel, and, when cooled to 98° F., a quart of good yeast is to be added and the whole allowed to ferment. Watch it carefully, and when the fermentation begins to subside, rack it off into a strong cask, tightly bunged, or put it into bottles adapted to the purpose. In a fortnight it will be fit for use. This simple formula will afford most excellent and delicious beer, and is one which can be followed by any family.

"What Chemistry has Accomplished for Agriculture."—The address upon the above subject delivered by us, at Salem, in Dec., before the *Mass. State Board of Agriculture*, is now in the hands of the printer, and will be published in the State Report in April. We make this statement, as many inquiries have been made regarding its publication. Secretary Flint writes respecting it: "The address gave very great satisfaction to the Board, and I am sure it will be read with much interest, and do good."

A Peculiar Audience.—By invitation of the Warden, we lectured to the convicts of the Mass. State Prison, a few evenings since, upon the subject of Chemistry. About six hundred prisoners were present, who gave most excellent attention, and manifested much interest in the experimental illustrations. It is needless to say that there was an entire absence of the "whisperings," "sparkings," and crunching of peanuts, common in lyceum audiences, and which are so annoying to lecturers.

The Great Ocean Telegraph.

There is strong desire on the part of many to obtain some idea of the recording instruments and other parts of the apparatus employed in the great Ocean Telegraph. Nothing has been published upon the subject, or at least I have seen nothing. Can you describe the apparatus in plain language? Yours, etc.,

C. T. L., St. Louis.

It is rather a difficult matter to describe the instruments used in connection with the Atlantic Cable in "plain language," but we will endeavor to present as popular a description as is possible. Of course it is understood that the novel undertaking of telegraphing through the great "waste of waters" between Europe and America called for apparatus of a new and novel character—a kind far more delicate and sensitive than either Baine's, Wheatstone's, or Morse's system afforded. All the resources of science and of the inventive faculty were called into requisition; and long before the Cable was laid, a plan was devised, which was a perfect marvel of delicacy and simplicity. It consists of a galvanometer the needle of which weighs only 7-16 of a grain, and is 1-3 of an inch in length; this moves in front of a mirror of the most tiny proportions, weighing no more than the needle, 7-16 of a grain. It is only 1-3 of an inch in diameter, and the little needle is suspended by that gossamer thread of silk which the silk-worm spins. This is the whole of the apparatus, which is acted upon by the current, and by the aid of which, all the important messages are recorded.

Think of the fact that messages which involve millions of dollars, or which concern the great affairs of nations, are received through an apparatus so small that the whole does *not weigh a single grain!* A coil of very fine wire is placed back of the needle, through which the electrical current passes before influencing the needle. By the reflection of the little mirror, a light is thrown upon a screen, and the deflections of the needle observed. It has only two motions, to the right and left, the right indicating a dot, the left a mark; and by the aid of these two signals messages are read. *The parting of a single fibre of silk, and all communication between the two continents is instantly suspended!*

In the working of the telegraph, currents of low intensity are used; that which is equivalent to about twenty of Daniels' cells, answers the purpose. The insulation of the wire is so perfect, that at least 95 per cent. of the current reaches the distant station. Earth currents create much trouble; and sometimes it is necessary to close the two cables, that of 1865 and that of 1866, and thus use a metallic circuit. This is especially necessary during the continuance of those great magnetic storms, which manifest themselves in the auroral displays. The cable of '65, in exact length, is 2181.31 statute miles; that of '66 is 2129.7. The old cable is, therefore, about fifty miles the longest. Its insulation is very nearly perfect, and its conducting power better than the other. It is presumed this arises from the fact that it has reached a more perfect equilibrium of temperature, from its longer immersion in water. The new cable will probably improve. Perhaps this is all that is needed in answer to our correspondent's inquiry To go into scientific details would require much space, and perhaps be imperfectly understood.

Many vulgar and absurd stories are told regarding the ocean telegraph. One is, that an English nobleman walked into the office in Ireland, and, by paying a round sum, was permitted to light his cigar by the "sparks" transmitted from Newfoundland! No man ever lighted a cigar by a direct current through the cable. It is simply absurd. It would be possible to bring into play a *local battery* at either end of the line, and by a great deal of trouble and expense, create a current of sufficient power to ignite some combustible substance so as to light a cigar, but that current *would not* come from across the ocean; it would be induced on the spot where the man stood with his cigar. It is not probable that even this was ever actually accomplished.

Liq. Ammo. Acet.

This valuable remedy is much more pleasant and acceptable when prepared from pure old cider vinegar. Take a pint of vinegar, and add carbonate of ammo. until it is saturated. This may be known by the stopping of effervescence when the powder is added. With many physicians of much repute the liquor ammo. acet. forms the main dependence in the treatment of pneumonia, bronchitis, etc., and in subduing febrile action it is of very great efficacy. Physicians should prepare it themselves

Chemical Examination of Urine.

Continued from Journal No. 3, page 22.

The quantity of *uric acid* found in the healthy secretion is seldom more than 0.3 in 1000 parts; in morbid urine there may be scarcely a trace, or it may run up as high as 2 parts in 1000.

It is seldom that ammonia, or ammoniacal salts, are noticed in perfectly fresh urine. Upon standing, however, by decomposition, the nitrogeneous constituents assume the form of ammoniacal compounds. Sometimes urine will be found to contain an excess of *urate of ammonia.* When this is the case, it is usually high colored, dense, and turbid. To test paper it will be found to give an acid reaction. This, however, is not always a positive result. *Urate of ammonia* is a very common deposit in urine. It forms the sediment which quacks make so much account of in their intercourse with their duped patients. The *brick dust* sediment, as they designate it, is the sure evidence of terrible *inward* disease; and so long as they are able to point out the least trace of the deposit, so long will their nostrums be paid for, and swallowed by the patient.

The color of the sediment varies. Sometimes it is a reddish purple, and sometimes a pink, or it may be a pale fawn color. Other alkaline bases, as potash and soda, are combined with uric acid in the sediment. To detect urate of ammonia, place a portion in a test tube, and gently warm it over a lamp. *It will readily dissolve.* Allow it to cool, and it will again precipitate. Under the microscope, it appears as an amorphous powder, and mixed with it are seen small round particles larger than the rest. To prevent mistaking the phosphate of lime for urate of ammonia, add a drop of hydrochloric acid to the deposit, on a slip of glass; if it is the former, it will instantly dissolve; if the latter, decomposition will slowly result, and minute crystals of uric acid will form. It is also important to distinguish between the *earthy phosphates* and urate of ammonia, in testing urine. The latter deposits rapidly upon cooling, or soon after the urine is voided; the former requires considerable time for chemical changes to occur, before they fall. Healthy urine always holds in solution the phosphates, that of brine being the most prominent. Sometimes they exist in abnormal quantity. It is difficult for the physician to form an opinion as to the amount present, whether it be normal or abnormal, by examining the urine, as sometimes, in peculiar states, there will be a spontaneous and rapid precipitation, when they are not in excess; and then, again, when the urine is loaded with them, they will be held in solution. If he has reason to suspect their presence, the addition of a few drops of ammonia to urine, with warming, will cause them to precipitate, and the quantity must be judged of by comparison with that from urine known to be healthy.

When urine contains *mucus* as an abnormal ingredient, it does not usually differ in color from the healthy secretion; but the *deposit* is viscid and tenacious, and of a dirty yellow color. A vessel containing mucous urine, has two layers — the ropy, tenacious mass at the bottom, and the more limpid liquid at the top. When agitated, the two do not readily mix together. This physical appearance will be sufficient, perhaps, to distinguish it from *pus*, but to give more certainty, heat a little in a test tube, with a drop or two of nitric acid; if *pus* is present, albumen is also, and it will coagulate, or form a floccy precipitate.

The absence of albumen in urine, is a strong, almost positive indication of the absence of *pus*. The urine containing this substance is sometimes neutral, sometimes acid, and also alkaline; so test paper affords no indications in regard to its presence.

Semen is occasionally found in urine, and for its detection we must rely upon the microscope of high power. When it is present the microscope reveals plenty of minute animalcules, of a more or less oval form, with long and delicate tails, resembling somewhat the tadpole. These of course are the *embryo* of the human being; and when seen in their native fluid, are active, moving about at will. In the urine, however, they are seldom found alive, the secretion proving fatal to them.

[To be continued.]

Neuralgia Pills.

One of our oldest and most reputable physicians hands us the following formula for a pill used by him with much success in neuralgia, headache, etc.: —

℞ Strychnia sulph.	gra. ss
Morphia	gra. i
Belladonna Ext.	gra. iv

M., and form Pills No. VIII. Dose, one pill every sixth hour, until relief is afforded. If any movement or twitching of the muscles occurs, omit the pills for forty-eight hours.

Starvation.

Reports come to us, from the island of Crete and the East Indies, of thousands dying by starvation. This is the most dreadful of all forms in which human beings are compelled to pass through the great struggle with death. Chemically speaking, persons who starve die by combustion; they are consumed, or burned. They burn more slowly, but not less surely than by the blazing pile. Materials are not supplied to the system to maintain animal heat and muscular strength, and consequently the oxidizing influence is exerted upon the system itself. Every part where nervous influence is perceptible; every organ, every tissue; muscle, brain, nerve and membrane, waste away like a burning taper, consume to air and ashes, and pass from the system rejected and useless. The starving man is burned to death at a low temperature: the various constituents of the body give way in succession; first the fat disappears (this is the most combustible); then the muscles shrink, soften, and decay; lastly, the substance of the brain is attacked, and madness and death close the scene. The want of a full supply of human food is the greatest of all calamities; and any people suffering from this want demand, and should arouse all our sympathies, and aid must be furnished at any and every sacrifice.

Messrs. J. R. Nichols & Co.: —

The druggists of whom I order medicines often send me articles manufactured by some other parties, whom they say make "just as good" as those you prepare; but I am *not* as well satisfied with their *effects*. Can I not obtain a supply directly from you?

F. B. A., M.D., Granby, Ct.

The above letter we publish, as it represents the character of letters which we are receiving by almost every mail. Great wrong and injustice is done to physicians, patients, and ourselves, by *substituting* articles made by others, when those from our laboratory are desired. A physician is presumed to have special reasons for requiring medicinal agents of a particular make. He understands their nature, method of preparation, dose, etc., and when others are forced upon him, he feels that he is wronged. In this feeling all honorable men will share. It certainly cannot be for the interest of wholesale or retail houses to *substitute* articles "just as good," made by others, and perhaps unknown parties, for ours, as this dishonesty must speedily be exposed. If a dispensing druggist or physician receives other goods when ours are ordered, it is but just and right that he should *promptly return them* to the parties by whom they were sent, charging them with the expense. We prefer to have our goods go through the regular channels of trade, and hope soon to hear that less injustice is done us.

Transactions of the N. H. Medical Society. — We have received a copy of these transactions, and read some of the articles with much interest. The address of the President, Dr. Buck, of Manchester, is a *unique* production, and its delivery must have created quite a "stir" among the sober medical gentlemen present. It is one thing to know how to state the truth, another to have courage to present it. Dr. Buck evidently possesses both of these qualifications, and the presidency of the association has fallen into the right hands. We wish we had room to present some extracts from the address. In a future number of the *Journal* we hope to find room.

Messrs. Gilman Bros., wholesale druggists of this city, whose card may be found in the advertising corner, are honorable men, and are careful to supply only good and reliable drugs.

Wheat Phosphates. — Our readers will notice the advertisement of Dr. Fox's *Organized Wheat Phosphates*. The nature of the article will be understood by the description given. In England they are largely used, and with the very best results. Adults, as well as children of weakly constitutions, gain flesh and strength by their employment. They are very pleasant and agreeable to the taste.

☞ The next number of the *Journal* will complete the first volume. We have sent to new subscribers the back numbers, that all subscriptions may expire with the May issue. The first number of the next volume will be ready July 1st, and will be published *monthly*, during the year, and will embrace many improvements. We intend to make the *Journal* a most useful and acceptable publication; and we trust our friends will aid us in extending its circulation. Those to whom we have sent the *Journal*, and who have not remitted the fifty cents, may do so if they are fully satisfied with the paper, not otherwise.

Advertisements. — We purpose to admit to our columns a few advertisements of a character interesting to physicians, druggists, chemists, etc. We shall not encroach upon the reading matter of the *Journal*, but make such additions as may be required. For medical books, surgical instruments, druggists' goods, etc., etc., our paper is the *best medium for advertising in the country*. We already circulate more copies than any half-dozen publications of the kind published.

☞ Owing to unexpected delays on the part of those intrusted with the manufacture of Dr. Sargent's Sponge-Pad Truss, it will not be ready as early as was anticipated or desired. We expected to have been able to present engravings and give a full description of it in this number of the *Journal*. It will, however, have to be deferred to the next, or May number.

Pilulæ Metalorum et Amarum.

By HUMPHREY PEAKE, M.D., of Visalia, Cal.
Formerly of Yazoo City, Miss.

I propose in this paper to make known to my professional *confreres* the formula for a pill which I have been using for the past ten years, and with such success as never to have been disappointed in the main object, — that of improving the quality of the blood. In plain English, I call it a blood-maker; in the language of the profession, a hæmatic, of the class Hæmatica of Dr. Headland. I have named it "Pilulæ Metalorum et Amarum" — pills of the bitters and metals — for a reason that any doctor may readily see. Its formula is as follows: —

℞ Quiniæ sulphatis, ʒj.
Ferri Redacti, ʒjss.
Strychniæ.
Acidi Arseniosi, aa grs. iij.
Confectionis Rosarum.
Vel Mucilaginis Acaciæ.
q. s. ut. ft. pil. LX.

The range of morbid conditions to which this pill is applicable is astonishing to any but the educated of the medical profession. It is applicable to all cases — saving, perhaps, organic disease of important organs; and here, indeed, it could do no harm, although it might be impossible to cure — when the object is to improve the quality of the blood. But it is more particularly applicable, and useful, and *curative*, in the whole list of what I will take the liberty of calling *malarial cachexiæ*. My native country, and that of my early study and practice, is one bathed in malarial poison, and through which flow the Ouachita of Arkansas, and the Red River, dividing the latter State from Texas.

I do not believe that the composition of this pill is to be found in any book. The manner in which I was led to its combination was natural enough, and the only wonder is that the combination had not been made before.

It was and is a very easy matter to stop the paroxysms of a quotidian, tertian, or quartan ague; but in a good many cases the paroxysms return at the end of one, two, or three weeks, and, in some cases, at the end of four weeks, — the latter giving rise, doubtless, to the designation *mensæ* in the older writers. They were known among the people as one, two, and three-weeks "chills." My father being a physician, I necessarily saw much of the treatment of these maladies, according to the ideas and teachings of the time. When a tyro in medicine and a commencing practitioner, they continually met me, and were among the opprobria medicorum.

I reasoned thus: — Sulphate of quinia is an excellent remedy for the ague. Its great value is unquestionable. So is and was that of the Jesuits' bark, from which quinine is made. Iron, also, is good in chronic ague, and enters into many or most prescriptions for its cure. So, too, of arsenious acid. Its reputation is older than that of the bark, or of quinine, and it is still resorted to when the latter fails. Late investigations, too, have shown that *all* the bitters were antagonistic to the malarial poison, and that strychnia more particularly was especially so. The inference was obvious. I would do a sort of "shot-gun" practice in these cases, and combine the whole of these drugs in appropriate proportions. I have never had cause to condemn the plain logic which led me to the result. The first thing I knew, I had a reputation for curing cases of malarial poisoning, which the other doctors within a radius of fifty miles had failed to cure. Persons came to me with immense infarctions of the spleen, many of whom, in accordance with what is now known of malarial poisoning, had had no ague at all. I prescribed the pills, and they got well. Persons remained pale, debilitated, and sallow, from attacks of malarial remittent fever. I prescribed the same pill, and they soon had a good color and a stock of good blood. Others came with neuralgia of longer or shorter standing — of the quotidian, tertian, or quartan type, evidently of the malarial stamp, which had been broken up, but which had returned. I broke them up with the usual remedies, and then prescribed the pills of the metals and bitters. Their neuralgia came back no more, for that season at least. Then came anomalous cases; pale exsanguinous persons, some laboring evidently under the influence of malarial poison, — others not, in whom no organic disease could be detected, and for whose maladies the Nosology of even John Mason Good hardly had a name, and who were yet sick. (What doctor of long practice has not seen persons die of a disease for which he could find no name?) There was one thing, however, about all these people, — they lacked good blood, and having already come to regard the *Pilulæ Metalorum et Amarum*, from experience as well as upon theoretical grounds, as a most powerful remedy for this condition, I prescribed them. These people almost invariably got well and hearty. — *Pacific Med. and Surg. Journ., Oct.*, 1866.

On the Use of Spider's Web as a Styptic.

By ABR. ROBERTSON, Wheeling, Va.

On one or two former occasions I have written something on the use of the spider's web as a styptic in cases of excessive hemorrhage after extracting a tooth. I now wish to add the result of my experience in another case. I do it with the hope and belief that it may be an essential service to some of my professional brethren, and perhaps to some of their patients. It may be thus serviceable on two accounts: first, it can always be obtained, and everywhere, and sometimes when other more popular remedies cannot so readily be obtained; and second, because in my hands it has proved efficient where everything else has failed.

About a year ago, a young man, about eighteen years of age, came to my office to have a lower molar tooth extracted. I examined the tooth, took my forceps, and extracted. The operation required rather less force than usual. The tooth came out entire and clean, and with no laceration of surrounding parts, except the necessary severing of the periosteum. But, from the first, blood flowed more freely than usual. I directed my patient to rinse his mouth with cold water, which he did considerably longer than the usual time of the flow of blood in such cases, but with no diminution of its flow. I then applied tannin on pledgets of moistened cotton, filling the socket with them. After repeating this application two or three times, the bleeding ceased, and he left. In about three hours after, he returned, bleeding as profusely as ever. I then filled the socket from whence the tooth came with cotton saturated with perchloride of iron. This I repeated several times, with a delay of a few minutes between the applications, without any apparent effect. I next applied the persulphate of iron, full strength in the same manner, and with no better result. Finally, I procured some spider's web, with which I filled the socket, as I had before done with the cotton, when — I need not say that I was gratified to see — the bleeding stopped almost immediately, and there was no more recurrence of it. — *Dental Cosmos, November*, 1866.

POISONOUS CANDY BOXES. — The French police have forbidden the sale of boxes in which the confectionery is placed in contact with those white, pearly, brilliant papers, containing a soluble, poisonous salt of lead.

[Translated for the Journal of Chemistry and Pharmacy.]

Gleanings from the French, German, and other Foreign Journals.

In the cholera epidemic of 1866, in Paris, the severity of the cases did not appear to grow less as the number diminished. This is an exception to the rule of the other epidemics of cholera.— *Gaz. des Hôp., Nov.* 13, 1866.

VACCINATION —Dr. Huet Desprès, in the *Union Médicale*, maintains that the serum of the vaccine pustule may be made to retain its properties long after the suppurative stage, by virtue of a regenerating process which consists of the removal of the scab, and the washing of the vaccine ulcer with tepid water. The serous looking matter which follows the cleansing is capable of producing the characteristic infection.

DRESSINGS FOR WOUNDS.— M. Maissonneuve now dresses all wounds with a solution of phenic acid, the French aromatic wine, or the pure tincture of arnica, according to the degree of stimulation required.— *Gaz. des Hôpitaux.*

MEDICATED MILK.—The use of medicated milk is much more common in Europe than in this country. In Paris there is an establishment where asses are fed upon a medicated diet, prescribed by the physician, and then driven to the house of the patient and milked. The treatment of hereditary syphilis, through the medium of the mother's milk, is very successful.

SULPHATE OF QUININE IN ACUTE ARTICULAR RHEUMATISM.— M. Bucquoy claims to abort acute articular rheumatism by bleeding the patient, and then treating him with Quinæ Sulph., ℈i in six doses.

A NEW REMEDY.—M. Mallez, of Paris, has been employing the proto-chloride of tin in muco-purulent affections of the bladder, vagina, and urethra. The formula is eight grains of the proto-chloride of tin to the ounce of distilled water; one injection a day to be given. This injection, which is much better borne than that of phenic acid, acts directly upon the muco-purulent secretions, by destroying the pus globules, and has thus far given the most satisfactory results.

NEW TREATMENT OF BRONCHITIS.—M. Régis lately proposed to the Acad. Imp. de Médicine, a new method for the treatment of coryza, laryngitis, asthma of emphysematious persons, sore throat and hoarseness, or aphonia, resulting from over use of the voice. According to M. Régis, the parts affected in those troubles are the glandular follicles of the mucous membrane of the bronchi, which are only incompletely and temporarily influenced by the remedies in use at present. What he considers necessary is something which shall act upon the air respired, and the saliva; and to meet those indications he has devised balls composed of balsam of tolu, myrrh, several aromatic, tonic, and stimulant essences, camphor and iodine, made up with yellow wax. These balls, which yield their constituent principles slowly to the air and saliva, should be held in the mouth day and night. The suggestion is a new one, and worthy of consideration

TREATMENT OF DYSPEPSIA.—In the ordinary treatment of flatulent dyspepsia by charcoal, the absorbent virtues of the powder are much lessened by the moistening which it undergoes during the process of swallowing. This difficulty is obviated by inclosing the pulverized charcoal in capsules, the envelope of which is dissolved in the stomach, leaving the charcoal floating on the surface with its full absorbent powers. The charcoal prepared from vegetable ivory is much superior to any other. Of woods, the poplar is the best.

ANTISEPTIC LIQUOR OF PENNES.—This antiseptic, so often referred to in the French journals, is composed of

Bromohydric acid . . . 2 parts.
Pure phenic acid . . . 8 "

Mix in a porcelain capsule, upon a sand or vapor bath, stirring carefully with a glass tube. It should be kept in bottles with glass stoppers.— *Gaz. des Hôpitaux, Nov.* 22, 866.

RHOENDINE.—Hesse has discovered a new alkaloid in the red poppy, which is also found in good opium. It is soluble in water, alcohol, and ether, and crystallizes from the last in white prisms.

MEDICAL TREATMENT OF STONE.—Dr. Becker, of Mulhausen, in Thuringia, is convinced that the *ludus* of Paracelsus, which obtained such a reputation in the treatment of the stone, was nothing but the borate of ammonia, which has been in use in such cases since 1844. By the use of this remedy he scarcely ever fails in obtaining a great amelioration. The urine becomes heavily loaded with uric acid and the earthy phosphates. In chronic catarrh of the bladder this salt is excellent. The following are the formulæ used by Dr. Becker:—

(1) ℞ Ammoniæ Boratis.
Glycerhizæ sacchari . . aa ʒ ii
Aquæ dist. . . . . ℥ iv.
M. ʒ ii every hour.

(2) ℞ Ammoniæ Boratis . . . ʒ ii
Aquæ dist. . . . . . ℥ iv
Syrupi simplicis . . . . ℥ ss
M. ʒ ii every two hours.—*Rev. de Therap. Méd Chir.*

ON CATCHING COLD.—Catching cold is a common phrase for an attack of catarrh, but it is a very incorrect one. One year I suffered so very severely from a series of "colds" that my attention was drawn specially to them I was then lecturer on medicine, and nearly every night from five o'clock to six during the winter months had to turn out from a warm room to go through all weathers, lecture for an hour in a theatre heated by a stove and lighted by gas, and then return again to my snuggery at home. When I felt a fresh cold beginning, I tried in vain to account for it, until I accidentally saw in Copland's dictionary that the most fertile cause of a cold was coming from a moist, cold air to a hot and dry room. This at once explained to me the reason of my frequent suffering, for I had invariably gone into my hot room straight from the cold. I, of course, soon changed my habit; I dawdled in the hall while taking off my great coat, perambulated the rooms which had no fire in them, went up and down stairs, and the like, ere I went into my study, whose temperature was also reduced. Since then I agree with a friend who says, "that a cold comes from catching hot;" and I am disposed to think that there is a strong analogy between a chilblain on a child's toes and a cold in a person's nose, throat, and lungs.— DR. THOMAS INMAN: *Medical Mirror.*

RAW FLESH AND BRANDY IN THE TREATMENT OF PHTHISIS.—The method of treating consumptive diseases by raw meat and alcohol appears, according to M. Fuster's statements, to have been attended with wonderful results. It has now been tried in no less than two thousand cases, and in nearly all successfully. The patients increase in weight to the extent of two, three, four, or six kilogrammes in the course of two or three weeks. M. Fuster recommends the adoption of his treatment for the following maladies:—Advanced anæmia, the last stages of ague, typhus and typhoid, leucocythæmia, albuminuria and diabetes, and also in cases where there has been great loss of blood or seminal fluid.—*Lancet, July* 21, 1866, *p.* 70.

DIPTHERIA.—When the exudation is fairly manifested, the most efficient local application is strong hydrochloric acid, diluted either with honey or with water, in equal bulk. This may require repeating once or twice again, at an interval of twelve or twenty-four hours. If much fœtor exists, a tolerably strong solution of chloride of zinc may be applied to the throat, and a solution of permanganate of potash employed to cleanse the mouth from stringy saliva and offensive discharges. The use of nitrate of silver as a caustic is unsatisfactory. The class of internal remedies from which most good may be expected is preparations of iron, given from the very commencement of the disease. The ordinary tincture of the sesquichloride is for several reasons the most suitable preparation. Stimulants should be used early and without hesitation; as, in cases of fever, the first-noted feebleness of the heart-beat, or softness and rapidity of the pulse, furnish full reasons for their employment.— *Dr. W. Newman.*

HOOPING-COUGH.—In some aggravated cases of hooping-cough, the inhalation of chloroform proves very beneficial.— *Dr. C. Kidd.*

DIABETES.— Diabetics do better on a natural than upon a restricted diet, saccharine and amylaceous food being as necessary to their comfort and well-being as to that of persons in health. The circulation of sugar in the blood is not productive of bad symptoms either immediately or remotely, and the tendency to it is not decreased by "diabetic diet," however long persevered in, for the ingestion of amylaceous matter is always followed by a discharge of sugar from the system.— *Dr. G. Owen Rees.*

BOSTON JOURNAL
OF
CHEMISTRY AND PHARMACY.

VOLUME I. Boston, May 1, 1867. NUMBER VI.

THE
Journal of Chemistry and Pharmacy
IS PUBLISHED BI-MONTHLY AT
150 Congress Street, Boston,
BY JAS. R. NICHOLS & CO.
TERMS, FIFTY CENTS PER ANNUM.

All letters and communications should be addressed, "Office of Journal of Chemistry and Pharmacy, Boston, Mass."

CURIOUS ELECTRICAL PHENOMENON. — During the late intense frost the small river which waters the valley of Glenelg was, like others, covered with ice varying from six to nine inches in thickness. This, when partially dissolved by the thaw of last week, was broken up into large plates and rapidly carried to the sea, except where it met with obstacles that retarded its progress, where it remained piled up into great masses until the weight of the water accumulating behind forced it onwards. One of these obstacles consisted of a slight wire foot-bridge, which formed a communication between the two parts of the minister's glebe, which the river divides. This bridge was supported by four pairs of wooden posts standing in the bed of the stream, and against these a great quantity of the ice had been collected, until the water, obstructed by it, rose several feet above its natural level Things were in this condition when, about 11 o'clock on the night of Wednesday, the 23d, one of the maid-servants at the manse, having occasion to cross the stream, and not being aware of the danger, went along the bridge, and had scarcely reached the bank when the whole structure was carried away, some of the wires being broken, and the others torn from their fastenings. Had the girl been a single minute later in crossing, her life would have been sacrificed; for she must either have been drowned in the swollen stream, or crushed to death by the heavy blocks of ice. On looking back to the bridge, the girl heard sounds emitted by the breaking wires above the roaring of the crashing ice, and saw a vivid flash of colored light at every fracture of the wires. This appearance might have been supposed to be due to the fright she was in at the time, had not a sister, who was in safety on the other side of the river, seen it likewise, and also a young man who was passing at the time along the public road, more than two hundred yards from the spot. The phenomenon was probably caused by the wires being strongly charged with electricity, developed by the breaking up of the ice and the friction of the detached masses, — separation of parts and friction being both known sources of electric action. — *Edinburgh Evening Courant.*

ON "GLYCONINE" — A NEW GLYCEROLE? — To obtain this compound, M. Edmond Sichel employs 4 parts (by weight) of yolk of egg, and 5 parts of glycerine, which he mixes simply in a mortar. It has the consistence of liquid honey, and is unctuous like the fatty substances, over which it has the advantage of being easily removed by water. It is unalterable, a specimen having been left exposed to the air for three years with impunity. Applied to the skin, it forms on the surface a varnish, which protects it from the contact of the air. These properties render it serviceable for broken surfaces of all kinds, particularly for burns, erysipelas, and cutaneous affections, in which it soothes the itching; and also for sore nipples. Its harmlessness prevents, in the latter case, any interruption of suckling. — *Journal de Pharmacie*, September, 1866.

Chemistry of a Bowl of Milk.

BY JAS. R. NICHOLS, M.D.

It is presumed that but few of those in city or country, who sit down to the evening meal, consisting mainly of a bowl of milk, know anything of the interesting chemical nature of the liquid they consume. It must be plain, however, to the most indifferent observer, that it contains hidden supplies of nutriment of no ordinary character, as the most striking results follow from its use as an article of food.

The infant, in the earliest stage of existence, appears almost too tender and fragile to be raised from its downy pillow. In a few months, however, it becomes strong and lusty, the osseous framework is firmly knit together, the muscles are hard and flexible, the teeth grow, the nails and the hair push out, and all the high functions of life move on most vigorously. From whence come all the materials which, under the influence of the chemical and vital forces, accomplish such astonishing results? The bones must have an abundance of *lime* and *phosphoric acid*, and so must the teeth; the blood must have *iron*, and *soda* and *potassa*; the brain demands *phosphorus*, in order that the embryo mind may be developed; the muscles need the nitrogeneous element, and fat the carbonaceous. In addition, large quantities of water are needed, to maintain in harmonious action the functions of life and growth. Now, through what channel can these numerous chemical and nutritive elements be supplied to the feeble infant? The colorless, and almost tasteless liquid, which we call *milk*, supplies them all, and usually just in the right proportions. In this nutriment, which has been provided for the young of the human race, and of the higher classes of animals, we have the most perfect type of food in general, that it is possible to afford. With tender care, provision has been made for this helpless condition in life, and it is furnished in a manner which confers upon both giver and recipient the most placid enjoyment and happiness.

It is easy for any one to comprehend how it is possible to supply the wants of the adult organism, through the variety of food which is accessible and employed. The bread, flesh, fish, fruit, and vegetables, and even water, so largely consumed, may be easily understood to furnish the complex and diversified chemical elements which the system requires; but how *milk*, so simple in its physical characteristics, can embrace the essential nutrient principles of all forms of food, is not so easily comprehended. Let us for a moment glance at the composition of milk. It contains, 1, a rich, nitrogenized material, *caseine*; 2, *fatty* principles; 3, a peculiar *sugar*; 4, various mineral *salts*, principally consisting of phosphate of soda, phosphate of lime, phosphate of iron, phosphate of magnesia: the potash, it is curious to observe, exists in the form of *chloride* of *potassium*. The substances are held in suspension by water. In one hundred pints of milk there are, usually, about eighty-eight pints of water. It is a remarkable fact that the composition of the milk of carnivorous animals, as the lion and tiger, does not essentially differ from that of the herbivorous, the cow, goat, etc. According to Dumas, however, there is no sugar in the milk of carnivorous animals. Cows' milk and human milk differ in the characteristic and leading constituent, *caseine*. One pint, or a bowlful of the former, affords about *three* fourths of an ounce, while the latter gives only *one* fourth as much of this important substance; therefore, in substituting cows' milk for the other, in feeding infants, it should be diluted with nearly two parts of water. Caseine is identical in composition with the muscular substance, and with the albumen of the blood, and it exists in milk in a *soluble* state. How easy it is of digestion and assimilation! The feeble powers of the infant are fully equal to its appropriation. By a molecular change of the simplest kind it becomes the material of flesh, or passes into the cellular tissues by an act of oxidation. Hence come muscular strength and nervous energy to the young offspring. In childhood, the function of respiration is exceedingly energetic, and ordinary food, in ordinary quantities, would be hardly equal to the waste. But in milk we have provision made for this demand. We have *two* non-nitrogeneous bodies, *butter* and *sugar*; these *burn* in the body, to carbonic acid and water, and develop the necessary heat. In one hundred ounces of milk, there is about half an ounce of mineral salts. More of the lime being needed to form the bony structure, it is furnished in milk in large excess of the other salts, so that the growth of the bones keeps pace with that of other portions of the body. The trace of ferrugineous matter is all that is needed to supply the blood with the little iron ships, whose office is to load with oxygen in the lungs, and voyage it through the great ducts to the capillaries, where the butter and sugar are oxidized or burned for warmth. The phosphate of soda and the chloride of potassium find their appropriate place in the blood and secretions, and perfect harmony and efficiency in chemical and vital changes are secured. Nothing superfluous is to be found in milk, and nothing essential to the well-being of the infant has been omitted.

What is man, or an animal, but a kind of chemical laboratory, where transmutations and changes in gross matter are going on constantly, in order that force may be developed, and the machine or body kept in motion? Is an atom of iron, or potash, or soda, any more sacred, or entitled to higher consideration, because it has happened to be absorbed from the rocks or dust by vegetable growths and taken into the body, there to be manipulated by the unseen chemist, and perhaps assigned, for a brief period, a place among the other earthy or atmospheric constituents of the flesh? What is *health* but an undisturbed play of chemical affinities in the animal organism? What is *disease* but imperfect chemical reactions, or insufficient supply of necessary chemical agents in the same?

With this brief and imperfect view of the chemistry of milk as an article of food, let us for a moment look at some of the physical and chemical changes it is capable

of undergoing in the various processes to which it is often subjected.

Caseine is a very remarkable substance, and is found only in milk, where it exists in a state of perfect solution. It is held thus by the presence of a small quantity of alkali. Now if we add to milk a few drops of acid, we neutralize this, and the caseine coagulates, or forms a solid body, which is called *curd*. The manufacture of cheese depends upon this coagulation of caseine. This result, produced under the influence of a *simple wet membrane* without acids, is a phenomenon so remarkable, that it is no wonder it has excited much attention. A bit of the lining of a calf's stomach—*rennet*—placed in milk, precipitates the caseine rapidly, and from this cheese is formed.

Berzelius states that he took a small piece of this membrane, washed it clean, dried it as completely as possible, weighed it carefully, put it into eighteen hundred times its weight of milk, and heated the whole to 120° F. After some little time coagulation was complete. He then removed the membrane, washed, dried, and once more weighed it; the loss amounted to rather more than one seventeenth of the whole. According to this experiment, *one* part of the active matter dissolved from the membrane had coagulated about *thirty thousand* of the milk. Does chemistry explain satisfactorily this wonderful effect of infinitesimal quantities of rennet upon milk? It does. The change is due to the presence of "sugar of milk" in the milk. This substance is peculiarly prone to pass over into lactic acid, under favorable conditions, by appropriating the elements of water. The membrane acts as a *ferment*, lactic acid fermentation is set up, and a minute quantity of that acid is produced; this immediately acts upon the caseine, coagulating it and producing curd. Without the aid of the membrane, milk will precipitate the curd. There is no lactic acid in fresh milk, but after a few hours in a warm place, it makes its appearance, the caseine falls, and it becomes *sour*. This could not occur if no sugar was present in the milk. The thin, pale-colored, translucent liquid remaining after the curd is removed, called "whey," consists mainly of water, holding the saline constituents, and the sugar of milk. The curd, after it is salted and pressed, undergoes a particular kind of putrefactive change, which gives flavor to the cheese.

Milk, examined by the aid of a microscope, presents to the eye myriads of remarkably minute globular particles, suspended in a thin liquid. These particles are termed *butter*, and rise to the top upon standing, bringing with them a portion of the caseine and serum, and thus form *cream*. By agitation, or churning, the fatty matter is separated from the milk, and butter is produced.

The secretion, or production of milk, may be very seriously and detrimentally interfered with. By the employment of certain articles in the food, the *color*, *odor*, *taste*, and *medicinal effect* of milk may be modified; and this is so well understood by physicians that, in France, children are brought under the influence of medicine administered to the mother. And further, a new form of treatment has been instituted which is based upon the plan of administering to animals certain remedial agents, and causing patients to live upon the milk of the animals. It is evident we cannot be too strongly impressed with the importance of providing pure healthy milk for children. The state of health of the female has much to do with the quality of the milk; and a sickly mother should hesitate before jeopardizing the well-being of the infant by allowing it to feed at the maternal fountain.

It is equally as important that cows' milk should come from perfectly healthy animals. Labillardière states that the milk of a cow affected by a species of phthisis contained *seven times* more phosphate of lime than usual; and Dupuy also noticed the large quantity of calcareous matter in milk from cows similarly affected. Diseased milk may be known by its want of homogeneousness, an imperfect liquidity, a tendency to become viscid on the addition of ammonia, and on microscopic examination the presence of certain globules not found in healthy milk.

The adulteration of milk by additions of water is a very common practice by milk venders in cities. It is a matter of regret that, owing to the great inequality in the amount of water found in cows' milk, the conviction of offenders in court is rendered a matter of so much difficulty. Much, however, may be done by vigilant, well-directed efforts, to arrest the monstrous frauds in milk in our cities.

Dr. Chambers on the Indigestions.

We present to our readers some interesting extracts from Dr. Chambers' new work, recently published, "On the Indigestions." They will afford to those not familiar with his books a good idea of his pleasing and attractive style and the sensible views of medical matters which he presents.

EATING TOO MUCH.

Occasional excess in the pleasures of the table is common enough, but people do not go to a doctor for its consequences. It suggests and often spontaneously carries out its own cure, and the shame which accompanies it causes the "remorse of a guilty stomach" usually to be concealed. Rightly enough; for as a rule there are few faults so deserving of contempt as gluttony. Indeed, I can remember but two instances in my life where it was not so, and I will quote one of them here, it being always pleasanter to reflect the bright than the dark side of human nature. I dare say I shall find some future opportunity of introducing the other also.

In November, 1859, I was requested to visit a lady past middle life, who, when I entered her library, certainly looked the picture of robust bloom. "Dr. Chambers," said she, "what is a British matron to do who habitually eats too much?" The question suggested the shortest of replies. "Aye, it's very easy for you to say 'Dont;' but, if I didnt, I should be a widow in a week. You know how old and infirm Lord C— is. He has always been used to feed highly, and if I cut the dinner short, or did not encourage him by my example, it would be his death." It seemed that the symptoms of eating too much were a sense of repletion and a want of sleep during the night, feverishness in the morning, a sort of worrying fidget in the bowels, sometimes followed by constipation, sometimes by fetid semi-liquid evacuations, never by natural motions, frequent headaches, and a tendency to depression of spirits. Sometimes she was attacked in the night by what she called "spasms," that is to say, severe pain in the epigastric and umbilical regions. If that ended in vomiting, she experienced rapid relief, and was better than usual for several days. My prescription was an aloes and myrrh pill before dinner daily, and a recommendation of a dry diet as mixed and varied as possible, avoiding only soup, slops, butter, and fat. But I doubt if it was quite successful, till the exciting cause of this virtuous intemperance bore his many years and honors to the grave.

I question if my recommendation of a mixed diet was wise. It would have been better to have taken a preponderance of meat one day and a preponderance of vegetables another, but more generally the latter.

SEDENTARY HABITS.

Among the originators of dyspepsia we commonly find included in books sedentary habits. But when I come to look over my notes, I cannot extract any cases which would exhibit this fact. I do not know by experience if a sedentary life, such as that of a clerk or bookkeeper for example, would induce the defect unless it were joined to some other cause. Alone, with a properly regulated diet, it seems consistent with quite healthy digestive powers. We find it so in the bedridden under our care, whose life may be viewed as the type of a sedentary one, yet they do not suffer except from some more than ordinary folly in diet, or from the misuse of some drug.

When, therefore, those who come before us for indigestion attribute their state to a sedentary life, we must not stop there, but search further for other and more certain causes. For example:—

M. S—, editor of a weekly newspaper, aged about forty, laid on the many hours he spent in the office chair the blame of enteric dyspepsia, which spoilt his night's rest by waking him in the early morning with flatulence. Charcoal gave him only temporary relief, but dividing his meals more, taking a good luncheon and a light dinner, seems to have set him up completely. This was in 1856, and now he seems quite equal to his official duties, and looks as robust as any leucophlegmatic men ever do.

Let it not be supposed that I underrate the value to health of exercise in the open air. The fresh oxygen, the cheerful occupation, the distraction of the mind from injurious tension, must, however, be taken into account by the physiologist, and not all the benefit set down to muscular motion, which latter element is but a small part of what is usually included under the recommendation of "exercise" by a rational physician. I have come across more brain-laborers whose digestion has been injured by injudicious excess in muscular exertion than by the reverse. Let not those whose avocations are necessarily sedentary despair of finding, by judicious experiment, a mode of passing their lives in complete, though not of course blooming health.

TIGHT LACING.

One wet winter day, at Florence, I had been spending the morning in the studio of a sculptor of world-wide reputation. We had discussed the perfections of female beauty, and I felt that I was sitting at the feet of a thinker, as well as an "*elegans formarum spectator*." In the evening we met at a hospitable palazzo, and, under cover of the waltz music, from a quiet corner of observation, saw whirling by us in the flesh much that we had been thinking of in the marble and the clay; and both our eyes could not but follow one particular face, famous for the assistance its great natural beauty received from art. "Face," I said, but the mind of Hiram Powers was penetrating deeper, for he exclaimed, after a short silence, "That is all very well, but I want to know where Lady —— puts her liver!" Where, indeed! for calculating the circumference of the waist by the eye, allowing a minimum thickness for the parietes of the chest, an area for the spine, œsophagus, vena cava, and aorta, the action of the waist seemed to admit of no room for anything else at all. In such a body the liver must be squeezed down into the abdomen, stick into its hollow neighbors, and infringe upon all the organs. The whole portal circulation must be carried on under great mechanical difficulties, the due supply of arterial blood reduced, and its return by the vena cava resisted. What a tough body it must be that does not become pot-bellied from the downward pressure, red-nosed from the hepatic obstruction! And must not, therefore, the style of dress which gives birth to such deformities be an abomination and an eyesore to the artist?

The organ which suffers most is the unresisting stomach, which is dragged and pushed out of all form during the continuance of this packing process. The longer the continuance the more it suffers.

Next to milk, the most digestible form of animal food is properly made beef-tea. The following is the best recipe for dietetic purposes:—

RECIPE FOR MAKING BEEF-TEA NUTRITIOUS.

Let the cook understand that the virtue of beef-tea is to contain all the contents and flavors of lean beef in a dilute form; and its vices are to be sticky and strong, and to set in too hard a jelly when cold.

When she understands this, let her take half a pound of fresh-killed beef for every pint of tea she wants, and carefully remove all fat, sinew, veins, and bone. Let it be cut up into pieces under an inch square, and set to soak for twelve hours in one third of the water required to be made into tea. Then let it be taken out, and simmered for three hours in the remaining two thirds of the water, the quantity lost by evaporation being replaced from time to time. The boiling liquor is then to be poured on the cold liquor in which the meat was soaked. The solid meat is to be dried, pounded in a mortar, and minced so as to cut up all strings in it, and mixed with the liquid.

When the beef-tea is made daily, it is convenient to use one day's boiled meat for the next day's tea, as thus it has time to dry and is easiest pounded.

Some persons find it more palatable for a clove of garlic being rubbed on the spoon with which the whole is stirred.

The utility of decoctions of animal food depends on several circumstances which modify the advantages accruing from their liquid state. Heat seems to have an effect in some degree proportioned to the period of application, rendering albumen more or less insoluble, at the same time that to a delicate palate there is a decided loss of savor. Thus soups and stews which are "kept hot" are wholesome enough during the first few hours, *may* be digested at a railway refreshment room for some hours after, but on the second or third day give the rash stranger beguiled into a Palais Royal two-franc dinner an infallible diarrhœa. (*Probatum est.*) Though finely di-

vided, the minute fragments of muscular fibre seem to be individually rendered insoluble by continued heat. Good soup is that which is made most like the above-described beef-tea, and is a highly digestible article; bad soup, that which least resembles it, and is to be avoided as poison. Next to good soup in digestibility comes sweetbread.

Milk-Diet and Onion-Juice in Anasarca.

By Dr. Pautier, of Aigre (Charante).

On the 27th of February, in a case of anasarca under his care, M. Pautier found that the symptoms had acquired the highest possible degree of intensity. The abdominal parietes overlapped on either side the upper third of the thighs; the skin was dry, shining, and here and there covered with blisters; the dyspnœa was considerable, the voice extinct, and the pulse small and quick; a bed-sore had formed on the back, and double hydrothorax was present.

No albumen was detected in the urine.

Sudorifics, diuretics, and aperients were exhibited without any apparent benefit up to March the 9th, when M. Pautier prescribed the following treatment:—

Three cups of milk porridge to be taken daily, each followed by the ingestion of dry bread and raw onions, without any drink.

For thirty days this diet was persevered in, and in the course of a fortnight the patient was enabled to leave his bed. In April nothing remained but slight œdema of the feet and ankles. A generous diet was then prescribed, and in another month a complete cure was effected.—*Gazette Hebdomadaire: Journal of Practical Medicine and Surgery, October*, 1866.

Simple Method of Radically Curing Reducible Hernia.

By Julian J. Chisholm, M.D., Professor of Surgery in the Medical College of South Carolina, U.S.A.

A simple plan for radically curing hernia, which Dr. Chisholm suggested and put into successful practice in 1859, consists in sewing the columns of the inguinal ring together, subcutaneously, by silver wire, and leaving the wire permanently in the tissues, so as to act the part of a permanent internal clamp. This restores, to a great extent, the virgin condition of the external oblique tendon, which gives strength and support to the lower portion of the abdomen. The only instrument necessary for the performance of this operation is a stiff needle, five inches in length, very slightly curved towards its point, near which is placed the eye. The other extremity of the needle is secured in a firm handle, which enables the surgeon to control its movements.

The various steps of the operation are as follows:—The patient, having undergone the usual preparation of having the bowels emptied by some mild cathartic, is placed in the recumbent posture, and all hair is removed from the pubic region corresponding to the side upon which the operation is to be performed. The hernial contents having been returned into the peritoneal cavity, the index finger of the left hand is placed over the centre of the fundus of the scrotum (palmar surface upwards), the needle lying upon and parallel with it, the eye of the needle corresponding with the pulp of the finger, which can guide it in the direction it should take to the point of transfixion. The finger, with the needle now capped by scrotal tissue, is passed up into the inguinal canal until the inner face of the columns can be readily felt. The pulp of the finger having passed well behind the internal column, the handle of the needle is seized, and the point, directed by the finger, is made to transfix the conjoined tendon and internal column at some distance from its free border. When the point of the needle projects under the skin of the abdomen, an assistant draws the skin inward towards the median line, so as to make the needle perforate that portion of skin which would normally lie over the central portion of the canal. The needle is now threaded with a silver wire, and then drawn back into the canal and through the scrotum, leaving one end of the wire exposed upon the abdomen. If the point of the needle has escaped from the scrotal puncture, it is carefully reinserted through the same orifice, and directed, as before, upon the pulp of the finger, passes with the invaginated scrotum into the canal, and is made to transfix the external pillar of the ring. As the point lifts the skin, the abdominal covering is drawn outwards in such a way that the point of the needle protrudes through the puncture first made in the skin of the abdomen. The silver wire is now detached from the eye, and the needle completely withdrawn through the scrotum, leaving the two ends of the silver wire protruding from the abdominal puncture. The portion of wire embedded in the tissues forms a long loop, which extends continuously through each column of the ring to the bottom of the scrotum; the extreme convexity of the loop lying in the scrotal fascia under the skin, where it can be felt by passing a probe into the scrotal puncture.

The next step of the operation consists in drawing firmly upon the ends of the wire, whilst the scrotum is drawn downwards and its invagination prevented, which forces the wire to tear or dissect up the scrotal fascia to the immediate vicinity of the ring. If the finger be now thrust up into the canal and the wire drawn upon, the finger will be squeezed by the approaching columns; and if drawn out of the canal, and the wire be still drawn upon, the ring will be so diminished in size as only to accommodate the spermatic cord, with no room to re-admit the finger. The wire is now twisted from above with a torsion forceps, and when the columns are brought well in apposition, without too much traction being made to cause the wire to act as an écraseur, the ends of the wire are cut off as close as possible to the abdomen, when the portion left in the wound immediately disappears from view under the skin.

From the beginning to the end of the operation not a drop of blood is drawn, the only external evidence of an operation having been performed being a small prick in the skin of the abdomen and a similar one in the scrotum, either of which can scarcely be found, and which heal in a few hours. For a few days after the operation the patient is kept quiet, until the wire can become imbedded in lymphy effusion. No truss need afterwards be worn, as the wire clasping the columns of the ring restores the support of the abdominal wall; the truss, moreover, would act injuriously, by painfully compressing the skin against the incarcerated wire suture. One suture suffices for the majority of herniæ. Should the orifice of protrusion be of large size, as in large inguinal or umbilical herniæ, two or more sutures may be required to keep the borders of the opening in perfect apposition. A point of much importance is that of introducing the needle the second time exactly through the same orifice in the scrotal skin as it had traversed in its first introduction; for, should a portion of the skin be involved in the loop of the wire, the ready dissection of the scrotal fascia cannot be effected without much force, and the scrotum becomes invaginated in the inguinal canal. The same rule holds good for the abdominal puncture, otherwise the twisted wire will not slip under the skin and become embedded in the subcutaneous fascia.

Phosphorus Pills.

Dr. Radcliffe having tried various means of administering phosphorus, has at length succeeded in effecting this in the form of pills; and as other medical men are now ordering phosphorus in this form, we have thought it desirable to publish the formula for the information of our readers. Take of

Phosphorus	6 grains.
Suet	600 "

Melt the suet in a stoppered bottle capable of holding twice the quantity indicated; put in the phosphorus, and when liquid, agitate the mixture until it becomes solid; roll into three-grain pills, and cover with gelatine. Each pill will contain one thirty-third of a grain of phosphorus.—*Pharmaceutical Journal*, 1866.

Black Varnish for Iron Work.—The beautiful, glossy, black varnish for iron work may be made by fusing one pound of amber in an iron vessel, and adding, while hot, one quart of boiled linseed oil, and three ounces each of dark rosin and asphaltum, in powder. When the whole is thoroughly incorporated, take it off; and, when cool, add about one pint of turpentine. Several coats of this varnish are put on, and the articles are dried, after each application, in a warm oven.

On the Trichina and Trichinosis.

BY M. DELPECH.

In an elaborate report on various papers on trichinosis, communicated to the Academy of Medicine, Paris, and from a review of the whole subject, M. Delpech arrives at the following conclusions:—

"Although the symptoms and gravity of trichinosis had been fully known only since the year 1860, still the disease was by no means a recent one, and its existence in Germany at a remote period, in an epidemic form, could be readily demonstrated.

"It was then confounded with various other affections, and was more especially looked upon as a peculiar and exceptional variety of typhoid.

"The disease has since given rise to much arduous research, and can scarcely in future escape detection, when it has been attentively watched in every stage of its development.

"Disturbance of the digestive organs, followed by œdema of the face, and subsequently by severe muscular pain, and by a degree of dyspnœa which may even end in asphyxia, on account of the impossibility of the movements of respiration, is an aggregate of symptoms not to be met with in any other affection. These morbid manifestations correspond with the successive birth in the digestive tube, and of the passage into the muscular structures of trichinæ in numbers sometimes enormous, but in general proportionate to the quantity of parasites which have been swallowed. Their presence can be demonstrated during life by the microscopic inspection of a minute particle of muscle removed from the patient's person with peculiar instruments, and by an innocuous and almost painless operation. In doubtful cases, the diagnosis can, therefore, at a certain stage of the disease, be confirmed by direct inspection.

"In general, one tainted animal will infect many persons. Hence more or less widely-spread and severe epidemics, according to the condition of the animals, the variable quantity of the flesh consumed, and the mode of cooking adopted.

"Certain animals are, as well as man, liable to trichinosis. In carnivora and omnivora the complaint occurs spontaneously, and herbivora may also artificially become affected, but only by the intervention of the human subject.

"In man the disease arises from the consumption of raw or insufficiently-cooked pork flesh, tainted by the presence of trichinæ.

"In pigs the propagation of the parasites is referable to several causes. They eat trichinized animals, especially rats, dead or alive, or abandoned on dunghills or in fields. They feed on human excrement, or on the dejecta of pigs which have recently consumed trichinized flesh, and which excrete, with the contents of their intestines, fecundated female trichinæ. Moles, earth-worms, the larvæ of flesh-flies, the beetroot worm, have nothing to do with the transmission of trichinæ.

"When the disease occurs spontaneously in pigs, it seldom gives rise to characteristic symptoms, and microscopic inspection alone leads to the knowledge of the parasites. In the human subject, the cyst, when encrusted with calcareous salts, can easily be discerned with the naked eye, in the shape of white patches, and the microscope affords further conclusive evidence. In the countries where trichinosis prevails, this mode of examination has become a general precaution, whether carried out by individuals or by order of the government.

"Merely optional microscopic examination, although doubtless useful, can give no absolute security, on account of the necessary absence of regularity and supervision. Compulsory examination alone can yield any seriously-beneficial results. Two objections are urged against it; viz., the difficulty of carrying it out, and the uncertainty of the information supplied in cases in which the animals are but slightly affected. These are, it is true, serious considerations; but, nevertheless, the advantages derivable from compulsory microscopic inspection are such that the measure should unhesitatingly be adopted in all countries contaminated by trichinosis.

"France appears hitherto to have escaped the contagion, and no cases have yet been adduced of acute or encysted trichinosis, nor have any records been brought

forward of former epidemics, as in Germany. The rats of the slaughter-houses do not seem to have been infected; at least, not habitually. The immunity is to be traced to the different customs of both countries, and to the more complete boiling to which the meat is submitted in France, which checks the development and propagation of the parasites.

"A temperature of 75° Cent. (167° Fahr.) alone can secure the destruction of the trichinæ. The same result may be attained by thorough and protracted salting, or by a hot fumigation of twenty-four hours' duration. Cold smoking does not destroy the worms."

M. Delpech further submitted the following resolutions to the approbation of the Academy:—

"1. The apprehensions awakened in France by the epidemic of trichinosis in Germany, have not hitherto been justified by any facts observed in this country.

"2. The custom prevalent in France, of thoroughly boiling pork flesh, explains this immunity, and should be more than ever persevered in.

"3. As no epidemic, and even no isolated cases of trichinosis have been observed, it is unnecessary to resort to any special measures of public hygiene, or to recommend the adoption of a general compulsory microscopic examination of pork flesh.

"It might, nevertheless, be useful to establish a service of inspection in certain towns provided with public slaughter-houses, with a view to ascertain, by authentic returns, the existence, the absence, or the proportion of trichinosis observable in the porcine race.

"4. Certain conditions of rearing and feeding being calculated to influence considerably the development of trichinosis amongst pigs, it would be well to distribute, in the agricultural districts, circulars or tracts for the promulgation of the precautions to be adopted, with a view to the preservation of the animals."

These resolutions, drawn up by the reporter, with the assistance of M. Raynal, were adopted without discussion.—*Annales d'Hygiene Publique.*

Journal of Chemistry and Pharmacy.

BOSTON, MAY 1, 1867.

☞ We publish an edition of **25,000** copies of this number of the *Journal.*

☞ All subscriptions must begin and end with the year. We have sent back numbers to all our present subscribers, so that they have a full volume for the past year.

VOLUME FIRST

ends with this number. Those who have not written us expressing a wish to have the *Journal* continued, will please write at once, that we may correct our list. We shall drop the names of those who have not or do not write us.

VOLUME SECOND

commences July 1st, and the numbers will be published upon the first of each month during the year. Although the cost of publication will be greatly enhanced, we have determined to maintain the same *low price,*

FIFTY CENTS A YEAR IN ADVANCE.

This will certainly make it the cheapest chemical and medical journal in the world. We have good reason to nticipate a subscription list reaching as high as 100,000 n a short time. No effort or expense will be spared on our part to make the *Journal* interesting, useful, and acceptable to all our patrons.

☞ Please give the name of the *State, Town,* and *County,* where you wish the paper sent, and write legibly, so it can be read without trouble.

☞ Any one sending us *three* paid subscribers will be entitled to the *Journal* for one year; and for *five* subscribers we will send the beautiful *petite microscope* as a premium.

The Beginning: the Result.

As a matter of experiment, and with the view of effecting communication with our numerous correspondents and business friends in various parts of the country, we decided in July last to publish the little journal now in the hands of the reader.

We scarcely expected to establish a permanent and popular publication, or to assume the labor and responsibility of a carefully-supervised journal of chemical and medical science. Indeed, had we anticipated the results of the enterprise, with our laboratory duties, and all our other numerous and exacting cares, we should certainly have hesitated before entering upon it.

Whatever may now be our views or feelings, it is evident the "Journal" *is* an "established fact,"—a permanent institution. We cannot avoid a feeling of pride and pleasure at its success. Without any personal solicitation whatever, by sending copies of the *Journal* to gentlemen for examination, we have secured a list of *bona fide, enthusiastic, paid* subscribers, in one year, larger, we believe, than any other journal of the kind in the country. As an illustration of the general interest manifested in it in many sections, it may not be improper to state, that our list embraces the names of twenty-five of the most distinguished physicians in the city of Washington, and the proportion is even larger in some of the New-England and western cities. Not one of these gentlemen was ever *solicited* to subscribe for the *Journal;* their patronage has been *voluntarily* rendered.

It may not be proper for us to give an expression of views regarding the cause of this success; nevertheless, we venture to surmise that it may be due to several features peculiar to the publication. Medical men in active practice have but little time to study extended treatises, or to follow the elaborate uncertain theories of writers so conspicuous in the journals. What they want are facts, succinctly given, the pemmican of medical and chemical literature. We have endeavored to collect and arrange such facts, and it has been our aim to admit no article, however high or distinguished the authorship, which did not present some new truth, or suggest some aid to the physician in the practical duties of his profession. General scientific truths, popularly presented, are always acceptable to medical men, as well as to all classes in society. In this direction we have proceeded, presenting in almost every number a popular chemical treatise upon some subject of interest. We intend to continue this as a feature of the *Journal.*

Medical formulæ, or statements of novel combinations of therapeutic agents, such as we have published, are regarded with disfavor by some, but the great majority look upon them differently, or with the feeling that they are competent to judge if there be in them any merit or demerit. Thus it is with new remedial agents. A few affect to despise them, but no one does this that is true to his calling, or alive to the great progress making in chemistry as connected with medical science.

It is becoming more and more apparent that it is to chemistry we must look for the unfolding of those great mysteries which relate to the cause and means of relief of human maladies. Therefore, a journal which more specifically brings before physicians chemical facts, bearing upon medical and therapeutical science, can hardly fail to be regarded with favor. These are, perhaps, some of the reasons why our *Journal* has proved a successful one.

In the future we shall continue the same general course, adding, however, some new features, which, we believe, will still further enhance its value and increase its usefulness. The interesting chemical facts connected with agriculture and horticulture will receive some attention at our hands; and chemistry as applied to the arts will not be overlooked.

We have no room to further allude to the improvements contemplated in the new volume of the *Journal of Chemistry.* We believe they are such as will meet the full approval of our numerous readers, and gain us many new friends.

The number of this journal issued September 27, 1866, contained an editorial which we have reason to believe did great injustice to a well-known chemical house in this city. It had not at the time the sanction or approval of the publishers, and we are satisfied that justice to the parties alluded to, requires this *amende* from us.—*Boston Medical and Surgical Journal, March 7th,* 1867.

The above has reference to the publishers of this journal. The *amende* is *full* and *explicit,* and such as we should expect from gentlemen of the high character of the publishers and the senior editor of the *Medical and Surgical Journal.* A *change* has recently been made in the conduct of this publication, Dr. Luther Parks, Jr., being now junior editor. He brings to the work an excellent reputation for culture and courtesy, and we wish him abundant success in his new vocation.

OYSTER LIQUOR. It is really wonderful how great a variety of what were once waste products are now saved or utilized. Our attention has recently been called to a new article of food, prepared from the albuminous liquid in which the oyster floats in the shell. This liquid, of which tens of thousands of gallons have been wasted annually by the oyster-openers upon the coasts of Connecticut, New Jersey, Virginia, etc., is now taken and evaporated at a very low temperature until it assumes the form of a dry powder, retaining much of the peculiar flavor or aroma of the liquor. With this powder a grateful and nutritious soup may be made in a few moments by the addition of water. Those who reside in the interior, at a distance from the sea, can now, by the use of this, have at command, in portable form, the material for preparing oyster-soup, and doubtless it will prove a delicious article of food to thousands.

Hernia---Trusses.

Several years since we were frequently consulted by patients afflicted with hernia, in some of its various forms, and were thus led to a knowledge of some facts regarding the use of trusses which probably correspond with those known to all in the profession who have given any special attention to the subject.

The most prominent facts were the objectionable form or plan of construction of trusses, and the methods of their application. It is singular that so important a department of surgery should have fallen very generally into non-professional hands. There have been but two or three forms of the instrument suggested by competent surgeons, either in this country or in Europe; and the applying of them has been left, to a very great extent, to makers and venders. Physicians in the country who are consulted regarding rupture feel obliged to send their patients to the druggist, or to the city, as they have no proper appliances at hand. The instruments obtained are far too often very objectionable ones. The patient knows nothing of what he requires, takes what is offered, and seldom reports himself again to his medical adviser, however severely he may suffer from the powerful steel

pring which is pressing upon the abdominal viscera with he grip of a vice. Very nearly all the trusses in the hands of venders are constructed of *steel*, and have a fixed compressing power, like the spring to a fox-trap. Some of them are very powerful, requiring several pounds force to open them. The pads are of ivory, wood, etc., and recently a *solid corrugated button of vulcanized rubber* has been introduced.

Is not the pernicious and even dangerous effects of such instruments in recent cases of rupture obvious? Do they not have the effect to *dilate* the opening, and thus increase the evil rather than to alleviate or cure it? The observation and experience of all medical men must correspond upon one point: that very few cases of hernia, unless they have been tampered with and abused, need a large amount of compressing force in order that the intestine or protruding substance may be retained. A *hard* substance forced against or *into* the opening by a powerful spring, does not bring the parts in apposition, does not tend to form adhesions or promote cure. Irritation, or perhaps active inflammation, may result; but the sufferer gets no benefit from any consequent adhesions. The use of such appliances complicates the evil, and lessens the surgeon's chances of success when his services are demanded.

It may perhaps be better to advise patients to submit to an operation, with the view of effecting a radical cure, since science has triumphed over all obstacles so as to render the operation a safe and by no means painful one. We give upon another page of the *Journal* an article upon this subject.

There are tens of thousands, however, who will not consent to place themselves in the hands of the surgeon, and therefore the matter of a properly-constructed truss is still an important one. The attention of Dr. Sargent, of this city, was some time ago called to this subject, and he conceived the idea of employing *sponge* as a compress upon the opening, and the use of elastic fabrics and malleable brass wire springs to retain it in place. His experience in the use of this form of truss was so satisfactory that he was induced to have them constructed for general employment.

The sponge, by its peculiar elastic nature, exerts a mild pressure upon every part of the ring, and it does not slip about and become displaced. It brings the ruptured surfaces together and holds them in place until, in many cases, a union is formed and a cure effected. It is very light, comfortable, and cleanly. The spring exerts gentle pressure and is of brass. It is so constructed that it may be *perfectly adjusted* by bending to any desired form. The physician will find no difficulty in adjusting it or in explaining to the patient how he can fit it perfectly to himself. The instrument for inguinal hernia is made of two brass wires placed parallel with each other, about three fourths of an inch apart. This affords perfect ventilation while in contact with the body, and renders the truss very light. We think physicians will be pleased with Dr. S.'s device and thank us for calling attention to its merits.

Mr. Peabody's Last Gift to Science.

Since our last issue, Mr. George Peabody has made another noble gift to science. He has given to the County of Essex in Massachusetts, *one hundred and forty thousand dollars* for the promotion of science and useful knowledge. This large sum he proposes to devote to the promotion of the study and knowledge of the natural and physical sciences, and their application to the useful arts, in his native county.

No definite plans have, as yet, been fixed upon by the Trustees in regard to the appropriation of the trust committed to them, but the best possible means will be devised to carry out the wishes and objects of the donor.

The names of the Trustees are as follows: Francis Peabody, Esq., Salem; Prof. Asa Gray, Cambridge; Wm. C. Endicott, Esq., Salem; Geo. Peabody Russell, Esq., Salem; Prof. O. C. Marsh, New Haven; Dr. Henry Wheatland, Salem; A. C. Goodell, Esq., Salem; Dr. Jas. R. Nichols, Haverhill; Dr. Henry C. Perkins, Newburyport.

Syrup of Lime.— Take of recently slaked lime ℥ viii, white sugar ℥ v, boiling water ℥ xvi, flu. Rub the lime and sugar together and pour them into the water and stir. Boil a few moments if necessary. Before cooling filter through paper. This is an excellent preparation for acidity and all purposes to which lime water is applied. Dose from 30 to 50 drops in milk. Dr. Buckingham of this city thinks it almost a specific in cases of acute rheumatism, having treated ten cases with it successfully.

Secale Cornutum, a Remedy for Hemorrhoids.— Dr. C.V. Jones writes us from Covington, Ind., that he has used the ergot in connection with opium as a remedy in hemorrhoidal tumors with great success. He uses tincture of ergot and opium equal parts; also an aqueous infusion of opium with ergot. A pledgit of lint or soft muslin is saturated with the liquid, and applied to the tumor. If it is situated high in the rectum, the tinctures are diluted and applied with a syringe. He states that he has used no other remedy for many years, and the results in every case have been satisfactory.

Chemical Examinations of Liquors.

There is much that is strictly empyrical in the alleged chemical "analysis" of alcoholic liquors. Respectable chemists hesitate to undertake such work and allow positive statements of results to be made public. They very well know that while it is quite a simple matter to determine the amount of alcohol in any liquid, and also to detect or isolate fusil oils, metallic poisons, and some of the delicate ethers peculiar to wines, manipulations of this kind do not constitute "analysis," in the true and *honest* sense of the term. It is a chemical examination, as far as it goes, but practically it leaves the question of the quality and value of vinous beverages unsettled. A positively factitious and poisonous liquor may be easily detected by a competent chemist, but there are but few such in the market. The adulterations in liquors most frequently practised are the mixing of cheaper with more costly ones. It is seldom that lead, copper, strychnine, and other organic and inorganic poisons are found even in the lowest grade of liquors. In whiskey, from copper stills, a trace of this metal may be present as an accidental ingredient, but it is never purposely added. We doubt whether chemists ever detected many of the poisons alleged to be found in liquors. Liquors may be hurtful and poisonous without holding in solution any such baneful substances. A mixture of two different wines, neither of which is poisonous of itself, will almost always sicken the drinker, and, in the case of invalids, produce the most unpleasant consequences. Analysis is wholly incompetent to detect them.

Chemical analysis of wines and other liquors, to be of absolute value, must make clear many other points, besides showing how much alcohol a specimen may contain, or whether it holds in solution active poisons or not. Age has much to do with the question whether liquors are fit for medicinal uses. Those recently prepared are much more narcotic, much less acceptable to the system than when they are old. Chemistry throws very little light upon the matter of the age of liquors. The opinion expressed upon the strength of "taste," by an old winedealer, is worth more than any analysis, so-called. Wine is often mixed with cider, the juice of elderberries; and sometimes there is found in the market factitious articles composed wholly of the three liquids, with the addition of sugar and alcohol. Gross mixtures of this character may be detected by chemical re-agents, and by some physical manipulations; but in the more skilful combinations the labors of the chemists are almost valueless. Here the experienced dealer has the advantage of science. His taste is better than chemical testings. Educated physicians everywhere understand this matter perfectly well. How much confidence have they in the purity and general excellence of the "analyzed" liquors vended by State or town agents? Very little indeed. They prefer to trust to the intelligent judgment and care of the apothecary, or reputable and experienced dealer, when medicinal spirits are needed. There is hardly a chemist in the country who would purchase liquors for himself or family from any assurances that they had been "analyzed"

These statements are not made to weaken confidence in chemically-examined liquors, but to expose a form of empyricism which has too long been practised for the honor of science and the cause of truth.

Chemical Examination of Urine.

[Continued from Journal No. 5, page 38.]

The ground gone over in previous articles upon qualitative analysis of urine is perhaps sufficiently extended to afford all necessary aid to the physician in the important department of diagnosis. Simple and reliable methods of testing for the important agents in morbid urine, have been given in the fewest words possible, and it is quite unnecessary to confuse, by referring to more complex and difficult processes, to reach the same general results, or to explain methods of quantitative analysis.

The intention is to show that by a few simple experiments it becomes easy, not only to confirm or dissipate our suspicions as regards the character of any specimen of urine, but, if morbid, to discover the nature of the difficulty. It may be well to briefly recapitulate the nature of the testings, and notice a few other reactions which are worthy of observation.

The first step in the examination is to test with blue litmus paper; if acid, the color will change to *red*, or *reddish purple*. If no change is produced, test with a strip of turmeric paper; if alkaline, it will become *brown*. If the liquid is alkaline, the alkalinity is probably due to the conversion of urea into carbonate of ammonia.

2. Ascertain the specific gravity of the urine by means of an urinometer; if that is not at hand, it may be ascertained by the use of a small phial.

These two steps being taken, the next may be postponed until time has elapsed sufficient for a sediment or deposit to form. If this occurs, it will most probably consist of *earthy phosphates, uric acid, urate of soda*, or *ammonia*, or *oxalate of lime*. These may sometimes be found alone, or sometimes two or more, mixed with the others.

3. Warm the deposit in a test-tube; if it dissolves, it is probably *urate of soda*, or ammonia. If it does not dissolve,

4. Add three or four drops of acetic acid to another portion; if *it dissolves*, it consists of *earthy phosphates*.

5. If it proves insoluble, try a little with hydrochloric acid; if it dissolves, it is probably *oxalate of lime*.

6. If still insoluble, dry a little of the sediment upon a watch-glass, and add a drop or two of nitric acid; if it dissolves, dry again to a powder, and *when cold* add a drop or two of ammonia; if this affords a beautiful purplish-red color, it is *uric acid*

These experiments show if the sediment be either of the four substances most common, earthy phosphates, urate of ammonia, oxalate of lime, or uric acid.

If it is neither of these, it may be *pus*, *mucus*, *semen*, *blood*, *cystine*, *fatty matter*, or chylous matter. The methods of detection of the first three substances have been pointed out with sufficient distinctness. Blood may be known by the *color;* also, it is not soluble when warmed. If a portion is warmed in a test-tube, and a drop or two of nitric acid added, it will coagulate.

To ascertain if it be fatty or chylous matter, agitate a portion with an equal bulk of ether, in a test-tube. Allow the ether to evaporate, and the fatty matter will be left behind; mix water with it, and observe the globules of fat float on the top. If, when the ether is shaken up with the urine, it becomes *opaque and almost milky*, chylous matter is probably present. Place a little of the deposit in a watch-glass, and add a few drops of ammonia; if it is *cystine*, it will dissolve. Dry the solution over the spirit lamp, and examine the crystals with the microscope; if the form is distinctly *hexagonal*, the proof of the presence of cystine is conclusive. If the urine under examination affords no deposit upon standing, it may be subjected to the same class of testings, having the same objects in view, as has been described in these papers.

The use of the microscope in this class of investigations is all-important. The most extended and satisfactory results cannot well be reached without the use of an instrument of the power of two hundred diameters. Smaller instruments, however, may be of great service, where larger ones are not at hand. The characteristic appearance of the crystalline or amorphous substances found in healthy and morbid urine, under lenses of high power, will be considered in our next number.

J. R. N.

New Medical Books.

We have received through the publisher, Henry C. Lea, of Philadelphia, Dr. Chambers' new work, "On the Indigestions." We have, in another column, given some extracts from the work, which will illustrate its general style and character. It is a most pleasing and highly useful book, and we advise our medical readers to procure a copy at an early day. It is sensible, practical; the work of a thorough student and teacher; and no one can read it without benefit.

We have also received, from the same house, a copy of a new edition of *Dr. Austin Flint's Principles and Practice of Medicine*. The first edition of this work was published in March, 1866, and within four months another edition was demanded. This is good evidence of a popularity which is deserved. It is a very complete digest of the principles and practice of medicine, of equal service to the pupil in the prosecution of his studies and the physician in active practice. It has been prepared with care, and it presents a view of the more recent discoveries in medical science.

Re-agents and Instruments for Testing Urine.—So many applications have been made to us to supply the instruments and re-agents for testing urine, that we have concluded to arrange a case suitable for physicians. The high price of glass apparatus and pure re-agents will make the cost nearly or quite double what we supposed it would be before investigating the matter, or what it would have been a few years ago. A case with urinometer, test-tubes, watch glasses, test paper, fluids, and pure re-agents, cannot now be furnished for less than six dollars. We shall arrange a few cases, which we will supply to our medical friends at that price.

The Microscopes.—These were received about six weeks since, and all the orders upon our books were immediately filled. A large part of them were sent by mail. We trust no one has failed to receive the instrument.

Questions and Answers.

Why is narceine so expensive? Have you had any experience in its employment?

M. D., Memphis, Tenn.

The high price of the alkaloid is owing to its scarcity. It requires about fifty pounds of opium to afford *one ounce!* This quantity of opium would give, of morphia, 50 or 60 ounces. It can, however, be prepared from waste liquors in the preparation of morphia, and, therefore, as soon as processes in its isolation are improved, the drug will be cheaper. We have experimented with narceine considerably, and find it to possess remarkable properties. Small doses of one eighth or one quarter grains, produce but little effect, while one half or a whole grain produces quiet sleep. Upon awaking there is no headache, or cerebral disturbance whatever. A still more remarkable property is, that it acts as an aperient.

Of what is the "oil of cognac" composed?

R. H. C., Bloomington, Ind.

Oil of cognac, so called, is composed of a mixture of the fruit ethers, or artificial essences. Enanthic ether is a prominent constituent. In France, it is stated, the grape pomace is fermented and distilled, and a flavor resembling that of brandy obtained.

Can the borate of ammonia be obtained in this country? I have failed to find it at the drug stores.

E. R. B., Sharon, Vt.

The borate of ammonia we have prepared for medicinal uses. It can be furnished in one ounce, or in pound packages.

What kind of meat is most easily digestible or most suitable for an invalid? K. N., Conn.

There can be no question but that *mutton* is the most digestible of any kind of animal food. In cooking, we prefer roasting before an open fire, and this accords perfectly with correct chemical principles. It is important that heat should impinge strongly at first upon the outer layer of albumen, that it may be coagulated and thus prevent that in the interior from becoming rapidly hard or from passing out. A delicate stomach will often retain and digest rare-done roast-mutton when all other forms of meat create disturbance or are rejected.

Communicated to the Journal of Chemistry and Pharmacy.

Alleghany, Jan. 22d, 1867.

Mr. James R. Nichols.

Dear Sir: In looking over your last number I came across an article over the signature of "Druggist"—What is Chlorodyne? I am in possession of the formula, and inclose it:—

℞ Morph. Acet. . . . grains viij.
Chloroform, ... ℥ ss.
Mix with a gentle heat.
Then add
Syr. Simplex, Mucilage Acacia . aa ℥ i.
Acid Hydrocyanic . minims xxiv.
Oil Menthe P. . . . minims iv.
Dose from three to five drops.

T. C. W.

A considerable number of formulæ have been published as furnishing the exact composition of Chlorodyne. Most of them give perchloric acid as one of the ingredients. The one sent us by our correspondent does not contain it, and is much less complex than any we have noticed.

I inclose a prescription which may be given in all cases of simple bronchitis. It was a standard formula with the late Dr. Cameron, in his Cliniques at the Denult Dispensary, N. Y. I have used it for six years, and think it invaluable. Respectfully, etc.,

F. M. Holly, M. D.

Round Hill, Greenwich, Ct.

℞ Potassæ chlo. . . . ℥ ij.
Pulv. Rhei. rad. . . . ℥ iss.
Eupatorium perfol. . .
Serpentaria Virg. . . aa ℥ ss.
Aqua bul. . . . . oiss.
M. Infuse for thirty minutes, and strain. Dose, one tablespoonful, four to six hours.

Gleanings from Foreign and Domestic Journals.

Gas from Apples.—The extraction of gas from the residue of apples used for manufacturing cider, promises fine results in Normandy, Brittany, Jersey, Guernsey, etc. The light produced by it is whiter and better than that from coal.—*N. Y. Med. Record.*

Hypodermism and Toxicology.—It seems that hypodermic injections may be put to a bad use in consequence of the difficulty in detecting poisons thus introduced. The alkaloids are said almost entirely to escape detection. One may readily conceive the impossibility of testing the presence of half a grain of strychnia, atropia, or aconita, diffused through the entire circulation.—*Pacific Med. and Surg. Journal.*

India-Rubber Varnish in Small-Pox.—The small-pox patients in a London infirmary, just after the full development of the eruption, have had their faces painted with a solution of India rubber and chloroform. This method of treatment is said to prevent the almost intolerable itching, as well as the unsightly cicatrice.—*N. Y. Med. Record.*

In the report of the Medical Society of the Upper Rhine is a case in which the sulphate of quinine, administered by the rectum, produced excessive purgation; administered by the mouth, excessive vomiting, and a species of intoxication; and finally, when applied upon a blister, acted as caustic potash would have done.

Coal-Oil Light.—We have found by experience that the light is greatly improved by adding to the oil one fourth of its weight of common salt. It makes the light much more brilliant and clear, keeps the wick clean, and prevents smoking.—*St. Louis Medical Reporter.*

Cause of Cholera.—An astonishing observation is conveyed to us from Vienna. Dr. Klob has, with the use of a microscope of from eight hundred to one thousand magnifying power, discovered in the rice-water evacuations, millions of microscopic fungi which, in appearance, differ little from the ordinary European forms; and that cholera is easily propagated by their means can scarcely any longer be doubted.—*British Medical Journal.*

Ginger Beer.—Take 1 pound lump sugar; best unbleached Jamaica ginger, well bruised, 1 oz; cream of tartar, 3-4 oz.; 2 lemons; boiling water, 1 gallon. Manipulate with frequent stirring, in a covered vessel, until barely lukewarm; add 1 1-2 to 2 oz. yeast. Keep in a moderate warm place, so as to excite a brisk fermentation. Next day rack the liquor, and strain through a flannel. Work for another day or two, according to the weather; skim clean and put into bottles.

II. Into every bottle put essence of ginger, 1 drop; simple syrup, 1-2 oz.; fill with aerated soda water at the bottling machines.

Antidotes for Poisons. — In the British and Foreign Medico-Chirurgical Review we find the following statements: Messrs. T. & T. C. Smith claim to have discovered a common antidote for prussic acid, antimony, and arsenic.

Antidote for Tartar Emetic. — Mix 5 fluid drachms or teaspoonfuls, and 7 drops of liquor of the perchloride of iron with a few ounces of water; then mix in a cream formed of 90 grains of calcined magnesia, rubbed up with water in a mortar; stir till, after gelatinizing, the mixture again gets thin; empty the mixture into a calico or muslin cloth, and press out the liquid; remove the mass from the cloth into a clean mortar, and rub it up with a little water into a smooth cream. In this state it can destroy twenty grains of tartar emetic. It can also be used as an antidote for arsenic, of which it absorbs about 10 grains.

M. Bunsen, an eminent German chemist, and Dr. Berthollet, declare, as the results of their carefully-conducted experiments on the subject, that the hydrated peroxide of iron, formed in the process already given, by the addition of the perchloride of iron to carbonate of soda, is a better antidote for arsenious acid or white arsenic, both solid and dissolved, than albumen is to corrosive sublimate.

Albumen, the antidote for corrosive sublimate, is always at hand in the form of white of egg. The person who has taken a poisonous dose of this mineral salt should immediately swallow as much white of egg, well mixed with water, as the stomach will bear. There is no danger from excess, and even if fresh vomiting should be excited, so much the better. The eminent chemist, Thenard, while lecturing at the Polytechnic School, February, 1825, swallowed by mistake a glass of the concentrated solution of corrosive sublimate. In five minutes whites of egg were obtained and taken. He vomited repeatedly, but never had any other pain or ill consequences.

Prussic Acid Antidote. — Take of liquor of perchloride of iron 57 minims (drops); protosulphate of iron in crystals, as pure as possible, 25 grains; as much water as will make a solution of a protosesquisalt of iron, measuring about half an ounce. Dissolve, on the other hand, 77 grains of crystallized carbonate of soda in about half an ounce of water. These quantities destroy the poisonous action of between 100 and 200 drops of prussic acid, officinal strength, in giving first the one liquid and then the other.

Antidote for Arsenious Acid, White Arsenic. Measure out 5 fluid drachms and 7 minims of liquor of perchloride of iron into 2 or 3 ounces of water, then add to the liquid a solution of 1 ounce (about two tablespoonfuls) of crystallized carbonate of soda in a few ounces of warm water, and stir till effervescence ceases. The resulting mixture destroys about ten grains of arsenic.

Antidote for Cyanide of Potassium. — The antidote for this compound is the same as for the prussic acid, except that the solution of protosesquisalt of iron is to be used without the alkaline or soda solution, the prussic (hydrocyanic) acid being already combined with an alkali. The use of the alkali, however, would not be injurious; a harmless, yellow prussiate would be formed. In this case, in consequence of the possible presence of free acid in the stomach, the alkaline liquid should be given first. The quantities given, as the prussic acid antidote, would decompose 35 grains of cyanide of potassium.

A brilliant and colorless spirit varnish is made with the following:

Bleached shellac	8 lbs.
Sandarach	4 lbs.
Bruised glass	4 lbs.
Alcohol, 40 B.	60 lbs.

A very brilliant red ink can be made with the following:

Brazil wood	2 ounces.
Muriate of tin	1-2 drachm.
Gum arabic	1 drachm.
Water	2 pints.

Creme de Bismuth.

℞ French Subnitrate of Bismuth, ℥ ijss.
Mucilage of gum,
Syrup strawberries, each ℥ ij.
Essence Vanilla, gtt. xxx.
Carmine, grs. ij.

M. S. — Shake vial, and take one teaspoonful three times a day, before every meal. Each teaspoonful contains five grains of the subnitrate of bismuth.

A Superior Glue. — A very superior glue may be made by dissolving three parts of India rubber in thirty-four parts of naptha. Heat and agitation will be required to readily effect the solution. When the rubber is completely dissolved, add sixty-four parts of finely-powdered shellac, which must also be heated in the mixture until all is dissolved. This mixture may be obtained in sheets like glue, by pouring it, when hot, upon plates of metal, where it will harden. When required for use, it may be simply heated in a pot till soft. Two pieces of wood or leather joined together with this glue can scarcely be sundered without a fracture or tearing of the parts. — *Drug. Circ.*, Jan., 1867.

Soluble Blue. — Dr. Brucke obtains soluble Prussian blue by preparing a solution of two hundred and seventeen parts of yellow prussiate of potash, and one of sesquichloride or tersulphate of iron made of seventy-two parts of protosulphate, or its equivalent of metallic iron, mixing each solution, before they are brought together, with twice its volume of cold saturated solution of Glauber's salts. The iron liquor is then added to the prussiate, keeping them well stirred, the precipitate is washed by decantation, until the washings come off blue. It is then transferred to a strainer, and afterwards dried and pressed between paper.

White Gunpowder has been prepared by Schultze, a German chemist; the carbon being procured from sawdust without charring. The sawdust is boiled for several days in a solution of soda, then washed, steamed, and washed again for twenty-four hours, and finally bleached with chlorine, boiled in water, washed, and dried. Six parts of the sawdust are placed in a mixture of forty parts nitric acid to one hundred parts sulphuric acid (made up at a fuming temperature, and cooled) in an iron vessel surrounded by cold water, and allowed to stand, with repeated stirring. The excessof acid is afterwards separated in a centrifugal machine, the residuum washed in cold water for several days, immersed in a dilution of soda to neutralize the remaining traces of acid, again washed and dried, and finally treated with a solution of twenty-six parts nitrate of potassium in twenty-two parts of water, and dried at a temperature not exceeding 111° Fahr. The result, after sifting, is a very strong and quick gunpowder. We should say that the process seems rather tedious and curious than useful. A very good gunpowder is said to be that of Reymond, called pyronine, made with spent tan-bark in place of charcoal. Its proportions are, by weight, eighty-seven and a half of dry spent tan-bark to seventy-two and a half nitrate of soda, and fifty of powdered sulphur. The pulverized bark is mixed in a solution of the nitrate; to the mixture the sulphur is added, and the whole is dried.

Syrup of the Phosphates of Iron, Quinia, and Strychnia.

"Dr Lyons has for some time past employed, with, he conceives, very important therapeutic results, this powerful tonic combination, for which the profession is mainly indebted to the late Dr. Eaton, Professor of Materia Medica in the University of Glasgow, and Professor Aitken, of the Royal Victoria Hospital, Netley.

"This concentrated sirup of the phosphates is a perfectly clear and liquid fluid, slightly refracting light with the peculiar tint of the quinine solutions, and, viewed in mass, obliquely showing the bluish tint of the phosphate of iron held in solution. It is perfectly miscible with distilled water, has a strong styptic and distinctly chalybeate taste, and an aftertaste of quinine. It may be exhibited in doses of twenty to forty and even sixty minims, diluted with water, according to age and the circumstances of the case. It is well borne in the majority of cases; it acts as an invigorating stomachic, and sensibly improves appetite; it is an admirable general tonic; it appears to be a readily assimilable chalybeate, and is thus well adapted for certain chlorotic and anæmic states. In the morbid states of the nervous system which precede and accompany the development of the strumous diathesis, the influence of the strychnine salt appears to be exercised with great potency as a nervine, tonic, and stimulant, and it would seem to be an important agent in altering the morbid state of the nervous apparatus which presides over the function of nutrient assimilation. Physiologically, this influence may be supposed to be attributable to the well-known action of the strychnine salts on the spinal cord, as well as by direct stimulus to the filaments of the great sympathetic plexuses distributed to the stomach and intestines. From the general tonic and invigorating effect of this drug, its influence on the stomach and promotion of appetite, as well as by the improved assimilation of food which it induces, it is a very valuable medicine in cases of strumous children threatened with scrofulous degeneration, and ultimately with localized tubercular development. As a preparative to the use of cod-liver oil, and in certain cases as a concomitant to this food substitute, the sirup of the three phosphates will be found a very important adjunct in the treatment of numerous forms of strumous disease.

"But the employment of this admirable combination is not limited to the cases just mentioned. In depressed states of the system in the adult and the aged, in several of the conditions tending to adipose degeneration of important organs, such as the heart and kidneys, the sirup of the phosphates will be found a serviceable and reliable remedy. Where it is desired to combine a tonic and styptic to aid in checking the drain of albumen from the system in chronic disease of the kidneys, this combination will be found of great use.

"In many forms of cutaneous diseases where a tonic effect is desired, this combination will be employed with benefit."

For the benefit of our readers we give the formula for the preparation of this valuable tonic, as obtained from the last edition of Dr. Aitken's "Practice of Medicine." This sirup is now in use in this city among many physicians, and is found to fully sustain the high commendation bestowed upon it by Drs. Aitken and Lyons.

"℞	Ferri sulph.	℥ v.
	Sodæ phosph.	℥ j.
	Quiniæ sulph.	grs. cxcii.
	Acid sulph. dil.	q. s.
	Aquæ Ammonæ	q. s.
	Strychniæ	grs. vi.
	Acid phosph. dil.	℥ xiv.
	Sacchar. alb.	℥ xiv.

"Dissolve the sulphate of iron in one oz. boiling water, and the phosphate of soda in two oz. boiling water. Mix the solutions, and wash the precipitated phosphate of iron till the washings are tasteless. With sufficient diluted sulphuric acid dissolve the sulphate of quinia in two oz. water. Precipitate the quinia with ammonia water, and carefully wash it. Dissolve the phosphate of iron and the quinia thus obtained, as also the strychnia, in the diluted phosphoric acid; then add the sugar, and dissolve the whole and mix without heat. The above sirup contains about one grain phosphate of iron, one grain phosphate of quinia, and one thirty-second of a grain of phosphate of strychnia in each drachm. The dose might, therefore, be a teaspoonful three times a day.

"The amount of phosphate of quinia might be increased, according to circumstances; and if eight grains of strychnia were employed in place of six, as in the above, the phosphate of strychnia would be in the proportion of the one twenty-fourth of a grain in every fluid-drachm of the sirup. I would scarcely venture on a much larger dose. In case of delicate children, with pale countenances and deficient appetites, I have given, with great benefit, a combination of equal parts of the above sirup, and of that prepared by Mr. Edward Parrish (of Philadelphia), often called Chemical Food. To children between two and five years of age the dose of this combination may be a teaspoonful three times daily." — *Medical Press and Circular*, *June* 20, 1866, and *New York Medical Journal*, Feb., 1867.

NOTE. — We have prepared this sirup, and, from a knowledge of the combination, have great confidence in its usefulness. We can furnish it, prepared with perfect accuracy, in packages, and also in bulk.

Solution Citrate of Magnesia.

Mr. John T. Buck, of Jackson, Miss., furnishes to the *American Journal of Pharmacy* the following formula for preparing solution citrate magnesia: —

℞	Magnesiæ carbonatis	℥ iii.
	Acidi citrici	℥ vi.
	Aquæ puræ	Ov.
	Syrupi simplicis	Oi.
	Ext. limon, q. s.	
	Potass. bicarb., q. s.	

Dissolve the acid in the water, add the carb. magnesia, and stir occasionally until dissolved; filter the solution, and add the sirup and ext. lemon. Agitate until well mixed, and put into eight 12-oz. bottles, add 40 grs. bicarb. potass. to each bottle, and cork immediately.

AMMONIA FROM THE ATMOSPHERE. — The nitrogen of the air is obtained and converted into ammonia (a compound with hydrogen, valuable for fertilizing and other purposes) by a process recently promulgated by MM. Marguerites and De Sourdeval. The air being passed through a calcined mixture of carbonate of baryta, iron filings, refuse of coal tar, and sawdust, the oxygen is converted into carbonic oxide, and the liberated nitrogen is introduced into a retort where barium is heated with charcoal, and there unites with the carbon, forming cyanogen, and, with the metal, forming cyanide of barium. The cyanide is then decomposed by passing steam through it at a temperature less than 300°, and the nitrogen is disengaged in ammonia. Nitric acid may next be obtained, perhaps, by oxidizing the ammonia. But the application of the process to practical purposes on the large scale is quite a subsequent question.

ASSAY OF TANNIN. — Tannic acid, or tannin, is now employed in manufacture. Although no fraud has been effected, yet, by reason of the high price of this product, it is well to be able to test it easily. Tannin being soluble in ether, one gramme of tannin placed in the testing-tube, and covered with ten grammes of ether, ought entirely to dissolve in it. — *Moniteur Scientifique*.

CHEMICAL NOVELTIES. — At the February meeting of the Massachusetts Institute of Technology, Mr. Fleury, of New York, explained the patented process of M. René Cupper, of Paris, for extracting iodine from sea water, which consists in the use of a new precipitating liquid composed of sulphate of copper, sulphate of the protoxide of iron, tartaric acid, and tartrate of ammonia, of which a mixture of only three pounds and a quarter — and which are afterwards nearly all recovered — precipitate one pound of iodine in the state of iodotartrate of protoxide of copper from twenty-five thousand pounds of sea water, at a cost of about $1.50 per pound. He stated the present yearly importation (none being manufactured in this country) as one hundred and twenty thousand pounds, at a price varying between $5.50 and $6.00 per pound. M. Fleury also gave a description of the properties of sulphide of silicum and its preparation by the action of sulphur and carbon, or quartz or flint; he explained the manufacture of a pure hydrate of silica, a neutral solution of flint or opal in water, resulting from the decomposition of the sulphide of silicum. M. Fleury remarked that gold quartz could cheaply be brought from Nova Scotia to Boston, converted into sulphide of silicum, dissolved in water, and all the gold precipitated by specific gravity and forcing of the suspended particles through mercury; that the liquid (the value of which would more than pay for the expense of extracting the gold) mixed with other cheap materials of a proper consistency, can, when poured into moulds, without application of fire or any heat whatever, form excellent snow-white flint-marble statuary, tombstones, ornaments, and building stones, hard enough to resist all the influences of the weather better than natural marble. M. Fleury remarked further that the cost of this flint-marble statuary, etc., would be less than one third of that of cut or chiselled marble.

POOR MAN'S HARD SOAP. — Put in an iron kettle 5 lbs. unslacked lime, 5 lbs. salsoda, 3 gallons soft water; let it soak one night; in the morning pour off the water; then add to the water 3 1-2 lbs. of grease; boil till thick; turn in a pan to cool; when cool cut it in bars.

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, JULY 1, 1867. No. I.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS. No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Chemistry.

BREAD AND BREAD-MAKING.

BY THE EDITOR.

From a careful examination of many specimens of bread offered for premium at agricultural exhibitions, the conclusion is reached that very many families have hardly yet learned what good bread is, and that there is a wide margin for improvement in the methods of bread-making. No subject is certainly more important, as it has a direct bearing upon the health and consequent happiness of households, and it should receive the attention which it deserves.

Besides the manipulating processes, the manufacture of good bread involves some other considerations of no secondary importance. It is useless to attempt its production with imperfect or bad materials. The flour or meal must be sweet, and from fully matured grain. During the past two years, the market has been crowded with flour of a damaged character. The severe rains and long-continued moist weather at the South and West were unfavorable for securing the grain crops, and much of it germinated in the fields and barns, and was thereby rendered unfit for bread-making. In the germinating process diastase is formed; this, reacting upon the starch of the flour in the baking, transforms it into dextrine and sugar, and prevents the formation of light, spongy bread. Flour from such grain will afford only sticky, glutinous, heavy bread, no matter how much care and skill is bestowed in the making. Fungous growths also appear in wheat injured by moisture, and the flour becomes "musty." In bread from such materials, beside its repulsive physical appearance and unpleasant taste, a chemical change has occurred which renders it positively injurious as an article of diet. The nutritive properties, the gluten especially, have undergone decomposition, and new bodies have been formed which are not of an alimentary nature. Impaired digestion, derangements of the bowels, follow the use of bread from such flour. The poor, who are unable to pay large prices for choice selected brands, suffer greatly from this source, and much of the bread they are compelled to eat is well calculated to weaken rather than sustain the vital functions.

During the most favorable seasons thousands of bushels of wheat are made into flour, which, owing to local causes, delay in harvesting, or storage in large bodies, is rendered entirely unfit to be used as food. A portion of this is employed in the arts, but the great bulk goes into families, and feeble children, as well as adults, are forced to consume it, much to their injury. It is doubtful if anything can be done to abate this evil; the cupidity of men is but little affected by considerations of right, and the thirst for gain is potent and irresistible.

There are several methods of testing wheat flour, which are available to purchasers, although none of them afford positive indications. Good flour is not sensibly *sweet* to the taste, but bad flour often is. This is owing to the presence of glucose, resulting from chemical changes in the grain, by partial malting. Extreme whiteness is a good indication, as changed grain is discolored in the process of change. Good flour is tenacious and unctous to the touch; when thrown against a wall it should adhere and not fall readily. It does not feel *crispy*, and, when formed into a ball in the hand, adheres together like a ball of snow. To the sense of smell it is sweet and pleasant, and, when taken into the mouth, forms a glutinous mass, free from all disagreeable taste.

The nutritive quality of flour depends upon the proportion of gluten which it contains. In the best specimens 10 or 12 per cent. is found. A barrel of flour contains about 20 pounds of gluten, and 150 of common starch. The starch can easily be washed out of a small quantity of flour by placing it in a bag of cotton cloth and kneading it under a stream of water. The gluten remains upon the cloth, and is a gray, viscid, tenacious mass, insoluble in water. It is the strength-giving principle of the flour, and in a three-pound loaf of bread there should be at least three ounces of this substance.

Bad bread is by no means always chargeable to imperfect materials. Hundreds of families, who procure and use the most perfect flour, subsist upon bread of a very inferior quality. Some housekeepers assert that they can have no "luck" in bread-making; their loaves are always heavy, or sour, or doughy, or burnt, and they give up experimenting and become discouraged. As with good materials every one can prepare good bread, there should be no want of success.

Success depends in a great measure upon good judgment, faithfulness and patience in working, and in using the right materials. It is quite preposterous to present a fixed recipe and set it up as an infallible guide in this department of household labor. The method of bread-making adopted in my family is as follows:—

Sift five pounds of good flour, and put it in an earthen pan suitable for mixing and kneading. Have ready a ferment, or yeast, prepared as follows: Take two potatoes the size of the fist, boil them, mash and mix with half a pint of boiling water. A fresh yeast-cake, of the size common in the market, is dissolved in water, and the two solutions mixed together and put in a warm place to ferment. As soon as it commences to *rise*, or ferment, which requires a longer or shorter time, as the weather is warm or cold, pour it into the flour, and with the addition of a pint each of milk and water, form a dough, and knead for a full half hour. Form the dough at night, and allow it to stand until morning, in a moderately warm place; then mould and put in pans, and let it remain until it has become well raised; then place in a hot oven and bake.

The points needing attention in this process are several. *First*, the flour must be of the best quality; *second*, the potatoes must be sound and mealy; *third*, the yeast-cake is to be freshly prepared; *fourth*, the ferment must be in

just the right condition; *fifth*, the kneading should be thorough and effective; *sixth*, the raising of the dough must be watched, that it does not proceed too far and set up the acetic fermentation and cause the bread to sour; *seventh*, after the dough is placed in pans, it should be allowed to rise, or puff up, before placing in the oven; *eighth*, the temperature of the oven, and the time consumed in baking, have much to do with the perfection of the process.

If this method is followed, with the exercise of good judgment and ordinary skill, white bread of the highest perfection will be uniformly produced.

Unfermented, or "cream-of-tartar" bread, is never placed upon the table in my family. There are special dietary or sanitary reasons for its exclusion. All "quick-made" bread is usually prepared in haste, and the adjustment of acid and alkali is apt to be imperfect. Not one pound in a hundred of cream of tartar sold in the market is free from adulteration. In ten specimens procured from as many different dealers, in a town of ten thousand inhabitants, I ascertained by analysis that the *least* percentage of adulterating material was twenty-two per cent., and several were over seventy per cent. The "yeast powders" so common in the market are composed of acids in association with alkaline carbonates, usually bicarbonate of soda. If tartaric acid, or cream of tartar is used with the soda, there remains in the bread, after baking, a neutral salt, the tartrate of soda, which is diffused through the loaf and is consumed with it. This salt has aperient properties,—in fact is a medicine; and thus, at the daily meal, those who use bread made with "powders," or with cream of tartar, are taking food and medicine together.

Several years ago, Prof. Horsford, of Cambridge, proposed substituting phosphoric acid for the tartaric, and this excellent idea has been put into practical effect in the production of yeast powders. In the use of this acid, *phosphate* of soda would remain in the loaf, and as this is made up of the element which we lose in sifting out the bran from the flour, it must prove healthful, or at least unobjectionable. But bread prepared by *effervescing* powders is at best a poor substitute for that which results when the dough is raised through the agency of vinous fermentation—regular yeast, in some of its forms, being employed. Effervescents may be used in exigencies, which occasionally occur, but it is hoped that the good housewives in our country do not, in their bread-making, habitually depart from the good old way of raising the loaf by panary fermentation.

It is a noticeable fact, at bread exhibitions, that no specimens of whole meal, wheaten, or corn bread, are offered for premium. It is presumed that the premiums of societies are intended to include these forms of the "staff of life," and it is a matter of regret that none are usually presented. There is manifestly a perversion of sentiment, or fashion, as regards bread made from the unbolted meal of wheat, which ought to be corrected. Why, upon the tables of farmers, the white flour loaf should usurp the place of the darker, but sweeter and more healthful one from the whole meal, is a question of no little interest and importance. In the Eastern States but few soil cultivators raise this noble grain in quantities large enough to meet family wants, and it is probable, if the reverse of this were true, the grist would be carried long distances to a mill with a bolt, to separate the fine flour.

If there is any one form of bread more delicious than another, or more conducive to the sustentation of the physical and intellectual powers, it is that from unsifted wheat meal; and every owner of land should include this grain among his crops, that he may have the bread fresh and in its highest perfection. A generous dressing of finely ground bone will put almost any field in condition to grow a profitable crop; and in these days, when flour of the better sorts commands such enormous prices, there seems to be no good reason why farmers should not resume the cultivation of wheat in all parts of our country.

Corn bread is also excellent and most nutritious. It contains a large amount of oil, not found in other grains, which adds greatly to its value. There is far too little of this used in our families. The old-fashioned dish of corn "pudding and milk" is now nearly as obsolete as that of "bean porridge;" and may we not, with much reason, attribute the physical degeneracy of the present race to the radical changes in the forms of food? Regarding the matter from a chemical and medical point of view, it certainly would be difficult to select better or more healthful forms of human nutriment—forms so well calculated to build up and sustain a "sound mind in a sound body," as the two named above, once so popular, but now banished from our tables. They were easy of digestion and assimilation, and contained all the chemical substances, or organic and inorganic constituents, needed to nourish the body and mind. Certainly, white flour bread, cake and condiments, are poor substitutes for the sensible, but plain dishes of our fathers and mothers a half century ago.

[*Communicated to Boston Journal of Chemistry.*]

MINERAL COAL.

BY R. B. HITZ, M.D., WASHINGTON, D. C.

Familiar as we all are in this country with this great staple of its business and trade, and brought home to our firesides as it is every hour of our lives, the keen edge of our own curiosity may well be turned and blunted by unceasing contact with so hard a subject.

Still, even among ourselves curious questions are often asked, and ideas, new or old, are thrown out as food for thought; and sometimes a crude theory is hazarded by some adventurous mind, and becomes the subject of merriment or of brief discussion, and is soon forgotten. We can readily imagine, therefore, with what unfeigned curiosity an entire stranger to the subject would examine the first specimen of coal presented to his view.

Its appearance alone would excite his close attention. The fact that it is used so extensively for fuel would add a deeper interest to the article, and that it is found in so great abundance, evidently laid up in store for man between the rocks of the earth, would lend a still deeper interest to the mysterious subject. How could he resist the promptings of a curiosity thus excited, and with what zeal would he inquire and demand a knowledge of every fact respecting it?

What is mineral coal? What is its substance? Of what material is it composed? are questions that would first arise in the mind of such an inquirer, and if he were only told that it is composed principally of *carbon*, he might feel but very little enlightened. To pursue the subject further, he would have to learn that the early chemists gave the name of *carbon* to all that part of common charcoal which burns, and that they attempted to distinguish between its main inflammable substance and the impurities found in its ashes after combustion. But this information might still be unsatisfactory. He might regard these impurities as accidental, or suppose they had been carried into the wood by the ascending sap of the original tree, for in the sap of wood the chemist finds certain salts of the earth, with *iron* and *silex*, and these are found in the ashes of the coal.

We see, then, that in charcoal we have not pure unadulterated carbon; and how far its appearance, properties, and characteristics are modified or changed by these impurities is impossible for us to know. We know that iron is the great coloring matter of Nature, in which she dips her mysterious pencil and paints all her handiwork; but how iron or any salts may modify the nature of carbon *no one* knows. Charcoal is not, therefore, pure carbon. It is only found in the precious diamond of the jeweller.

In that brilliant gem we behold a substance, in appearance, very different from charcoal, and apparently not possessing one of its properties. Diamonds are found in the loose diluvial sands of rivers and plains, and are washed from mountains of granite and other primitive rock. So *rare* are they, that one weighing less than an ounce was sold to the Duke of Orleans for more than one hundred thousand dollars. Another weighing only about 2¼ ounces is now among the crown jewels of Queen Victoria, and cost the British Government nearly nine millions of dollars. So *hard* are they, that no other substance has been found to scratch or cut them; and the consequence is, that they are shaped and polished only by rubbing them together, or by using upon one the grit of another, pulverized for that purpose. As to light, it possesses a high refractive power, thus indicating its vegetable origin. It is a non-conductor of heat and electricity, is unaffected by acids or alkalies, and will not volatilize in any heat that can be applied. Its beauty as a gem consists in its power of absorbing the sun's light, and of giving it out afterwards in beautiful phosphorescence. In a word, it is pure *crystallized* carbon, so very different from charcoal in all its aspects, that we must have the very strongest proof before we can admit that they are substantially one and the same substance. And what is the evidence of this fact?

The first test is a very simple one. If a diamond be enclosed in a wrought iron shell or ball, and the whole heated red hot, upon opening it nothing of the diamond is to be seen; but upon examining the inside of the iron ball, its nature is found to be entirely changed. Before it was wrought iron, soft and malleable; now it is steel, showing clearly that the diamond is but pure carbon, and that it has entered into combination with the iron and changed its nature, as carbon always does; for if a small piece of charcoal be put in the ball and heated as before, the same result follows, except that the impurities of the charcoal are left in the shell as ashes, while the nature of the iron is changed, as in the case of the diamond.

There is another test to be added to the foregoing, but to understand it some of the most prominent qualities of oxygen must be borne in mind. And the following facts will prove conclusively that the process of combustion is only the oxidation of the substance consumed. A small measure of water may be entirely decomposed by a galvanic battery, and its original elements proved to consist of two distinct gases, oxygen and hydrogen, each differing from the other in almost every particular, except their gaseous form; and yet, when again mixed in the same proportions as in water, they retain that form, and do not become water by mere contact. To combine them to form water, heat must be applied; and if this be done only by a heated wire, an explosion occurs, and the whole is instantly changed to water. Now what is the chemistry or philosophy of this change? Clearly this: the hydrogen gas is only oxidized, and the oxygen has united with it so rapidly as to disclose the latent heat in both gases, and in such abundance as to produce light.

By putting such facts as these together, and by reading their meaning aright, we are enabled to see clearly what the process of combustion is. It is the oxidation of whatever substance is burned.

Differing then, as these two gases do, so widely from each other, these experiments are of great importance. They present undeniable evidence that the diamond is the only specimen of pure carbon found to exist, and that charcoal is the next purest, having only about two or three per cent. of impurities. In like manner careful chemical analysis proves that *anthracite coal* is the next purest form of carbon found in large quantities. A fine specimen of it contains about 95 per cent., while about 5 per cent. consists of water, sand, sulphur, alum, iron, etc., but in various proportions. From this the bituminous coal differs essentially. If we go to one of our gas works, we see it there in the process of distillation, and the chemical changes going on afford ample material for thought. The main products of this distillation are *gas*, *tar*, and the *coke*.

The gas is collected in the gasometer and distributed through the town or city, and known as carburetted hydrogen. In its pure state hydrogen gas burns with a faint light and a bluish white flame, and it is rendered

useful for lighting purposes only by the carbon it carries off from the coal.

Bituminous coal, upon distillation, produces carburetted hydrogen gas, *tar*, and carbon in coke; while wood, treated in the same manner, produces the same gas, a similar tar, and carbon in charcoal. These resemblances long ago produced in the minds of scientific men strong impressions that wood was the origin of coal, and further investigations since have strengthened these conclusions into the strongest convictions. For example: charcoal, pure and perfect, is often found in the middle of anthracite coal, and in the deepest beds, and sometimes the charcoal seems to run almost imperceptibly into the anthracite.

Again, if a thin flake of anthracite, rubbed down until it is semi-transparent, is placed between a microscope and a powerful light, the vegetable structure of its cells is unmistakable; for the cells are characteristic of the labors of the Creator in the wood of forests, just as the cells of the honeycomb are characteristic of the labors of the bee.

Dr. McCullock also, by heat and great pressure, converted wood into a substance so strongly resembling mineral coal, that he no longer doubted the vegetable origin of the latter.

And last of all, beds of cannel coal have been found to contain whole trees, with roots, branches, leaves, and even seeds, converted into perfect coal of that quality. It differs from other coal principally in form, weight, and structure, and yet it is so clearly nothing but mineral coal, that all further question as to the vegetable origin of the latter seems to have been abandoned. Even the unlearned workmen, seeing so many evidences of this in the impressions of the coal strata, and otherwise, are also impressed with the same convictions as to its origin. But this fact conceded, there are still many interesting questions to be solved.

Where could all this vegetable matter necessary to form such extensive coal beds, and so many of them, have come from? This question will be considered in the next number of the *Journal*.

[To be continued.]

Chemistry Applied to the Arts.

FACTS ABOUT METALS.

Spectrum analysis has already revealed the existence of four new metals, which, but for this mode of examination, probably might never have been discovered.

Cæsium was first discovered by Bunsen in the Durckheim mineral spring, one hundred gallons from which yield one grain of the metal. A sample of lepidolite from Maine, yielded twenty-four per cent., and a rare mineral called pollux, has yielded thirty-two per cent. of cæsium. This metal is recognized by giving two bright blue lines in the spectrum.

Rubidium was also discovered first in the above-named spring, by the same process and the same chemist, but in larger quantity than the cæsium. It gives two violet lines and two red lines to the spectrum.

Thallium was discovered by Crookes in certain sulphur ores, and is most readily obtained from the flues attached to the burners of the sulphuric acid chambers where pyrites are employed. It is very dense, and resembles lead in general appearance. It gives a beautiful bright green band of intense brilliancy.

Indium was first detected by Reich and Richter, but has been more fully investigated by Winkler. It is found in the zinchlende of the Freiburg mines. It resembles lead in softness and fusibility, but in color is white, resembling platinum in general appearance. It is not oxidized by the air, and burns at a red heat with a violet-blue flame. Its spectrum is indigo blue.

Pure iron, according to Stahlschmidt, who was the first to prepare it, is a silver white metal, so soft that it may be readily cut with a knife.

A thin shell of a metal, such as copper, brass, bronze, silver, gold, etc., which from its costliness may not be available for a desired purpose in solid form, may be filled in with molten iron without melting or even tarnishing, if it is immersed in water. The utility of this method is obvious in cheapening ornamental furnishings of almost all kinds. Another method for coating iron with copper, is to plunge it into a boiling solution of a compound of copper with an organic acid (such as the double tartrate of copper and potash) with excess of alkali, and hold it with a brass wire during the immersion, which may be longer or shorter according to the thickness of coating desired.

The effect of phosphorus in copper, in very minute proportions, impairs its value as a conductor of electricity, while it increases very much the tenacity of the metal and its value in manufactures.

Two and a half ounces of magnesium are equal in light-giving power to twenty pounds of stearine. It burns as readily in carbonic acid gas as in air.

The raw copper ore, worked in Swansea, contains about fifty per cent. of sulphur, and it is calculated that some of the melting furnaces discharge into the atmosphere from their chimneys, one thousand tons of sulphuric acid per week.—*Scientific American.*

Cleaning Glass.—A method of cleaning glass, which may be useful where other methods fail, is given in the Appendix to the second edition of Major Russell's "Tannin Process," published by Robert Hardwicke, Piccadilly. Dilute the ordinary hydrofluoric acid sold in gutta-percha bottles with four or five parts of water, drop it on a cotton rubber (not on the glass), and rub well over, afterwards washing till the acid is removed. The action is the same as that of sulphuric acid when used for cleaning copper; a little of the glass is dissolved off, and a fresh surface exposed. The solution of the acid in water does not leave a dead surface on the glass, as the vapor would; if a strong solution is left on long enough to produce a visible depression, the part affected will be quite bright. This method is recommended in some cases for cleaning photographic plates, but we should think it might also be useful in cleaning the insides of bottles, flasks, etc., which have got stained through use.

Preservation of Sulphuretted Hydrogen Solution in the Laboratory.—At the last meeting of the Pharmaceutical Society of Paris, M. Lepage, of Gisors, brought forward a process which he has adopted for preserving solutions of sulphuretted hydrogen. All chemists know that this useful reagent cannot be preserved long in aqueous solution. The author has adopted, for some years, an artifice which enables sulphuretted hydrogen solution to be kept for twelve or fifteen months with scarcely any loss of strength. Instead of using water, he saturates a mixture of equal parts of pure glycerine and water with sulphuretted hydrogen gas, and uses it in the ordinary manner. None of the reactions are interfered with in the least, whilst the solution possesses almost perfect stability. The dilute glycerine dissolves less gas than distilled water will; representing the solubility in the latter liquid by 100, that in the former will be 60.

Glycerine likewise prevents solution of sulphide of ammonium from becoming colored, and M. Lepage believes that it has a similar action on the sulphides of potassium and sodium.

DRILLING GLASS.

In the *Chemical News* of April 19, there is a description by Mr. Spencer of the old and well-known method for drilling glass by means of a file wetted with oil of turpentine. Some years ago I read, in a German periodical, of another means for the same purpose, viz., dilute sulphuric acid; and I found it, on trial, to answer much better than the first. Not only, it appears, is the efficacy of the cutting tool more increased by sulphuric acid than by oil of turpentine, but also, strange as it seems, the tools (files, drills, etc.) are far less rapidly destroyed by being used with the acid than with the oil. I also found it stated, that in the engineering establishment of Mr Pintus, at Berlin, glass castings for pump barrels, etc., were drilled, planed, and bored, just like iron ones, and in the same lathes and machines, by the aid of sulphuric acid. As to drilling, I can fully testify to the efficacy of that method. Whenever I want, say, a hole in the side of a bottle, I send it, along with some dilute (1:5) sulphuric acid, to the blacksmith, who drills in it, with a hand brace, a hole of ¼-inch diameter. This hole is then widened to the required size by means of a triangular or round file, again wetted with the acid. I also find a great help in the latter when making graduations on litre flasks, etc. There is hardly any smell perceptible during the work, which proves how little the acid acts upon the tools, undoubtedly owing to their being tempered; but each time after use I take the precaution to wash and dry the files at once, and I have, so far, observed no sensible deterioration in them.

G. Lunge, Ph. D.

Separation of Cadmium from Zinc.—Add a considerable excess of tartaric acid to the solution containing these two metals. Then add solution of caustic soda until the reaction is decidedly alkaline, and after dilution with much water, keep the solution in a state of ebullition for several hours. Only the cadmium is deposited. The zinc may be separated from the filtrate by sulphide of ammonium.

Separation of Cadmium from Copper.—Well wash the precipitated sulphides, and then dissolve them in hydrochloric acid to which is added chlorate of potash. Precipitate the solution by an excess of potash, and dissolve the precipitate in hydrocyanic acid. This will form a solution of double cyanides, from which sulphuretted hydrogen precipitates the cadmium, but not the copper. Or the solution of the sulphides may be treated as in the case of cadmium and zinc, and the filtrate containing the copper oxidized with aqua regia, and precipitated with caustic potash.

Copper and cadmium may also be separated by precipitating the former with sulphocyanide of potassium, after having first reduced it with sulphurous acid.

CEMENT CISTERNS FOR WATER.

I find among the answers for correspondents in No. 386 of your valuable paper, an excellent suggestion to J. Y. S Permit me to call your attention to the use of hot coal-tar for preventing the contamination of the water by the cement. It is a cheap and effective means of preventing what is complained of, and is not a fancy. Experiments made by Captain de Bordes, of the Netherlands Royal Engineers, and myself, many years ago, have proved that even from hydraulic cement, which sets and hardens in a few hours, for days after lime and other salts are dissolved out by pure distilled water in very appreciable quantity. In the kingdom of the Netherlands in many parts, and especially in portions of the provinces of Zealand, North Holland, and Friesland, no other water than rain water is in general use for domestic purposes, because, like as at Amsterdam, Flushing, the Helder, and other places, all the water of canals, rivers, etc., is either brackish or decidedly salt. Large cisterns built underground, in order to prevent foul infiltrations of surface water, but which have to be laid entirely in strong cement (hydraulic as it is termed), are used to keep the rain water for the use of barracks and large establishments. These cisterns are often lined with Dutch glazed tiles, fixed in cement, but it has been found cheaper to simply line the cisterns with cement, and after it is dry to give two coatings of hot coal-tar. I suggested lately the same to an engineer, who, having applied it to a cistern of his own in his house, found it to answer perfectly. For a few days the water had a slight tarry taste, which is now entirely gone.—Dr. Adriani, in *Chemical News.*

Extraction of Indium from the Products of the Roasting of Blende.—The flue dust which condenses in the chimneys of the zinc works of Gosler contains indium. The author has operated on 100 kilogrammes of this dust, which contains about one part of oxide of indium in 1,000. To extract this metal, boil the deposit for half an hour with hydrochloric acid, and digest the clear liquid with pieces of zinc for six hours at the ordinary temperature. There is then deposited a black metallic powder, which is washed with water, and which contains copper, arsenic, cadmium, thallium, and indium. By boiling this with a concentrated solution of oxalic acid, a solution of cadmium, thallium, and indium is obtained; the latter is precipitated by ammonia, and the precipitate is then boiled with ammonia and afterwards with water, until the washings contain no more thallium. The oxide of indium is then almost pure, and only contains traces of iron, from which it may be freed by Dr. Winckler's method, given in the *Chemical News*, vol. xiv., p. 157.—*M. Boettger*, in the *Journal fur praktische Chemie*, t. xcviii. p. 26, No. 9.

Chemistry Applied to Agriculture.

"OUR FARM."

We have, during the past three or four years, endeavored to escape from the exacting and exhausting labors of the laboratory, by fleeing to the country and engaging in the delightful and healthful occupations of the farm. We find, however, that we have hardly succeeded in leaving behind us the odors of the city workshop, and that the June atmosphere of the farm premises is sometimes tainted with the unseemly exhalations of acids and gases. It is pretty evident, in looking around upon the piles of bones, boxes of salts and alkalies, and carboys of acids, that we have, as a matter of *recreation*, established another laboratory in the country, for special rather than general purposes. In truth, we have upon our hands an *experimental farm*, and are making and using a good deal of what our farming neighbors call "'pothecary stuff," in the way of special fertilizers.

Under the above heading of "Chemistry Applied to Agriculture," we intend, from month to month, to present some of the results of our experience and experiments in farming. We do not expect to extend much the field of agricultural knowledge, but perhaps we may be able to throw out some suggestions which will be of service to the great interests of husbandry. "Our Farm" embraces an area of about eighty acres, and is situated upon the borders of one of the most charming of New England lakes, "Kenoza Lake," in Haverhill, Essex County. The poet Whittier was born and reared upon the shores of this lake, and he gave to it its name. The word *kenoza*, in the Indian tongue, signifies *pickerel*—pickerel lake. The farm embraces a good variety of soil, with uplands and lowlands, hill and dale, brooks and meadows. We have a fine peat bog, so deep in some parts that upon sounding with a "rake-handle" no bottom is reached. We also have fruits and flowers, and birds and bees. How delicious is the perfume of flowers, and how sweet the song of birds! Happy is life upon the farm; delightful and prosperous are all its pursuits. Truth compels us to say, however, that beside the singing birds and chirping squirrels, we also have woodchucks, and another kind of animal, the *Mephitis Americana*, a little black and white creature, which so closely resembles a kitten that he is often mistaken for one (much to the grief of the person making the mistake). These animals sometimes nip off our pea blossoms, and tread down our clover, and root up our wheat. We have also a black battalion of very cunning, sagacious crows, hanging on the outskirts of the woods, ready to pounce upon our corn and wheat fields when opportunity offers. These are slight disturbing ripples upon the generally smooth current of farming affairs, just annoying enough to show that every pursuit has its dark shadows and slight disappointments. True, farmers long in the business are able to make out a pretty formidable list of evils and annoyances, but so long as they are not generally believed it is useless to allude to them.

But, in speaking of "Our Farm," it was not designed to go much beyond the simple announcement of the fact that we owned one, that we might properly claim the right of talking about farming matters occasionally in the *Journal.*

"What Chemistry has Accomplished for Agriculture."—We regret that we have been unable to send copies of this address to all who have desired them. The edition printed independent of the *Mass. State Report* was small, and has been entirely exhausted. In a work just issued by Messrs. Williams & Co., of this city, called *Chemistry of the Farm and the Sea*, by the Editor of the *Journal*, will be found those portions of it which are of general interest to husbandmen.

☞ Some objection has been made to the use of flour of bone, on account of its extreme fineness, it being liable to be blown away by even a light wind. This can be obviated by moistening it with water previous to using it. A barrel of bone dust may be turned into one part of a divided molasses cask and just two pailfuls of water added. This, when well mixed with a hoe, affords the right amount of moisture to adapt it for for sowing broadcast or for use in drills.

SUPERPHOSPHATE.

Superphosphate of lime, or that compound formed by dissolving finely-ground bones in sulphuric acid, is a most excellent fertilizer. There is scarcely any land in New England that will not, under its use, render highly remunerative returns, but we cannot depend upon manufacturers for it. Every farmer must make it upon his own premises, and I insist that it can be produced readily, safely, cheaply. Let me present to you the method which I adopt upon my own farm premises.

Take a common sound molasses cask, divide in the middle with a saw; into one half of this place half a barrel of *finely*-ground bone, and moisten it with two buckets of water, using a hoe in mixing. Have ready a carboy of oil of vitriol, and a stone pitcher holding one gallon. Turn out this full of the acid, and gradually add it to the bone, constantly stirring. As soon as effervescence subsides, fill it again with acid and add as before; allow it to remain over night, and in the morning repeat the operation, adding two more gallons of acid. When the mass is quiet, add about two gallons more of water, and then gradually mix the remaining half barrel of bone, and allow it to rest. The next day it may be spread upon a floor where it will dry speedily if the weather is warm. A barrel of good loam may be mixed with it in drying. It may be beaten fine with a mallet or ground in a plaster mill. If several casks are used, two men can prepare a ton of excellent superphosphate after this method, in a day's time. It affords a prompt fertilizing influence, especially upon root crops, even when employed alone. Much less acid is used in this formula than is demanded to accomplish perfect decomposition of the bones; but it is important to guard against the possibility of any free sulphuric acid in the mass.

Another most excellent method of preparing bones for field use, is to dissolve or saponify the gelatinous portion by the employment of caustic alkalies. For this purpose, take 100 pounds, beaten into as small fragments as possible, pack them in a tight cask or box with 100 pounds of good wood ashes. Mix with the ashes, before packing, 25 pounds of slaked lime, and 12 pounds of sal soda, powdered fine. It will require about 20 gallons of water to saturate the mass, but more may be added from time to time to maintain moisture. In two or three weeks the bones will be broken down completely, and the whole turned out upon a floor, mixed with two bushels of dry peat or good soil, and after drying it is fit for use.

This mixture, embracing nearly or quite all the great essentials of plant-food, is one which in its application will afford most prompt and satisfactory results. Its production cannot be too highly recommended.—*Chemistry of the Farm*, *by* Dr. J. R. Nichols.

☞ When superphosphate is made upon the farm premises, as it always should be, it is better to prepare it the season before it is to be employed, as time is afforded for perfect drying, and it can be ground more easily It may be placed in rough shallow boxes and placed in the sun, removing it to the shed or barn at night, or in rainy weather.

THE CHEMISTRY OF STOCK-FEEDING.

In the course of a lecture on the above, delivered to the Newbury Farmers' Club, Mr. Warrington, of the Royal Agricultural College, Cirencester, has given details of some original researches of great practical value, with an outline of the chemistry and physiology of nutrition, respiration, and muscular force. The question of obtaining the maximum mechanical work from an animal by judicious feeding was left untouched, we hope, only to be exhaustively treated on a future occasion. The following remarks apply to food as a means of increasing the animal frame. In the sheep are the following constituents:—

	Store Sheep.	Fat Sheep.	Very Fat Sheep.
Nitrogeneous substances	15.7	13.0	11.5
Fat	19.9	37.9	48.3
Mineral substances	3.4	3.0	3.1
Water	61.0	46.1	37.1
	100.0	100.0	100.0

It will be seen that as the fat progressively increases the nitrogeneous substances and water decrease. The more rough and practical statement is,

Nitrogeneous substances = muscle
Fat = fat
Mineral substances = bone,

being sufficient for stock-feeding considerations. The fat and muscle both increase, this increase ultimately having a much smaller proportion in a fat animal than in a lean one. Suppose the sheep weighs 100 lbs., and after fattening weighs 150 lbs., what is the composition of the 50 lbs. put on? Increase of a sheep while fattening,—

Nitrogeneous substances	7.5
Fat	63.0
Mineral substances	2.5
Water	27.0
	100.0

The increase in other animals is very similar. The proportionate increase by bulk of the muscle will be different from that by weight, by reason of the association of the water with it. The animal economy is shown to be destructive, and the foods commonly used to supply aliment for animals have the following composition:—

	Swedes.	Meadow Hay.	Barley.	Beans.
Water	89.0	16.0	16.0	16 0
Nitrogeneous substances	1.4	9.6	10.6	25.3
Fatty matter	.3	2.5	2.0	1.5
Sugar, starch, cellucose, etc.	7.8	41.7	64.7	49.6
Woody fibre	.9	24.2	4.5	4.5
Mineral matter	.6	6.0	2.2	3.1
	100.0	100.0	100.0	100.0

How do these percentages determine the fattening of an animal? Take an animal not increasing in weight, what purposes does its food serve? 1. Renovation of tissue. 2. Production of muscular force. 3. Production of heat. To give an idea of the second series' demands, we must note that a vast deal of muscular work is done within the body. It has been calculated that the work of the human heart in one day would suffice to raise its own weight ninety miles, other muscles acting to preserve the various positions of the body. In the case now considered, the whole of the food will be consumed in supplying these three requisites; all the nitrogen not so used requires evacuation as manure—is not stored up. The excess of fat is stored up. Mr. Warrington remarked that, "If the chemist cannot imitate the constructive powers of a plant, neither can he imitate the destructive powers of an animal; he can only observe and admire." Excess of starch, sugar, etc., cannot be stored as such; they are converted into fat and so stored. The following experiment is interesting: Two pigs from the same litter, and of almost equal weight, were taken; one was killed and found to contain 22 lbs. of fat. The other was fed for ten weeks longer, and then killed; it yielded 78 lbs. of fat: 56 lbs. of fat had thus been stored up in the ten weeks; the food of the pig during this time had, however, contained only 14 lbs. of fat; 42 lbs. had thus been actually formed by the animal. It is possible, also, that nitrogenized food may form fat; as a result where an excess of nitrogeneous food is supplied, a portion is stored up as muscle, wool, etc. while the excess of sugar and starch is converted into fat. It is important to remember that it is only the excess of food which is stored up as increase. Chemical calculations have likewise shown that two and a half parts of starch are about the smallest quantity from which one part of fat could be produced; two and a half is thus said to be the "starch equivalent" of fat. As would be expected, the manure from fattening animals is most valuable; about 90 per cent. of the nitrogen in the food appeared in the manure; the more nitrogeneous the food, the more valuable the manure. In liberal feeding a larger proportion of the food is excess; liberal feeding is thus true economy. Fattening is most economical when done in the shortest time. An ox weighing 1000 lbs. or more has through its whole life to be kept at a temperature of about 98° Fahr. by the combustion of food, which costs the farmer a good deal, but as thus consumed makes no return; the sooner the animal can be made prime, the smaller is this expense. Experiments at Rothamsted have taught us that, even when an animal is fattening under favoring circumstances, one half its food is consumed to supply heat, etc., and does not minister at all to the formation of increase. The whole of these considerations show that for the farmer to judge what is really the cheapest food in different states of the market, he must know the chemical composition of foods. We hope, with Mr. Warrington, that the time will not be far distant when farmers will be the philosophers that theoretically they should be.—*London Chemical News*, March 15.

SPECIFIC HEAT OF SOILS.—A German chemist has determined with great care the specific heat of seventeen soils. He finds soils free from humus have the lowest specific heat, whether they consist of sand or lime. The more rich a soil in humus, the higher is its specific heat. Loamy soils holding much water, also have a specific heat. The variation in so important a physical property of soils may be of considerable importance to agriculture. A plant of a certain kind may be unable to grow on a soil of low specific heat, however rich the soil may be. This is a point worthy of investigation.

☞ The farmer who stalls his cows at night, during the summer months, secures a valuable amount of manure thereby. If the barn has a properly-constructed cellar, and peat or soil is used freely as an absorbent, the actual money value of the liquid and solid excrement from each cow, during the season, exceeds *twelve dollars*. By allowing the animals to remain in the yard, the value does not reach *five dollars*. Actual experiment gives these results.

Boston Journal of Chemistry.

BOSTON, JULY 1, 1867.

FIRST NUMBER OF VOLUME SECOND.

We present to our readers in this issue the first number of the second volume of the *Journal*. Some changes have been introduced both in the name and general arrangement of the reading matter, which we hope will meet with the approval of our friends. We give a table of contents upon the first page, and also arrange topics under appropriate heads, which is certainly a convenience. Chemistry, as applied to agriculture and the arts, forms new departments, which we trust will not be without interest to all classes of readers. We designed to change the *form* of the *Journal*, but upon further consideration concluded not to make the change for the present year. A great accession has been made to our list of subscribers during the past two months. We solicit the co-operation of physicians, druggists, chemists, etc., in extending our circulation. We now publish the *Journal* upon the first of each month, at the *low price of 50 cents per annum*.

It furnishes reading adapted to all classes, and we depend upon our friends to extend its patronage so that we may increase its value and usefulness. It is the cheapest scientific journal published in the world, and the only one specially devoted to chemistry in the United States. We shall endeavor to make it interesting and useful.

BISULPHITE OF SODA AS A PROPHYLACTIC.—We are informed, by a medical friend connected with a dispensary in this city, that this salt has been extensively used as a prophylactic in *scarlatina* with most remarkable success. In about seventy families where one or more cases of the disease occurred, the bisulphite was administered to the children not affected, and in but two or three instances did other cases occur, and in them the illness was very slight. From very diligent inquiry among medical men who have largely employed the bisulphite of soda, it is evident that it possesses prophylactic powers in scarlatina and zymotic diseases generally of a marked character. This fact is of great interest to physicians and their patients.

COMMON TABLE-SALT.—It is certainly a curious chemical fact that the substances required to form this article are both of them poisonous,—chlorine and sodium. No one can use either of these articles separately with safety, and yet, combine them together and they form a substance necessary to health, and one found upon every table.

CONTRIBUTIONS FOR THE JOURNAL.—We are under obligations to many friends for sending us communications. We shall be pleased to receive interesting articles of a chemical, medical, or pharmaceutical character. They should be brief, comprehensive, and prepared with great accuracy and care. It should be remembered by those residing in distant States, Ohio, Illinois, Indiana, Missouri, Minnesota, etc., that our circulation in those States is very large, and articles of special local interest in those sections will reach a larger number of medical and scientific readers than can be reached through any other publication.

LIGHTNING RODS.—A copper rod is preferable to one of iron. A rod presenting a large amount of conducting surface, and made firm by corrugations, is now manufactured by a party in this city, which fully meets our approval. We presume coppersmiths in any part of the country can make them. Glass insulators are of no special consequence. Any secure way of fastening the rod to the building is all that is necessary. A building need not be covered all over with rods, with numerous points projecting upwards. This is a perfectly useless expense. Two good copper rods rising above the chimneys of an ordinary dwelling is a perfect protection, if the *ground terminations* are properly attended to. This point is very important, and the owners of buildings should personally attend to having the rods pass into the earth eight or ten feet, or until a place of permanent moisture is reached.

NEW DRUG MILL.—A mill, or pulverizer, of novel and ingenious construction, has been invented by Dr. James D. Whelpley and Col. Jacob J. Stone of this city. These gentlemen have introduced a new process for working metallic ores, which seems destined to supersede all other methods, and the mill in question forms a part of the apparatus. The scientific skill and persistent labor bestowed upon these inventions, which involve both chemical and mechanical means, reflect great credit upon the inventors.

The pulverizer may properly be called an air mill, and the principle of pulverization consists in the attrition of particles subjected to its action. A rapid rate of revolution is communicated to substances placed in the peripheral space of the mill, and they are speedily reduced to a very fine dust, which is blown into a box or chamber by an air current. The most refractory substances, not malleable, like bones, quartz, shells, mineral coal, etc., are rapidly reduced to powder in this mill.

It has been found applicable to the pulverization of drugs, roots, barks, etc., and the inventors are having constructed some mills propelled by man power, which will be of great service to druggists, chemists, etc. They will supply a great want, and afford facilities to druggists for bringing articles into the form of a fine dust rapidly and with small labor. The cost will probably be such as to bring them within the reach of most in the trade.

SODA WATER.—Priestly was the first who impregnated water with carbonic acid gas. This was about the year 1767, or one hundred years ago. He found that fixed air could be liberated from chalk or marble by the action of oil of vitriol, and he contrived apparatus for impregnating water with its own weight of gas, and thus manufactured the first soda water ever used.

He ventured to recommend the use of a gas, as a beverage, which produced the most deadly effects when breathed into the lungs. A gas which is deleterious to inhale, is healthful and grateful when received into the stomach. This is a curious physiological fact.

NEW METHOD OF PRODUCING CAUSTIC POTASH AND SODA.—It affords much gratification to be able to announce the discovery of a new method for the cheap production of potash and soda. By the discovery of a new method of producing fluosilicic acid on a large scale and at low cost, it is made, with great advantage, to take the place of sulphuric acid in the great industries of potash and soda. This discovery is first made known through the chemical department of the Paris exhibition.

M. Tessie de Mothay, of Sarrebruch, France, have constructed furnaces on a great scale for the production, *first*, of fluoride of silicium and fluosilicic acid; *second*, of caustic and carbonate of potash, extracted by the action of fluosilicic acid from the chloride of potassium of the Stasfurth mines. By means of the apparatus employed, they are enabled, at the present time, to deliver *a ton of potash per day* at a cheap rate to the trade.

In Class 51, of the Great Exhibition, is exhibited a complete plan of the works, with bottles containing fluosilicic acid of 180° of fluosilicate, of potash, of soda, of barytes, etc.

Chemists only a few years ago would have refused to believe that one could procure so easily and certainly, and on so large a scale, fluosilicic acid; a product hitherto confined to the laboratory, but now destined to modify, in the most successful manner, one of the most important of modern industries.

To the agriculturist this discovery is full of promise. If potash can be furnished cheaply, it will be of great service to husbandry, as well as to the industrial arts.

☞ The microscopes which have been sent to so many of our patrons are very interesting when used in connection with the evening lamp. By placing the object upon the little lens and holding it up to a bright light, it can be very distinctly seen and studied. Children enjoy the use of the microscope as well as adults, and no more profitable amusement can be afforded them.

A bit of human hair under it discloses the coloring matter and its structure; the dust from a butterfly's wing, the mites from cheese, or the animalcules from water, are very interesting. By taking a glass of rain-water and placing in it some tufts of grass or water-cress, and allowing it to remain in a warm place until it ferments, or becomes putrid, the little animals will be developed in great abundance. As much of the water as can be held upon the head of a pin and placed upon the glass, will afford a fine display.

☞ It is remarkable that the State authorities should be required to *destroy* seized alcoholic liquors. By the simple process of distillation the worthless parts could be separated from the alcohol, and that obtained in a pure state for use in the arts. Poor whiskeys and brandies usually yield from 30 to 45 per cent. of alcohol, the market price of which is $4.00 per gallon. Probably the State loses, by this wanton waste of alcohol, more than $50,000 per annum.

REAGENTS, AND APPARATUS FOR TESTING URINE.—We have arranged some neat cases containing all the reagents and apparatus necessary for qualitative examination of urine. The case contains chem. pure acids. Acetic, nitric, muriatic, ammonia, sol. sulph. copper, liquor potassa, test papers, urinometer, two boxes assorted test tubes, watch glasses, lamp, glass rods, etc. The case is a neat one, and sufficiently strong for all practical purposes. The price is $6.00 for the whole, and the case will be sent to any address by express, upon receiving the price by mail. Directions for testing urine accompany the box.

Chemistry of the Farm and the Sea.—Messrs. A. Williams & Co., the well-known publishers and booksellers of this city, have reproduced, in book form, under the title of *Chemistry of the Farm and the Sea*, the articles published in the *Journal*, *Chemistry of the Sea*, *Chemistry of a Kernel of Corn*, *Chemistry of a Bowl of Milk*, etc. The unusual favor with which these familiar chemical essays were received by the readers of the *Journal*, and by the readers of numerous other publications into which they have been copied, induced us to consent to their reappearance in the more convenient form of a book. They occupy, however, but a small portion of the volume, as three essays which have not appeared in the *Journal* fill two thirds of its pages. These, *Chemistry of the Farm*, *Chemistry of the Dwelling*, and *Chemistry of the Sun*, are in part new. The latter essay has not before appeared in print. Our aim has been, in these essays, to present the interesting and wonderful facts of science in a familiar way, so as to interest and instruct those not specially acquainted with its technicalities. The book is elegantly printed and bound, and may be had of Messrs. Williams & Co., or of most booksellers in cities and towns.

Solution of Carbolic Acid and Carbolate of Lime.—These articles have had a very extended trial as disinfectants in this section, and are proved to be invaluable. The solution is found by undertakers to preserve corpses longer and more perfectly than any other agent. Physicians will perform a good service by calling the attention of this class to the great merits of Sol. of Carbolic Acid. We have it ready prepared in gallon and three-gallon demijohns of the proper strength, with full directions for its use. Carbolate of Lime is excellent for stables, cesspools, cellars, and for disinfecting all sources of impurity. We have this in boxes of 10 lbs., which cost but $1.25 per box.

Book Notices.

We have received from *Lindsay and Blakiston*, Philadelphia, the publishers, a *Treatise on the Art of Manufacturing Soap and Candles*, by Adolph Ott, Ph. D. The manufacture of soap and candles in the United States is a great industrial interest, and we are pleased to have placed in our hands a treatise so thorough and complete as is this of Dr. Ott. It is eminently practical, and all the details of the manufactures are given, with many cuts, illustrative of apparatus employed. All interested in the manufacture of soap and candles should procure this book.

We have also received, from the same house, *The Art of Perfumery*, by S. Piesse. This is an exceedingly useful treatise to druggists and perfumers. All the interesting processes employed in preparing perfumery are fully given, and the formulæ for *extracts*, *colognes*, *medicated waters*, are very clearly presented. We presume our druggist friends will be pleased to know that this important treatise is placed within their reach.

L. & B. also have sent us a *Treatise on the Practice of Medicine*, by Edwin R. Maxon, M. D. This treatise was first published in 1861, and has been long enough in the hands of students and the medical profession to have its merits known and understood.

Dr. Maxon's work is used largely as a text-book, and is regarded as very clear and comprehensive in its style and arrangement, and is worthy a place in all medical libraries.

The American Naturalist, a popular Illustrated Magazine of Natural History. Salem, Mass., Essex Institute. The city of Salem is fortunate in having not only an Institute of Natural History, which, in its museum and collections of objects, is hardly second to any in the country, but in having a corps of indefatigable men, young and middle aged, engaged in extending the boundaries of science. The industry and intelligent zeal of these gentlemen is worthy of all commendation, and the results of their labors are of the highest importance to the cause of true science. One of the important *results* is seen in the new magazine, the name of which is given above. It is a most interesting and useful publication, and we most heartily commend it to the attention of our intelligent readers. Terms, $3.00 per year, monthly.

PREMIUMS FOR SUBSCRIBERS.

☞ Any one sending us the names of *three subscribers* with advance pay, will be entitled to receive the *Journal free* for one year.

☞ For *five* subscribers we will send the *petite microscope*.

☞ For *twenty-five*, we will send, in addition to the microscope, a copy of *Stockhart's Chemistry* for students, the best elementary treatise yet published.

☞ For *one hundred* subscribers, we will send a complete set of chemicals, together with test tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimen copies of any one or all the numbers.

Medicine and Pharmacy.

ON THE SEVERAL MODES OF ADMINISTERING COD LIVER OIL.

BY JOSEPH ADOLPHUS, M.D.

Cod oil to many stomachs is exceedingly nauseous, and it is with difficulty that such persons are induced to take it. This is particularly so of the darker shades of the oil. Often it is a severe task on the physician to devise ways and means whereby an intolerant stomach may be induced to retain it.

The greatest objection I have encountered is the complaint many persons make, that they "taste the oil for a long time after taking it." This is induced by three causes: 1st, a deep-seated prejudice against the oil; 2d, a singular state of the nervous coat of the stomach, which prevents the digestion of the oil; and, 3d, from idiosyncrasy. The first is overcome by persistence, cautious management and small doses of the oil. I have often commenced on five drops of oil three times a day, increasing by one or more drops on each occasion, till I have got the stomach accustomed to and tolerate the oil in ℥ss. doses. Three cases in particular, delicate females, who so utterly rejected the oil as to have severe seasons of nausea come on even on "mentioning oil to them."

I commenced by inducing these ladies to take five drops of oil and lime water three times a day. The effect was encouraging. The doses were gradually increased, and in eight days one did take a teaspoonful at a dose. In another the same dose was tolerated in two weeks. And the third succeeded in taking the same quantity in twenty-three days. At the expiration of forty days each took a tablespoonful three times per diem without any effort. These were the worst cases that have fallen under my care.

The second is a specific form of dyspepsia engendered in the submucus tissue of the stomach. The digestive force appears to be seriously disturbed. Acid emitations, or cardialgia, or a peculiar form of neuralgia of the organ occurs, or the patient complains of a disagreeable weight in the "pit of the stomach," or the action of the heart is disturbed both in frequency and regularity. The sympathetic distribution coming from the semilunar ganglion and the lolor plexus and the pneumogastric nerve, form a dense network of nerve-tissue in the stomach. When any derangement is present, more particularly in the sympathetic centres, cod oil appears to be most obnoxious, and increases all the difficulty. This is overcome readily by the acetum opii ("Black drop"), or by acetate of morphia.

I have found the union of the oil with lime water just sufficient to form a soap, and flavored with oil of bitter-almonds, to be an excellent form.

But opium appears to quiet the abnormal condition of the sympathetic ganglion, especially the prevertebral centre in front of the aorta and the plexus of the celiac axis. Saturated tincture of lobelia seeds, in very small dose, *far short* of nausea, with the morphia, act remarkably well in many cases. I have frequently found that giving the oil but once a day, between supper and bed time, for the first week, and then adding a dose two hours after dinner, works well. Chewing a clove before taking the oil prevents the taste being impressed. An excellent remedy is the oxalate of cerium in this state of the stomach. I have repeatedly ordered it, either alone or with extract of conium, with the happiest results. Here I place my confidence. But I never neglect uniting the oil with the lime water.

The third condition must be overcome by adding to the oil its bulk of glycerine. Chloroform thoroughly mixed with the oil by long agitation has overcome the difficulty. But it must never be lost sight of that, whenever any difficulty is experienced in taking the oil, it must be administered in *very small* doses, so as to gradually and cautiously accustom the stomach to the remedy. Furthermore, in many cases, in which the oil was at first exceedingly repugnant and disgusting, by perseverence and the cautious adoption of adjuvants, etc., all repugnance was eventually overcome, and the greatest benefit possible was derived and experienced from its use.

Often it occurs that the oil after its passage from the stomach into the duodenum causes a disturbance in the bowels. I have relieved this by ordering, an hour after the oil is taken, the aromatic spirits of ammonia. At other times small portions of sulphur taken with the oil accomplish the purpose. But these cases are true cases of duodenal dyspepsia, and require treatment for that. To accomplish a cure in such cases I generally order: ℞ Reduced Iron ℈ii., Hypophosphate Lime ʒi., Hydrastine ℈iv. [verberin.—Ed.]; triturate well; take four to eight grains three times a day. A decoction of rhatany taken several times a day works well. But if the tongue is red the hydrochloric acid with the tincture of iron is often the best remedy. If it is white, pasty, or broad and furred, I order bicarbonate of potassa and podophyllin, the latter in one-tenth grain dose, four or six times a day.

In this duodenal disturbance opium and iodine are splendid remedies, and aid the oil digestion greatly. Thus: ℞ opii pulv. gr. vi., iodine gr. ii., ext. nux vomica gr. iv.; triturate well and make into twelve pills. One or two for a dose, repeated as often as needed, but never less than three times a day.

In taking cod oil it must never be forgotten that the diet must be of the most nourishing kind and easily digested. But I cannot close without referring to the flour of malt as a part of the diet, especially of children, where there is any difficulty in the digestion of the oil; the malt flour made into pap with wheat flour and used as a constant food as nearly as is agreeable and consistent, during the first week, and sometimes even as late as into the third.

By this means digestion of the oil will be most happily accomplished. In very many cases I have found that in combining the cod oil and the syrup of the phosphates of iron, quinine and strychnia, that both were heightened in their therapeutic action and tonic effect.

Hastings, Michigan, March, 1867.

ON THE EMPLOYMENT OF NARCEINE.

BY DR. EULENBERG.

The following is translated in abstract from the *Répertoire de Pharmacie*: —

The doses of narceine commonly employed by Dr. Eulenberg for *internal use* were from one sixth to one half a grain; and for *hypodermic use* from one eighth to one fourth of a grain. With healthy persons these doses are generally followed by a slight narcotic effect, without any accompanying disagreeable subjective symptom, such as headache or gastric derangement. When used hypodermically it produced a sensation of burning at the place of puncture, but of little intensity and duration, a sensation in every case less evident than that caused by every other alkaloid (morphia, quinia, etc.). It never had any irritant effect; but in patients with sensitive skins, when the injection was made on the face, it produced an œdematous swelling without redness at the place of puncture, which disappeared in from one to two days, leaving a somewhat sensitive and limited induration. Such an effect has nothing in it of a peculiar nature, as it has been noticed after the injection of other alkaloids, as morphia, for example.

Among the physiological effects of narceine which accompany the narcotism is its action on the circulation; this consists principally (contrary to the action of atropia) in a diminution of the pulse, succeeded some time after by an acceleration. In rare cases, the pulse is accelerated during its employment by twelve to sixteen strokes in a minute. Its action on the cutaneous nervous system appears to resemble that of other narcotics, and produces its effects directly when used hypodermically, and indirectly, by acting on the centres, when given internally. The repeated use of internal doses often produces from one to two stools, sometimes even diarrhœa. On the other hand, it appears to retard the appearance of the menses. M. Eulenberg concludes that, for sedative and hypnotic effects, narceine is preferable to every other substance. Besides its employment in some essentially neuralgic affections, its use is indicated in all cases where pain is a prominent symptom, as in articular affections, phlegmons, ocular lesions (iritis, keratitis, etc.), orchitis, blennorrhagic epididymitis, cystitis cirrhosis of the liver, and in wounds, or after painful operations. In all these cases, narceine, when employed either internally or externally in the doses before mentioned, rapidly lessens the pain, and often produces a sleep of four, five, and even nine hours, — sleep which is soft, tranquil, uninterrupted, and followed by a quiet awaking. These doses never give rise to any derangements or any poisonous effects. Although, by the use of morphia, in numerous cases we obtain the same effects, it often fails; many diseases (especially among women) present, in fact, a kind of idiosyncrasy which renders the employment of morphia impossible; thus, by its internal use vomiting is produced, or else the medicine causes, instead of a refreshing sleep, a state of great excitement, with distressing dreams, delirium, and convulsions; while, in some other diseases, morphia, without appreciable cause, produces only a very slight effect, or one of very short duration. The hypodermic employment of morphia renders it more active and more trustworthy, but it increases in a like degree all the inconveniences, and often gives rise to cephalalgia, faintings, vomitings, or profound collapse; often the sleep is very prolonged (according to Semeleder, fifty-four hours); and sometimes the effects of morphia are prolonged even for some days after the awaking.

Narceine, as an anodyne and narcotic, may be always employed in place of morphia, and is in every respect equal to it in value, and even in a great many cases is to be preferred to it.

M. Eulenberg has not as yet had many opportunities of employing narceine in hemicrania, supra-orbital, trifacial, and crural neuralgias, but every time it was tried it produced a rapid cure. In hemicrania one sixth of a grain, taken at the commencement of the attack, produced a sleep of several hours, followed by an awaking in perfect health. — *London Pharm. Journ.*, Feb., 1867.

Itching of Skin in Various Complaints. — Apply a lotion of bichloride of mercury, ex. g., hydr. bichlor. gr. i., aquæ destill. ℥ v.; alcohol ʒ ij. ft. lotio.; apply this three times a day. The quantity may be increased or diminished according to the effect.

ACTION OF CARBOLIC ACID ON VITALITY.

BY WM. CROOKES, F.R.S., LONDON.

The action of carbolic acid on vitality has been tested in various ways: —

Cheese mites were immersed in water, where they lived for several hours. A few drops of a solution of carbolic acid containing 1 per cent. added to the liquid, killed them instantly.

An aqueous solution of carbolic acid was added to water in which a small fish was swimming. It proved fatal in a few minutes.

A very minute quantity of a weak solution of carbolic acid was added, under the microscope, to water containing various infusoria, such as bacteria, vibrios, spirilla, amœbæa, monads, euglenæa, paramecia, rotifera, and vorticellæ. The acid proved instantly fatal, arresting the movements of the animalcules at once. These animalcules are the almost invariable accompaniments of putrefactive fermentation. The above experiment has been tried with putrid blood, sour paste, and decayed cheese, and in every instance the destruction of vitality and the arrest of putrefaction have been simultaneous.

Caterpillars, beetles, crickets, fleas, moths and gnats were covered with a glass, the inside of which was smeared with carbolic acid. The vapor proved quickly fatal. It allays the pain caused by the stings of bees, wasps, hornets, and gnats, if applied pure, or in strong solution, to the wounded part.

I find it recorded by Dr Lemaire and other observers that carbolic acid vapor will also kill flies, ants and their eggs, lice, bugs, ticks, acari, musquitos, aphides, butterflies, earwigs, woodlice, cockchafers, centipedes, and other insects of this size; its vapor, however, does not appear to be strong enough to act injuriously on animals larger than mice. When such animals are killed with it, their bodies dry up in the air, and resist putrefaction for some time.

From the intense aversion shown by all insects to the odor of carbolic acid, it is probable that the plentiful use of this agent would effectually preserve cattle from those terrible scourges met with in certain parts of Africa, the zimb and tsetse fly. The effects following the bite of the latter have been described to me as being almost identical with the symptoms of cattle plague.

M. Lucien Baird, in speaking of the invasions of the large ants of Mexico, says that when one of their battalions threatens his house, he sprinkles a little carbolic acid in front of it. The army immediately makes a detour to avoid the obstacle.

When an animal is killed by the injection of a saturated aqueous solution of carbolic acid into its veins, circulation is instantly arrested, the blood is not coagulated, and no alteration, either in the shape or the appearance of the globules, is detected under the microscope. The only apparent change consists in the immobility of the globules.

In the *Annales de Chemie et de Physique* for October last, there is a letter from M. Béchamp to M. Dumas, in which it is said that creosote appears to be the agent which most strongly opposes the development of organic ferments, but that it does not interfere with the living ferments or animalcules when they are once developed. This assertion is in direct opposition to all my experiments, about the accuracy of which I have no doubt whatever, having submitted them to repeated tests. The powerful action which carbolic acid exerts on the phenomena of life is the most remarkable property which it possesses. It may be looked upon as the test proper for distinguishing vital from purely physical phenomena, and in most cases its action is characterized by the certainty and definiteness of a chemical reagent. In the presence of carbolic acid the development of embryotic life is impossible, and before its powerful influence all minute forms of animal life must inevitably perish.

It may be considered as definitely proved that the vapor of carbolic acid, in the atmosphere, exerts a special selective power on all minute organisms possessing life. If the contagious matter of cattle plague is possessed of organic vitality, as must be now admitted, it will be destroyed, beyond the possibility of revival, when brought into contact with the vapor. French experimentalists have repeatedly tested the influence of carbolic acid on vaccine lymph. The vaccination with pure lymph was followed by the usual results, but in no single instance was any effect produced by the lymph containing carbolic acid

REPORT OF DR. TYLER OF THE M'LEAN ASYLUM FOR THE INSANE.

We have read Dr. Tyler's Report with much interest, and present to our readers the following extracts regarding the influence of alcoholic liquors in producing insanity. The Doctor remarks: —

"The excessive drinking of wines and ardent spirits has brought insanity upon many persons during the last year. This indulgence seems to be increasing very greatly, and its consequences are indeed alarming. More persons, and chiefly young men, either positively insane or who have been seriously damaged mentally and physically by this cause, have come under our professional observation, or have applied here for advice and relief during the last year than we can remember before in the same length of time. Excessive and continued drinking of wine leads to a peculiar disease of the brain, not always manifested by any violent demonstrations of conduct, and is therefore very apt to be disregarded until entirely beyond cure. The same excess may bring the brain into a state in which any shock, whether of disappointment or chagrin, or loss of friends or property, will develop an utterly hopeless form of mental disease, but which would have been borne without breaking by a healthy organ.

"Excessive use of ardent spirits produces forms of mental disease, different in their manifestation and destructive in their tendency.

"What the condition of an inebriate is, I need not describe. It is well enough understood."

Gleanings

FROM FOREIGN AND DOMESTIC JOURNALS.

Medication by Inhalation. — M. Beclard, in a report made to the French Acad. de Medicine, states that nearly 30 quarts of a liquid may be injected into the bronchia of a horse in six hours, and will be absorbed without sensibly interfering with the respiratory functions. He also states that pulverized liquids reach the finest divisions of the bronchial tubes. As to the difficulty in regulating the doses, M. Sales-Gizons, the inventor of the method by inhalation of pulverized liquids, claims that a drop is imbibed by the bronchi at each voluntary inspiration. In many diseases of the respiratory passages this treatment is undoubtedly of great value. Whether it is of equal value in general diseases which find their entry into the body by these passages, is still a question to solve.

A new society has been formed in Paris for the study of experimental therapeutics. Drs. Trousseau, Pidoux and Gueneau de Mussey are among the officers.

Warning Against the Simultaneous Prescription of Chlorate of Potass and Iodide of Potassium. — M. Vee has demonstrated the danger of such practice by showing that the chlorate of potass gives up its oxygen, which forms with the iodide of potassium an iodate, whose toxic properties have been recently demonstrated by Melsen. — *Gazette Medicale.*

Sulphuric Acid in Vinegar. — Into the vinegar to be tested put a small quantity of starch, boil the solution down to half its original measure, then drop into it a very minute portion of iodine. If the vinegar is pure the usual blue will be shown, but if it be adulterated with sulphuric acid no such coloration will take place, because the action of this acid upon starch converts it into glucose or grape sugar. — *German Paper.*

Eye washes containing acetate of lead have been found to produce a precipitate of chloride of lead upon the cornea, which renders it dim and forms erosions upon it by destroying the epithelium. The ulcers thus formed are very obstinate and worse than the original trouble. — *N. Y. Med. Record.*

Trichinosis. — The committee appointed by the Med. Soc. of Vienna to investigate this subject, have reported that the real source of infection lies entirely in the rat, and that trichinized meat is safe food when thoroughly roasted, boiled, salted, or smoked. The committee consisted of Professors Klob, Muller, and Wedl.

Formulae

USEFUL IN MEDICINE AND THE ARTS.

Raisin Wine.—Wine may be made of raisins, and one which, if well made, will be far better than most of the sherry now obtainable. Let the raisins be well washed and picked from the stalks; to every pound, thus prepared and chopped, add 1 quart of water which has been boiled and has stood till it is cold. Let the whole stand in the vessel for a month, being frequently stirred. Now let the raisins be taken from the cask, and let the liquor be closely stopped in the vessel. In the course of a month let it be racked into another vessel, leaving all the sediment behind, which must be repeated till it becomes fine, when add to every 10 gallons, 6 lbs. of fine sugar, and 1 doz. of Seville oranges, the rinds being pared very thin, and infused in 2 quarts of brandy, which should be added to the liquor at its last racking. Let the whole stand three months in the cask, when it will be fit for bottling; it should remain in the bottle for a twelvemonth. To give it the flavor of Madeira, when it is in the cask, put in a couple of green citrons, and let them remain till the wine is bottled.

Preserving Polished Steel from Rust.—A correspondent says that nothing is equal to pure paraffine for preserving the polished surface of iron and steel from oxidation. The paraffine should be warmed, rubbed on, and then wiped off with a woollen rag. It will not change the color, whether bright or blue, and will protect the surface better than any varnish.

Tooth Cement (Stehle).—Gutta percha, 5 parts; white wax, 1 part; oil of cloves, a few drops. (*Wittstein's Vierteljahresschrift f. Pharmacie*, p. 2, xiv.) Another (Sorel):—A light oxide of zinc is prepared by moistening the ordinary oxide with nitric acid, and then igniting it. Thus prepared, it is made into a soft paste with a solution of chloride of zinc, having a specific gravity 1.9 or 2.0. This soft mass speedily acquires great hardness, which it permanently preserves. If a gray color is required, the least trace of carbon may be used, got by holding the pestle with which the paste is made over the gas for a moment. A trace of sulphide of cadmium will produce a yellow tint.—*Year Book of Pharmacy*.

Varnish to Prevent Rust in Iron and Steel.—M. A. Vogel, in *Repertoire de Pharm.*, suggests that the oxidation of steel and iron instruments is very perfectly prevented by coating them with a varnish made by dissolving one part of white wax in fifteen parts of benzine, and applying it by means of a brush. The very thin layer of wax forms a perfect covering for bright instruments, and, when needed, is easily removed.

Paste for Labels.—Melt one ounce of good glue with two ounces of white sugar and half an ounce gum in a dish on a spirit lamp; the glue must have macerated two hours in water; shake continually in four ounces of water; boil till the mass is a fluid; cover the labels with that paste, and let them dry. They could be used on ware and glass.

Cement.—Alum and plaster of Paris, well mixed together with water and used in the liquid state, will form a very useful cement. It will be found handy in the laboratory for many purposes. It forms a very hard composition, and for fixing the brasses, etc., on paraffine lamps, nothing could be better.

Uses of Sulphate of Magnesia.—A strong solution of sulphate of magnesia mixed with whitewash will produce a beautiful white for ceilings of rooms in houses. It will, if used in the same way, be found useful for rifle targets. A small quantity of this salt used along with starch adds considerably to its stiffening powers, and renders the articles, to a certain degree, fireproof.

Liquid Blacking.—Take ivory black 5 oz., molasses 4 oz., sweet oil ¾ oz.; triturate until the oil is perfectly killed, then stir in gradually vinegar and beer bottom, of each ½ of a pint, and continue the agitation until the mixture is complete.

II. Take ivory black 1 lb., molasses ¾ lb., sperm oil 2 oz., beer and vinegar each 1 pint; proceed as before.

Flexible Varnish.—I. Take India rubber in shavings 1 ounce, naphtha 2 lbs.; digest at a gentle heat till dissolved, and strain.

II. Take India rubber 1 ounce, drying oil 1 quart; dissolve by as little heat as possible, employing constant stirring, then strain.

III. Take linseed oil 1 gallon, dried white copperas and sugar of lead, of each 3 ounces, litharge 8 ounces; boil, with constant agitation, till it strings well, then cool slowly, and decant the clear. If too thick, thin it with drying linseed oil.

The above are used for balloons, gas bags, etc.

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, AUGUST 1, 1867. NO. 11.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

A list of premiums is offered to those who obtain subscribers.

Contents.

ADVERTISEMENTS.

This Journal presents unusual facilities for making known such articles as are of use to physicians, druggists, chemists, manufacturers, artists, etc., etc. Each number is read by at least 25,000 persons, residing in all parts of the country. It not only circulates largely in the N. E. States, but in all the others. It has 2,000 paid subscribers in the State of New York alone, outside of the city. No advertisements will be admitted that are in any sense empyrical. *Terms*: 40 cents a line, first insertion; 30 cents for each subsequent insertion. Special contracts made for large advertisements.

Familiar Chemistry.

PRESERVING FRUITS, ETC.

The season of the year has again come round when many delicious fruits have reached maturity and are ready to be gathered for use. The decay of small, soft berries and fruits commences almost at the very moment when full ripeness is attained, and therefore the season in which they can be enjoyed fresh from the plants and vines is a brief one. Fortunately, methods have been devised by which much of the freshness and delicacy of taste and aroma of fruits may be retained for months, or even years, and thus they can be enjoyed out of season as well as in season.

The plan of preserving fresh fruits and vegetables by boiling, and then hermetically closing the can or vessel, is, after all, not a very modern notion. As long ago as the times of Gay Lussac, the celebrated chemist, it was practised. Appert, a Frenchman, practically tested the process in 1760, and Gay Lussac wrote a report upon the subject. We have, in our day, invented some very convenient and cleanly glass jars, and other vessels suited to the purpose; but little improvement has been made in methods of preserving perishable substances. The extent to which the preserving of fruits, vegetables, meats, etc., is carried on in the United States is perfectly enormous. Summer vegetables and fruits are now found upon the tables of those even in moderate circumstances, all the year round, and if carefully placed in air-tight vessels they are surprisingly fresh and palatable.

The exclusion of the *air* is an indispensable condition to their perfect keeping. Why is this? It was long supposed to be owing to the exclusion of *oxygen*, which forms so large a constituent of common air, and which is the grand agent of destruction in all forms of organized bodies. But decay is not due to this alone. In excluding the air, we not only shut out oxygen, but the *germs* of corruption and decay which float in the air. We may boil meat or vegetables, and admit air that has been heated to 800° to the preserving vessel, and they will undergo no change. This temperature destroys the living germs, or spores, which are found in the atmosphere at all times in immense numbers, and which act as a ferment, inducing putrefactive change.

These corpuscles or spores are exceedingly minute, the largest having a diameter of only 1-2000th of an inch. In form some of them are spherical, others oval; some are opaque, others altogether translucent. Microscopic investigation has solved many difficult problems in this interesting field of inquiry, and it is as yet hardly entered upon.

In preserving fruits and vegetables it is very important that the heat should be carried sufficiently high to destroy all germs of decay, and so change the chemical equilibrium of the juices as to prevent spontaneous fermentation in the substances themselves. The boiling point, or 212° F., is sufficient. Let the fruit just boil in the preserving vessels, and then hermetically seal them, and the work is done. If care and skill is used in the labor, little or no sugar is required. The preservation is certain, if the work is perfect. Several *preserving compounds* have been invented and used to some extent; but, after extended experiment in their employment, we cannot advise their use. They are all alkaline sulphites, or solutions of sulphurous acid. A solution of bi-sulphite of potassa, we believe, has been patented as a fruit-preserving compound. The sulphites, to a certain extent, arrest decay in fruits, but they leave a taste and odor which is exceedingly unpleasant, and they destroy their rich flavor.

[*Communicated to Boston Journal of Chemistry.*]

MINERAL COAL.

BY R. B. HITZ, M.D., WASHINGTON, D. C.

[Concluded.]

In the single coal-field of the Wyoming and Lackawanna valleys of Pennsylvania, there are at least one hundred and fifty square miles of coal land; and in most of that area there are six or seven workable coal-beds, whose united thickness cannot be less than sixty feet. The shape of the Wyoming Valley, and the evidence, in my opinion, of its once having been a lake, and the flowing into it of a large river, have given rise to the impression, in the minds of many, that the large amount of vegetation preserved in these coal-beds must have been swept into it, at different and remote periods, by overwhelming floods. But such a theory cannot be correct. If it were, the coal, instead of being nearly pure carbon, as it now is, would have been mixed with sand, gravel, clay, and stone, in such large proportions as to render the coal comparatively useless. There is, indeed, abundant evidence of overwhelming floods or drifts, but not of vegetable matter. The materials of such drifts have been the clay, sand, and gravel which now compose the rocks intervening between the beds of coal. The vegetable matter composing the beds themselves is too pure to have been disturbed by such drifts, except to be covered by them; and thus the conclusion irresistibly follows, that the vegetation in question must have been buried where it grew.

Our minds are prepared, then, to understand the next prominent fact bearing upon this question, and it is this: Under every coal-bed, and immediately in contact with the coal, is always to be found a stratum of what miners call fire-clay. Its thickness, hardness, and color, of course, vary. Sometimes, and most generally, it is found in the form of a slaty rock; but, whatever its color or consistency, the same material is always found under every coal-bed, whatever its thickness. Its nature is always that of a clayey soil, in which the vegetation of the coal took root, and began to grow; for, upon close examination, it is found to be full of the fossil impressions of the roots and the twigs of the coal vegetation which once grew from its bosom.

These facts are suggestive; and our minds are naturally turned from them to the process of a coal-bed's formation upon this theory. It is not, however, a mere theory; for we can point to well-known facts for its illustration. The formation of peat-beds is strikingly analogous. We are familiar with them in this country. They are in a great degree the products of a species of moss called by

botanists *Sphagnum Paluster.* Like some other kinds of moss, its roots annually die, while the top continues to live and grow, by sending out new roots above those decayed. In this way, a year's growth is annually added to the thickness of the bed; and this is so well understood by the workmen, that, in some localities where it is an object to preserve the bed, the sod containing this moss is carefully removed, and, after a stratum of peat of uniform thickness is taken from the bed for use, the sod is replaced, that the bed may be renewed. This peat is cut out in blocks, stacked, covered, and dried for fuel. It burns well when dry, and answers a good purpose for fuel. I have seen specimens of peat from Canada, portions of which seemed to be fibrous, as would most naturally be anticipated; but the other end of the block, which doubtless was the lower end, as it was in the bed, very strongly resembled bituminous coal in odor and appearance. Besides the moss already referred to as the principal vegetable concerned in the formation of peat, there are about forty other varieties which help its growth in some degree; but they are all of small stature, mere weeds, rushes, etc.; while the fossil remains of the coal flora exhibit about four hundred different kinds, of all sizes, from the smallest to the largest of trees.

These facts, therefore, present a difficulty in the case of coal-beds which does not exist in the case of peat; and yet this difficulty may be solved by another appeal to facts.

In the Geological Reports of New Jersey is a full and particular description of the cedar swamps in the southern part of that State. In these swamps there is generally a thick growth of timber, and the report says, —

"The soil in which these trees grow is a black earth or mud, varying in depth from two or three to twenty or more feet, and is composed of vegetable matter, which, when dry, is easily burnt, and the amount of ashes left is exceedingly small. In two trials which we made, the amount of ashes left from the dry earth was only one half per cent. When this earth is open to the sun and rain, it decays rapidly; but when covered with a growth of trees, and so shaded that the sun does not penetrate to the ground, it increases rapidly, from the annual fall of leaves, and from the twigs and small trees which die and fall. A log, sawed at both ends, was recently found entirely buried in the swamp, and was known to have been cut within the memory of men familiar with the place. Other trees were also found in great abundance, at all depths in the earth, quite down to the solid ground. Men are annually engaged in digging them out and converting them into rails and shingles. Some of these buried trees are found with the roots upturned, as if blown down by the winds; while others are broken off, as if they had stood and decayed until too weak to support their own weight."

Another significant fact is developed by this survey. It is found that, in the southern parts of New Jersey, the land is sinking; and this is proved by portions of these swamps being under sea water, with these trees yet standing where they grew, but killed by the effect of salt upon them. Certainly they never started into life and grew to their present size under water; and therefore the land in that region must have been sinking below its former level.

Now, suppose these cedar swamps shall continue to subside, until their timber shall have all fallen, and the ocean shall have thrown over them beds of sand and gravel hundreds of feet in thickness, what is to hinder their twenty or forty feet of carbon being in time compressed, hardened, and converted into coal, if they continue to sink? Every one must see the probability of such a result, in fact, the almost certainty of it; for in England coal beds not only exist under the sea, but are mined for more than a mile under the ocean in several localities.

If we are convinced of the probability of such a formation, we can then understand why it is that at the bottom of a coal-bed we find the ancient fire-clay or soil in which the vegetation commenced, and at the top, impressions of leaves, twigs, etc. Along the roofs of some coal-beds the fossil remains of trees seventy or eighty feet long are found; consequently, if a coal-bed has been so formed, the bottom of it is exactly the place to find the clay, and the top to find the changed vegetation.

We have seen that the mud of these swamps is full of trees that have lived out their time, and are thus buried beneath the surface. We also know they possess a power of still resisting the elements of decay. In aid of this power come the preserving qualities of the carbon in which they are embedded, and their exclusion from the oxygen of the air, the great destroyer of organic substances. Can they ever become mineral coal? We know not, it is true, the details of their future history, but we can look at the past. On beds of cannel-coal, whole trees of all sizes, with roots, branches, leaves, and seeds, are found carbonized and forming fair specimens of that kind of coal. Its name is an English corruption of the word *candle*, and is given because it burns with great freedom, affording a substitute for candle-light in many a cottage home of England.

This coal was first discovered in England. It is now found in this country in Kentucky and Pennsylvania. In addition to this, there is the *brown coal* of Europe. Geologists speak of it as formed by vast accumulations of trees, buried by inundation under beds of clay, sand, and gravel. The woody parts have probably undergone a certain degree of vegetable fermentation and pressure of incumbent earth, and thus have become carbonized and consolidated.

I have thus endeavored to notice the outlines and strong points of the evidence by which those who have examined the subject carefully and thoroughly have been convinced of the vegetable origin of mineral coal. In the minds of most men this is now a settled question. There are other questions of great interest which arise at once upon the foundation of this theory.

In the Wyoming Valley of Pennsylvania, there are coal strata whose united thickness is at least sixty feet. We are all familiar with its solid structure; and if, as we suppose, it has a vegetable origin, its solidity must be owing to the great pressure of the overlaying earth and rocks. What, then, must have been the original thickness of those ancient vegetable deposits which, thus compressed, present now such a great thickness of coal!

The coal-beds of England, not thinner than our own, cover nearly one third of that island. Those of the United States *east* of the Rocky Mountains are supposed to cover an area of 133,000 square miles; and this is but a small part of all the coal in the world.

Where, then, we may well ask, could all this vegetable matter, forming these vast beds of coal, have come from? The question, it is true, may not be answered satisfactorily to every one, but we are not without a guide in the inquiry.

A forest tree of the first class contains a large mass of vegetable matter. A portion of this can be placed in a retort, and, by heat, all its resinous and volatile matter can be expelled, leaving its carbon or charcoal of the same shape and size as the piece of wood subjected to the process. And if it were practicable to subject the whole tree, just as it stands, to a similar distillation, we could then see at a glance its whole perfect anatomy or framework of carbon, and better realize the massiveness of the material.

Applied to such a structure, the question, Where did all this carbon come from? has *more* of significance and difficulty. Carbon, with all the other elements, was formed by the Creator, it is true; but here is a *large* towering column of carbon, that was not standing here a century ago. Whence and how was it gathered up and raised into this elevated structure?

We know that about the roots of such a tree there is carbon in the vegetable mould or in the soil; but not enough within reach of its roots to build up such a huge column. Besides this, there seems to be no loss of carbon in the soil at its roots. On the contrary, the tree itself adds its annual contribution to that deposit, increasing its thickness from year to year, as we have seen in the case of the cedar swamp; and this annual deposit is over and above what is annually retained in the tree. It cannot produce or cast off more carbon than it receives; and, as it receives little from the ground on which it stands, we have forced upon us the conclusion that its carbon is derived mainly from the atmosphere; that its leaves gather it from every breeze: and yet in our atmosphere there is scarce a trace of free carbon to be found.

We know that it exists; that myriads of living beings are constantly exhaling a gas surcharged with carbon, and inhaling the life-preserving oxygen. This is furnished by plants; and thus we see that one kingdom, in the order of Providence, is made to sustain the other.

We also know that carbon is one of the simple elements supplied to *us* by the Creator, but we cannot yet understand the process of its distribution, nor all the movements and changes to which it has been subjected.

We look back to the time when, at the commencement of the coal formations, no oxygen-breathing animal could have lived upon our planet; and we judge of that period by the fact that no fossil remains of any land animal have come down to us from the coal period, while the remains of those once living in water are abundant.

We have evidence that the vegetation of the coal period was most abundant, and of very rapid growth and decay. It was the production of a much warmer temperature and a more humid atmosphere than our own; and, when we reflect upon its peculiar character, its rapid growth, and the almost inconceivable amount necessary to form our coal-beds, we are deeply impressed with the conviction that the atmosphere at that period was overburdened with carbon, derived, much of it, probably, from the disturbed volcanic condition of the earth. Carbonic acid gas now bubbles up from many a mineral spring, issues from thousands of volcanic fissures; and the Lake of Solfatara, in Italy, to this day, sends forth immense quantities of it from its depths.

Traces of extinct volcanic action are visible all over the earth; and though the ancient crater can be pointed out in many sections, yet the upheaved rock of our mountains attests the great energy of the disturbing power to which they have been subjected; and we can thus understand the great probability that in those early days the atmosphere may have been loaded with carbon sufficient to nourish the rankest vegetation.

Chemistry Applied to the Arts.

ANALYSIS OF WATERS.

The glass case, at the great exhibition, of M. Robinet, of Paris, 3 Rue de l'Abbaye Saint-Germain, formerly President of the Academy of Medicine, is distinguished from his neighbors by the fact that he sells nothing, that he gives away all the products he obtains, — that is to say, his numerous analyses of waters, — and he limits himself to the task of soliciting new ones, which he analyzes in succession, and gives gratuitously the results of his analyses to those who send the samples. He even goes so far as to give bottles of certain waters to those who, for particular reasons, would be interested in knowing the nature of those in their neighbourhood; and he bears the expense of carriage, bottles, etc., even if they are sent to the other end of the world. What motive has induced M. Robinet to make so many great sacrifices, and to give himself so much labor? Nothing is more simple to answer. He has undertaken to fill up a void in the physical history of our country; he has given to science, industry, agriculture, and public salubrity, a Hydrographic Dictionary of France. There exist, undoubtedly, already, numerous documents from which such a work might be compiled; but they are scattered about and incomplete. The "Geographical Dictionary" no longer exists. The work of 221 pages, published under this title, in 1787, by M. Mothey, Geographer to the King, did not fulfil the required result. M. Robinet set courageously to this task after the work he had performed as reporter to the commission of inquiry for the diversion of the waters of the Dhuys. He proposes to treat of soft or potable waters in a statistical, geographical, geological, chemical, economical, hygienic, and agricultural point of view. A first essay, already published, devoted to the study of the basin of the Marne, amply proves that the author will complete his programme.

In his glass case we find a hundred specimens of water, and one of the labels bears the number 2082. In fact, M. Robinet has analyzed more than 2000 waters! His exhibition is only intended to invite remittances of water from the four quarters of the globe. We would say that his appeal has already been responded to, for we find in the galleries waters from London, the Danube, etc.; and there is every reason to hope that the geographical dictionary especially devoted to France will also interest, in a greater or less degree, most of the foreign nations. We sincerely wish, that among the numerous

pilgrims to this great *fete* of nations, some will not object to encourage his work and send specimens of waters. The notation, for the representation of water courses, of M. Robinet, is well worthy the attention of hydrographic and other engineers; his new system gives immediately a very exact idea of the direction, extent, inclination, and other essential characters of water courses. In order that the remittance of water to be examined may be complete, it should comprise the waters of the rivers, brooks, and wells, with the nature of the soil in which they rise, drainage water, rain water collected in an earthenware or porcelain vessel, and drinking water from the public fountains.

UTILIZATION OF HORSE CHESTNUTS.

M. Emile Genevoix, 14 Rue des Beaux Arts, exhibits feculous seeds and fruits containing from 1 to 10 per cent. of different oils which play an important part in alimentation. Disseminated between the grains of starch, these oils can be extracted by means of sulphuret of carbon, chloroform, benzole, ether, etc. M. Genevoix substituted for these solvents, firstly, carbonization by sulphuric acid, which in spite of the high temperature produced, set the fatty matters at liberty, without destroying them, in a state easily soluble in menstrua, or able to be obtained in a greater quantity by distillation.

But this method was too costly when it was used on the large scale, and it has given place in the factory of M. Genevoix to an industrial process which allows the production by tons weight of the oil of some fruits, very abundant and without value, — the horse-chestnut for example. Bought at 40 or 50 fr. the ton, the finest chestnuts are rasped, submitted to a full fermentation, boiled in ten times their weight of water, and transformed into glucose by the addition of 2 per cent. of sulphuric acid. The liquor, freed from insoluble portions, is submitted to a slow ebullition, which allows the oil to agglomerate at the surface, particle by particle. Drawn off and filtered, this oil is sold to the public without any addition. For ten years past, the average quantity of oil manufactured in the chemical works at Romainville has been 600 kilogrammes, extracted from fifty or sixty tons of horse-chestnuts, which were bought from agriculturists for 2,500 to 3,000 fr. The wholesale price of the oil is 20 fr. Vegetable wax is separated from it under the form of stearine, margarine, etc. The water on which the oil floats, when neutralized, gives "syrup of glucose" and "horse-chestnut alcohol," prepared for trade on a large scale. The fabrication of starch had to be abandoned, as the supply of horse-chestnuts was uncertain and insufficient.

This fatty substance, very fluid, absorbable by the skin, has a place marked out in the therapeutics of the gout and rheumatism. In fact, the chestnut oil of M. Genevoix has been very efficacious, and enjoys a great success. — *Chem. News.*

NEW METHOD OF PRESERVING MEAT.

M. François Cerio, owner of the gastronomic establishment at Turin, has invented a method of preserving meat, flesh of all sorts, vegetables and fruit, and in general all substances usually treated by salt or saltpetre. This is so simple and efficacious that we are astonished it was not discovered and put in practice earlier. The machine consists of a receiver, able to preserve a vacuum when closed by a cover also impenetrable to the air. It is furnished at the top with two pipes, with stop-cocks communicating one with the exhausting machine, the other with a vessel containing a solution of common salt (with the addition of 2 to 5 per cent. of nitrate of potash or saltpetre, if the meat is required to take a high color). The cover being removed, the substance to be preserved is inserted; the vessel is then closed tightly, and the cock communicating with the exhauster is opened, and the vacuum is made, if possible, down to five millimetres pressure. The exhausting cock is then shut, and the brine cock is opened; the salt liquor is allowed to remain in contact with the substance to be preserved for a certain time, depending upon its mass, which never exceeds a few minutes. The substance is then removed and hung up to drain in a well-aired place; after a few days it is dry, and fit for putting in a case for sending off to any distance.

Let me remark that, in proportion as the expansion proceeds, the food to be preserved swells up and increases in volume one third more than its original bulk. It is on account of this considerable opening of the pores or void spaces that the alimentary substance placed in contact with the saline liquors absorbs the necessary quantity for its preservation, if not indefinitely, at least long enough to warrant its expedition for a long voyage.

Thus treated, the substance preserved loses absolutely none of its nutritive elements — fibrin, albumen, creatin, etc. It loses its color by drying, but the interior preserves the fresh tint, odor, and taste peculiar to it. When cooked, it retains very slight traces of salt. I can affirm that, by this mode of preparation, the substances prepared keep all their natural properties and qualities, and are able to replace, without inconvenience, fresh food.

Coal and Gas. — It is not at all proved that our coal supply will run short for the next three or four hundred years, and in the meantime there will certainly be many discoveries made by which, if coal cannot be superseded altogether, its waste may be diminished. This is the most important problem; for nine tenths of the coal raised is absolutely wasted, so far as the utilization of the available force it is capable of exerting is concerned. Dr. Frankland, speaking of coal gas, says that physical science has as yet scarcely attempted to estimate the true light-giving power of any sample of gas; but it can be proved from the laws of conservation of force, that the light obtained by an argand burner is certainly less than the 1-265th of the light which could possibly be obtained from the same gas, consumed at the same rate. Our problem now should be, to try and get some of this enormously greater amount of light out of our gas. But we need not be dependent upon coal for gas. An ingenious Frenchman has lately propounded a brilliant idea. His theory (advanced through the medium of *La Gazette Médicale de Lyon*) is that all dead bodies of human beings are at present wasted, when they might as well be utilized by distillation into gas, for illuminating purposes. He remarks: — "Coal is being exhausted; and since the human carcase is capable of supplying a gas of good illuminating power, why should it not be employed to this end? In India the idea is already realized. By a process of combustion in retorts, a corpse of common dimensions may be made to yield twenty-five cubic mètres of illuminating gas, which, at a cost of twenty-five centimes per cubic metre, would give a value of about eight francs for a body of ordinary size." — *Chem. News.*

Hydrogen and Meteorites. — Hydrogen has been recognized in the spectrum analysis of the light of the fixed stars, by Messrs. Huggins and Miller. The same gas constitutes, according to the wide researches of Father Secchi, the principal element of a numerous class of stars, of which *a* Lyræ is the type. The iron of Lenarto has no doubt come from such an atmosphere, in which hydrogen greatly prevailed. This meteorite may be looked upon as holding imprisoned within it, and bearing to us, hydrogen of the stars. It has been found difficult, on trial, to impregnate malleable iron with more than an equal volume of hydrogen, under the pressure of our atmosphere. Now, the meteoric iron gave up about three times that amount, without being fully exhausted. The inference is, that the meteorite has been extruded from a dense atmosphere of hydrogen gas, for which we must look beyond the light cometary matter floating about within the limits of the solar system.

Indium the King of Chemical Products. — At the Paris Exhibition, M. Richter, of Friburg, exhibits two ingots of perfectly pure indium. This metal, the last of those discovered, is rare enough to cost 36 fr. the gramme. The two bars weigh about 500 grammes, and therefore represent a sum of 18,000 fr. There is a great resemblance between indium and cadmium, especially in their chemical nature; also, it is difficult to distinguish or separate one from the other. The only tangible difference is that the oxide of indium is insoluble in ammonia. Indium is as white as tin or cadmium; it is volatile, and has a peculiar odor; its spectrum is remarkable for its bright indigo line, hence its name. The indium of the Paris Exhibition of 1867 is the king of chemical products, as thallium was in 1862. But M. Richter has no rival claimant for the honor of the discovery of indium, and is to have a gold medal.

Chemistry Applied to Agriculture.

"Editor Journal of Chemistry: —

"Will you be so kind as to inform me if you regard the oxygen disengaged by plants to be in its natural or neutral state. From some experiments, not of a very satisfactory character, I am led to suspect that it may be different, in what regard I cannot conjecture. I am not a chemist, and only experiment in a rough way at times, when my medical duties do not press too heavily upon me. "Medicus."

We thank our intelligent correspondent for his note of inquiry. It is one of much interest. We do not think the oxygen eliminated by plants is in a neutral state. It produces entirely different effects upon organized bodies and upon chemical compounds, from oxygen as found in the ordinary state. It is nascent oxygen, apparently having no positive properties belonging to its ordinary condition. It behaves like, and has the peculiar odor of, *ozone*. It is electro-negative, produces discoloration upon iodized paper, has bleaching properties, and influences putrefactive fermentation in a marked manner.

We know so little of the remarkable agent which we call oxygen, that it is hazardous to theorize regarding its capabilities. It is, apparently, capable of existing under so many forms, or in so many conditions, we can scarcely define what it is. Ozone is probably oxygen without admixture of other elements; and further, it is oxygen *uninfluenced* by any other elementary body. It is oxygen in a peculiar electrical condition, — a condition which is stable, and which has imparted to it peculiar properties

What a disruptive force the plant is capable of exerting upon the atoms of carbonic acid, when the carbon is torn from the embrace of the oxygen atom! They perform a work beyond the power of man to perform. The chemist in his laboratory is put to shame by the silent power of the fragile leaf and bud, expanding and forming organized structures out of dead, inorganic matter. The oxygen atom, subjected to such extraordinary influences, is probably placed in a condition unlike its normal state, or in a form resembling ozone.

BEET-ROOT SUGAR.

M. Robert de Seclawitz has invented a method which presents more than usual novelty. Instead of compression, he depends upon diffusion for the extraction of the saccharine juice. The beet-roots are not rasped into pulp, but cut up into slices about an eighth of an inch in thickness. The juice is then drawn from these slices by means of water in a series of cylinders called diffusers; and the extraction of the sugar is said to be more complete than by any other known method. The temperature found to be most favorable for the operation is said to be 50° C., or 122° Fahr.; at this heat no swelling of the pectose takes place in the intercellular portion of the roots so as to present an obstacle to the solution of the sugar in the cells. The pectose itself is not rendered soluble, except to a very small extent, only just where the cells have been actually cut or broken by the slicing. Another advantage attributed to the new method is the greater relative value of the residue; the azotized substances which form so important a part of the nutrition of animals remain almost entirely in the residue, very little indeed passing off with the syrup. Consequently, also, the juice is much purer; it contains no more salts than that obtained by means of simple pressure, and very much less than when maceration is employed, and less organic matter than when any other method is employed. These advantages seem to proceed naturally from the mode adopted by M. de Seclawitz, as a low temperature and the absence of force must certainly favor the purity of the juice obtained; but it is not stated whether the sugar obtained is larger in proportion as well as purer in quality. At all events, this new mode of extraction deserves the attention not only of sugar-makers, but of all whose operations include the extraction of vegetable juices. — *The Grocer.*

Agricultural Society of Philadelphia. — At a meeting of this society, recently, Dr. Lewis Hall stated that during the last summer he had analyzed different artificial fertilizers sold in Philadelphia, and that he had taken great pains to ascertain the true value of the different articles sold as fertilizers. He had examined seven different kinds, and placed the following valuations upon them: First, superphosphate of lime sold for $60, worth $38; second, another quality sold at $56, worth $40; third, burned ground bone sold at $60, worth $37.50; he

said there was very little ammonia in it, and that the bones were burned so much before grinding, that they lost about 3½ per cent.; fourth, Peruvian guano sold at $100, worth $49.50. He stated, that his mode of ascertaining the value of guano was by finding out how much ammonia there was in it; he valued that at 12½ cents per lb. He then ascertained how much phosphate there was in it; that he calculated at 1½ cents per lb, which made the worth of it as stated. The fifth article was Saldanho guano, sold for $45, worth $20.79; sixth, tuffoo, sold for $16, worth $6.80; seventh, poudrette, sold for $20, worth $14. The Doctor submitted for consideration, whether it would not be advisable to have a committee appointed to memorialize the legislature to pass a law by which all artificial manures should be examined by a regular agricultural chemist, and have his indorsement of its real value before it could be sold. Drs. Hall and Kennedy, and J. Morgan Kennedy, Esq., were appointed a committee to prepare a memorial to the legislature to appoint a commissioner for the inspection of guano and artificial manure.

ANALYSIS OF MANURE.

The dark heaps of animal excrement which lie about the barn-yards of farmers, have, during all ages, been known to possess specific fertilizing influence upon plants; and if it were furnished in sufficient quantities to replace the elements removed from soils in repeated croppings, the labors of chemists in the direction of seeking out new supplies of plant-food would be practically aimless and absurd. But this is not the case. The exhaustive process is continuous in all civilized communities, and it is impossible, in densely peopled sections, to maintain a satisfactory balance between supply and demand.

It was very natural, then, that early in the history of chemistry as an exact science, it should be called to the investigation and determination of the chemical nature of that material which common observation and experience had taught to possess the natural food of plants. As regards its superlative value, no one has ever entertained a doubt, either before or since the field of chemical investigation was fairly opened. What is its composition? Allow me to present the results of some determinations of my own on this point. A parcel obtained from the yard of a neighbor, which, under the conditions in which it was produced and preserved, may be regarded as a fair representative of the article as furnished by ordinary farmers, gave the following results: A portion weighing 7,280 grains was carefully dried in a porcelain dish over a water-bath, and it was found to lose of water 5,960 grains, leaving of dry matter 1,320 grains. Of the residuum thus freed from moisture, 455 grains were placed in a platinum capsule and carefully ignited, thus removing the combustible or carbonaceous matter made up of the elements, oxygen, hydrogen, and carbon. The resultant ash weighed 177 grains, showing a loss of volatile or combustible elements amounting to 278 grains. In order that the results of the analysis may be clearly understood, it may be desirable to present them without regard to fractional parts, and to estimate by the whole amount experimented with, viz., 7,280 grains. This amount gave of water, 5,960 grains; combustible or carbonaceous matter, 806; nitrogen, 29; potash and soda, 41; lime, 43; magnesia, 14; phosphoric acid, 15; sulphuric acid, 11; chlorine, 14; silicon or sand, 335; oxide of iron and alumina, 22. The points in this examination which will doubtless appear most striking, are the large amounts of worthless material which constitute the bulk of barn-yard manure, the water and sand greatly predominating over everything else.

A better idea of this may be obtained if the results of the analysis are applied to a larger amount of manure, which will give the constituents in pounds. Assuming that a cord of ordinary barn-yard manure will weigh 3,000 pounds, its actual value as a fertilizer may be presented as follows: There are contained in it of water, 2,456 pounds; common sand, 138 pounds. These added together give 2,594 pounds of perfectly worthless substances. Now, if we still further subtract the carbonaceous matter, 332 pounds, which is of no more value than muck, peat, straw, or chaff, we have left only 74 pounds of active fertilizing material which has a money value. To obtain this 74 pounds, which really is all that is valuable, the farmer loads and hauls upon his field 3,000 pounds, or one and a half tons of a compound in which there is water enough to do the weekly washing of a small neighborhood, and a sufficiency of sand to keep the kitchen floor tidy for a month. The 74 pounds of mineral salts might be taken in an ordinary bushel-basket, and carried upon the shoulder to any point desired. In this amount there is the nitrogen, potash, soda, lime, magnesia, phosphoric acid, sulphuric acid, chlorine, iron, and alum. In estimating the market value of these substances, we may obtain the nitrogen by the use of crude nitrate of soda or sulphate of ammonia, at a cost of $2.60; the potash, soda, etc., in one and one half bushels of good wood ashes, at 35 cents; and fifteen pounds of common salt, ten pounds of bone-dust, three pounds of gypsum, will supply the remaining constituents, at a cost of fifty cents. If we estimate the carbonaceous matter at ten cents, we have, as the actual cash value of all that promotes plant-growth in 3,000 pounds of barn-yard manure, the sum of $3.35. There are but few localities where the farmer can purchase manure at less than $7.00 the cord; and when to this we add the expense of hauling and applying to fields, we find there is a wide margin between the cost of the isolated valuable constituents of manure and the article as furnished in its natural condition. Barn-yard manure may be imitated by thoroughly composting with a cord of seasoned meadow muck sixty-five pounds of crude nitrate of soda, two bushels of wood ashes, one peck of common salt, ten pounds of fine bone meal, two quarts of plaster, and ten pounds of epsom salts. The cost of this compost will not be over $3.50 the cord, and ought, other things being equal, to serve as good purpose in the field. In practical trials of this mixture I have found that while it serves a most admirable end, giving very satisfactory results, it does not act so rapidly and energetically as manure; but its effects are more lasting. In short, the same salts and organic matter as found in the dung-heap, have a higher money value, and seem to exert a more specific influence upon plants than when presented in artificial mixtures. By substituting nitrate of potassa, or saltpetre, for soda, the compost is greatly improved, while its cost is enhanced. If the salts are dissolved in water—those that are soluble—and the bone in ley, and good muck is employed, a compost is formed very nearly as valuable as seasoned excrement.—*Chem. of the Farm.*

Boston Journal of Chemistry.

BOSTON, AUGUST 1, 1867.

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☞ Our subscribers complain much that they do not receive their papers. The fault is with the P. O. Department. We carefully mail the paper to each of our subscribers every month. In some instances we have sent three or four copies of an issue before the subscriber succeeded in obtaining one. It ought not to be so.

MAGNESIUM.

Some ten years ago, a friend, engaged in experimenting with alloys of the metals, requested us to prepare for him a small quantity of the metal magnesium.

We presume, at that period, the whole amount which had been isolated or manufactured in the world would hardly have reached a single pound. Specimens in the hands of chemists were great curiosities.

We succeeded in furnishing our friend with a small specimen, for which we were compelled to charge a large price, owing to the cost and trouble of its production. Being of a mathematical turn, he was curious to know how much a *hundred pounds* would cost, estimating from the cost of the small specimen supplied to him. Much to our amusement, he presented a sheet covered all over with figures, showing that all the wealth of all the nations of the earth would hardly furnish the means to pay for that quantity. We make these remarks preliminary to calling attention to magnesium and its manufacture at the present time.

All of this rare and singular metal which is produced in this country is now made by the American Magnesium Company of this city. We sold to this company their present laboratory building, in Watertown, in 1864; and since then they have been steadily at work, engaged in the reduction of this metal, working under new and patented processes originating in England.

No more interesting substance to chemists and metallurgists was exhibited at the last Mechanics' Fair of this city than the large ingots of pure magnesium furnished by this company. The uses to which it is applied in the arts are not as yet very numerous. It is principally employed in the production of an intense artificial light. A small wire or thin ribbon of the metal will take fire and burn like a wood shaving when it is held in the flame of a lamp. In its combustion it affords a most intense and brilliant white light, which can be seen a long distance. The light emitted by a burning wire no larger than a common pin can be seen many miles, and hence the wire is used for signal lights, for magic lanterns, photographic purposes, pyrotechnical displays, theatrical illuminations, etc.

The burning of the wire is a beautiful chemical experiment, and it is now furnished so cheaply almost any one can indulge in it. It is supplied at about three dollars the ounce, or forty dollars per pound. So great have been the improvements in processes for its manufacture within the period of a few years, that it has passed from being a rare metal, but little understood and made at enormous cost, to one of comparative cheapness, and a regular article of manufacture and sale. Its most wonderful physical characteristic is its *lightness*. A mass of it taken in the hand seems no heavier than an equal bulk of *cork*. It is the lightest of all known metals.

In burning magnesium, a copious white smoke is given off, which is nothing but freshly-calcined magnesia. The oxygen of the air unites with the metal and forms the medicine known as magnesia. This smoke, or light magnesia dust, is somewhat troublesome in using lamps with the burning metal, and it is very desirable that some method should be devised for getting rid of it. If any one of our ingenious chemists can invent a smoke-consuming chimney, which can be applied to magnesium lamps, it will greatly increase the use of the metal.

We suppose the greatest use of magnesium will be in the art of pyrotechny. The powdered metal, covered with paraffine, is mixed with rocket powder, and when ignited high in the air, it glows with intensest light; a cloud of smoke forms, which floats like a canopy over the

illumination, and greatly adds to the effect. No rocket stars hitherto produced can bear any comparison with those produced from magnesium.

It is an exceedingly interesting metal, and one worth examining by those who have not seen specimens.

"B——T, Ohio, July 8, 1867.

"MESSRS. J. R. N. & Co.

"I have been prescribing the medicinal agents prepared in your laboratory for several years, and have found them excellent and reliable. I am troubled to obtain them however; the druggists, when I order yours in prescriptions, fill them with something else; and when I have detected the fraud, as an excuse, they allege the articles used are "just as good," or, that they cannot obtain yours, and so are compelled to use another kind. I have been sadly deceived in this way, and I learn that many other physicians in this section have been annoyed in like manner. What is the remedy? "B. L., M.D."

This letter is of a character similar to many others which are constantly reaching us. We dislike to record facts so dishonorable to those engaged in the important and responsible business of dispensing remedies for the sick, but duty to ourselves, to physicians, and their patients, compels us to do so. The practice of *substituting* cheaper, and oftentimes worthless, articles, for those of known integrity, in prescriptions, is a form of dishonesty not less reprehensible than that of positive *adulteration*. It is practised, we fear, to a much larger extent than physicians suppose. Physicians desiring to use our agents in their practice or prescripions, should *insist* upon *examining* them before writing prescriptions, to see if they have our *label* and *stamp;* and if the druggist states that he cannot obtain them of dealers in cities, request him to change the direction of his orders until a dealer is found honest enough to supply them.

The products of our laboratory are supplied to all the cities of the country, and they can be obtained in all sections.

Physicians must *insist* upon druggists furnishing them with *exactly* the kind of agents they require, and they must take the trouble to make personal examination as regards quality and brands, else their reputations may suffer through the dishonesty of others.

A NEW GALVANIC BATTERY.—We have had in use in our laboratory a most singular looking piece of apparatus, devised by Moses G. Farmer, Esq., the well-known electrician, of this city. It is a new form of instrument for converting heat into electricity; and most satisfactorily does it perform its work. All that is necessary to put it into active operation, is to light a gas jet, and in a few moments the electrical impulses are manifested, and the battery is ready to be set to work. It deposits metals with great facility, and the development of the agent is constant and uniform so long as the heat is supplied. It resembles a "fretted porcupine" as much as anything we can compare it with. The metals employed in its construction are antimony and copper. The strips or arms of copper protrude outwards from the bars of antimony, so as to secure the cooling influence of an air current, while the gas is heating the other extremity. A portion of the heat of the flame is transformed over into electricity, thus showing the easy convertibility of one imponderable into another, and the correlation of the forces.

Here we have a battery which works without the aid of acids, or any physical agent whatever; and telegraph lines can now be worked over long distances with no other battery power than that afforded by an ordinary lamp, or jet of gas. Truly, science is progressive.

GYPSUM.—Sulphate of lime, plaster of Paris, gypsum, are names applied to a grayish-white rock, found in great abundance in some parts of the world. It has so long been known to exert special fertilizing influence upon plants, that its physical properties are as well understood by agriculturists as mineralogists or chemists. How it happened to be learned, that this unpromising-looking rock, when finely powdered, would serve as food for plants, we are not informed. As early as the times of Dr. Franklin it was used in this country. The Doctor, ever zealous to introduce new inventions and improvements, sowed it upon a field so as to form the sentence, "*Manured with Gypsum.*" The grass springing up where it was sown, made the letters distinctly visible, and created much interest and curiosity among the farmers of those days.

It seems to promote in a special manner the growth of white clover, and many a barren pasture has been renovated by its application.

Near Windsor, Harts County, Nova Scotia, the gypsum beds are one hundred and fifty feet wide, and not less than fifty miles in extent; so it is apparent the supply will not soon be exhausted. From this deposit at least 100,000 tons are annually exported.

We have sent a considerable number of microscopes by mail to parties in different sections, who report that they have not received them. We have, in several instances, mailed two or three to the same address, all of which failed to reach their destination. We cannot, therefore, continue to send the instruments by mail at our risk. Those who order them will please designate how they may be sent; and when we have carefully complied with the directions, our responsibility ends. We cannot supply another instrument for a lost one.

☞ We have had printed in very neat book form the articles published in the *Journal* upon chemical examination of urine. As a convenient and reliable treatise for reference, it will be of great service to physicians. We will mail a copy to any of our subscribers free, who will inclose to us a stamp to pay postage.

Questions and Answers.

N. R. S., *Troy, N. Y.*—"What is *eserine?* I have had an inquiry for it, and do not know what it is."

Eserine is the principal active matter of the calabar bean. It is a crystallizable alkaloid, very rare, and very expensive. M. Vee, a French pharmaceutist, first isolated this curious substance. The one-hundredth part of a centigramme, introduced under the eyelids, *contracts* the pupils. How curious!—*atropine dilates, eserine contracts* powerfully the pupil of the eye. Two of the most remarkable vegetable alkaloids produce precisely opposite physiological effects upon the visual organs.

CHEMIST, *Rock Island, Ill.*—"How can I obtain *absolutely pure water?* I need some for delicate chemical research, and that distilled in the ordinary way is not sufficiently pure for my purpose."

We would recommend the use of the manganate, or permanganate of potassa in the distillation. Dissolve 100 grains of the crystals of permanganate of potassa in a gallon of spring water; add, also, an equal amount of hydrate of potassa; let the water stand twenty-four hours and carefully distil, using glass retort with platinum condenser. If you conduct the process with care and skill, you will obtain absolutely pure water. Don't use *rain water*, as that contains an appreciable quantity of *ammonia*, which will come over and trouble you in the product.

B. S., *Mount Vernon, N. Y.*—"I use considerable gun cotton, or soluble cotton, in my business, but I find that which I have made recently changes rapidly, showing free acid, and spoils. What causes this? Is there a remedy?"

Perfectly pure gun cotton is a remarkably stable compound. The lower nitro-products of cellulose, also, if pure, are not liable to change. The difficulty you meet with is caused by small quantities of nitrogenized organic products in the cotton, of unstable properties, which give rise to the development of free acid. To prevent the decomposition, you must work with perfectly *pure cotton* and acids free from foreign agents. Look well to the cotton; have it carded and thoroughly cleansed before using. One per cent. of carbonate of soda added to gun cotton is a preventive against spontaneous change. It may be used where its presence is not objectionable.

FARMER, *Burlington, Vt.*—"Since lining my cistern with cement, the water appears to be *hard*,—not what it once was. Is it due to the cement? If so, what is the remedy?"

We hardly think the cement influences the water. If you insist that the water is harder than formerly, and believe it due to the cistern, you had better procure some silicate of soda, make a solution, and wash over thoroughly the inside of the cistern, allowing it to dry a day or two. This will prevent water contact with the cement.

T. D., *Ohio.*—No, sir. The heat must be equal to that of incandescent iron, to accomplish your purpose; certainly as high as 800° F.

ALBERT, *Mass.*—"A thunder-storm happened to occur in this section when the apple-trees were in full bloom, and consequently all, or nearly all, the fruit was destroyed. How does lightning cause blight in blossoming fruit trees?"

We are not prepared to admit the assumption upon which the inquiry is based, and therefore no answer can be given. We can see no connection between "lightning" and blossom-blight, although many entertain a belief that there is. The atmosphere is constantly under electrical influences, and the more striking display of this agency which occurs in a thunder-storm should not lead us to infer that there is specific effect exerted upon the fruit germs.

B. E. S., *Amherst, Mass.*—"How can I cleanse a well into which the house drainings have accidentally flowed for two or three months?"

This is a serious evil, and very obstinate of cure. The stones of the well are probably incrusted with a slimy substance, the changed organic *debris* of the kitchen, very difficult of removal. Hundreds of families are suffering from accidents of this kind. The most serious illnesses are caused by the use of this disgustingly impure water.

If you do not wish to fill up your well, and dig a new one, which we think the best course, the use of a saturated solution of carbolic acid would be the proper agent to employ in its purification. A pound or two of the crystals dissolved in the water, and allowed to remain a week or more, may remedy the evil. The water should be removed, and a fresh supply allowed to flow in several times, before it is used.

Medicine and Pharmacy.

CHLOROFORM: ITS ADMINISTRATION AND USES.

BY T. C. HART, M.D.

Mode of Administering.—To avoid danger, much depends on a careful observance of a few simple rules. Be sure the article is not adulterated; administer slowly, allowing a *free admixture of air*, and, when practicable, on an empty stomach. Watch the pulse and respiration, and if the former becomes weak and flickering, or stertorous breathing arises, stop it at once. If the depression and stertor are great, resort to the usual restoratives, as dashing cold water in the face, ammonia to the nostrils, stimulants internally, artificial respiration, etc., taking care always to pull the tongue forward, as it sometimes falls back in the fauces, and thus blocks up the air passages. When there is much depression, or when the nervous system has been previously much excited, I always give a dose of morphine and whiskey before I induce anæsthesia. If this precaution were always taken, I think there never would occur a case of "death from chloroform," to be reported. This agent destroys life by completely paralyzing the nervous system, thereby arresting the heart's pulsations. This effect sometimes arises suddenly, but will be invariably obviated by the whiskey and morphine, which seem to keep up, so to speak, an undercurrent of stimulation, while they do not interfere with the action of the chloroform, but, on the contrary, appear to favor a more speedy and gentle action.

Many plans have been proposed, and instruments invented, for its administration; but I have found none to answer so well as the following, which is safe, con-

venient, and economical. Pour a few drops of chloroform on a piece of old domestic or linen, two or three inches square, and secure this in the palm of the hand by partially closing it. A sort of cup is thus formed, which can be nicely adjusted to the nose so as to admit a free supply of air, while none of the vapor escapes. By closing the hand entirely on the rag when it is occasionally removed (which should always be done), evaporation is suspended and all waste prevented. By this method anæsthesia is readily induced, and may be sustained for a long period with a very small amount of chloroform.

Uses. — Chloroform is no longer confined exclusively to surgery, but has been found to be a most valuable therapeutic agent in many diseases. Much of the prejudice which at first existed against its employment during labor, has been removed. In my opinion, it should always be given, when not positively contra-indicated, not simply to alleviate much unnecessary suffering, but because, in most cases, it acts as a direct parturient. When, for example, the mucous membrane of the vagina is diseased, it often becomes very irritable, so that after the fœtus has been partially expelled from the womb, its further progress is retarded by firm contractions of the vaginal walls, excited through reflex nervous action. By relaxing these contractions, as well as the muscles of the perinæum and soft parts generally, the latter stages of labor are greatly expedited. It is not necessary to administer chloroform until the "bearing-down," or true expulsive pains come on, and then not in sufficient quantity to induce complete anæsthesia. If given in the manner described, suspending it entirely between the pains, it may be continued for a long period without the slightest danger.

The objection has been urged, that it favors the occurrence of hemorrhage after delivery. If this be true, the casualty can always be averted by giving ergot, timing its administration so that it will take effect just at the completion of the labor. Indeed, whenever I find the uterine contractions feeble, when the labor has been protracted, or there is the least predisposition to hemorrhage, I always give the ergot, thus securing a firm contraction of the uterus and speedy expulsion of the placenta.

Puerperal Convulsions. — In this fearful malady chloroform is invaluable. Whether the convulsions occur before or after the birth of the child, establish complete anæsthesia at once, apply ligatures to the extremities, and resort to such other remedies as are indicated to give permanent relief, being careful not to suspend the chloroform entirely until all symptoms of spasms have passed off. In one case I had to continue its use for seventeen hours before the patient was entirely relieved.

Intermittent Fever. — In the cold stage of this disease, especially when the chill is severe and the congestion great, the inhalation of a little chloroform will speedily arrest the rigors, or "shake," and the distressing sensation of cold; allays the mental disquietude and nervous excitement; equalizes the circulation and restores warmth; in a word, breaks up the chill at once, and greatly modifies the subsequent fever. In 1858, I first tried it upon myself as an experiment, and finding it to act so well, have since continued it regularly in general practice. Latterly, however, I am in the habit of giving it internally, one dose being generally sufficient to stop the "shake" and procure profound sleep. During the intermission, of course, the usual remedies must be resorted to, as it is not claimed that the chloroform is positively curative. I believe, that if given in time, almost every case of that terrible disease — the congestive chill — would be averted.

Cramp Colic. — In this painful, spasmodic affection, forty drops of chloroform and a drachm of spirits of camphor will relieve almost immediately.

Erysipelas. — A few applications locally will often speedily remove erysipelatous inflammation.

Dysmenorrhœa. — Some women suffer intense pain just before the menstrual flow is established, in consequence of irritability of the neck of the womb, which becomes spasmodically constricted as soon as the secreted fluid comes in contact with its sensitive surface, on its downward passage. The discharge is thus retained in the *fundus uteri*, acting as a constant irritant, and causing great suffering until a free exit is obtained. In such cases, the inhalation of a little chloroform at once overcomes the difficulty, the menses appear, and continue regularly.

Asthma. — The discovery of any agent that will speedily relieve the mental and physical torture, and intense distress attending a paroxysmal attack of asthma, cannot be too highly estimated. The victim of this annoying disease has found this boon in chloroform. A few whiffs will generally allay his suffering. When repeated very frequently, however, a larger quantity is required, and its good effects are not so marked.

Neuralgia and Muscular Rheumatism. — Applied locally, chloroform may be so managed as to produce on the skin every grade of excitement, from a slight irritation to complete vesication. In addition to its counter-irritating action, we have in it also a local anodyne. A piece of linen moistened with it should be laid over the seat of pain, and, with the palm of the hand, kept firmly pressed to the skin. This should be continued as long as the patient can endure the burning, or until sufficient irritation is induced, and repeated from time to time. Dr. Dupay de Frenelle speaks very highly of this mode of treating idiopathic neuralgia and muscular rheumatism (which he regards as modifications of the same disease), and reports 150 cases cured by this treatment, in no instance having to repeat the application more than twelve times. In sciatica it should be applied over the course of the nerve, from its origin to termination.

Preventing Hysteria and Epilepsy. — In hysterical and epileptic convulsions, the more violent and long-continued the spasms are, the greater the shock and consequent injury to the nervous system. Inhaling chloroform while the fits are on cuts them short, and if taken in time, often entirely wards off their occurrence. The mental aberration and stupor which follow are greatly lessened. Dr. Brown Sequard recommends it highly in these cases.

Cholera. — Chloroform was used in this disease as early as 1848, by D. G. Hill, of the Peckingham Lunatic Asylum. The patient should be anæsthetized, while brandy and other agents are also employed. I have no experience with it in this malady, but am of the opinion, from its efficacy in congestive chill (varieties of which present many features similar to cholera), that it would prove a very efficient remedy, particularly if given internally, combined with camphor and turpentine.

There are other diseases in which this agent may be beneficially employed, both locally and internally, placing it among one of our most positive and reliable remedies, and all its virtues have not yet been discovered. In general, where there is muscular contraction, or pain, arising from nervous irritation, it will be found to be a useful remedy.

Unfortunately, its soothing effects are too well known to the non-professional; and it is a growing habit, particularly among females, to resort to their chloroform bottle, not only for relief from physical, but mental suffering. Accidents are thus liable to happen, and injury result, from a too frequent use of it. The constitutional effects of its prolonged and oft-repeated employment, according to the observations of Dr. Hyde Salter, are insomnia, deafness, apathy, and tremulousness of the hands. In general, they may be stated to be similar to those induced by the abuse of alcoholic stimulants and opium; and hence, there is great danger attending its indiscriminate use by the masses. — *A. E. M. Review.*

A Sentiment by Dr. Holmes. — At the late meeting of the Massachusetts Medical Society, Dr. O. W. Holmes made some remarks in reference to a charge, that in his writings he drew all his villains from the clerical and legal professions. He said: —

"I am afraid I shall have to square accounts by writing one more story, with a wicked physician figuring in it. I have long been looking in vain for such a one to serve as a model. I thought I had found a very excellent villain at one time, but it turned out that he was no physician at all, only a —— ; I mean, not what we consider a practitioner of medicine.

"I will venture to propose a sentiment which, as I am not a working physician, need not include the proposer in its eulogy:

"'The Medical Profession — so full of good people that its own story-tellers have to go outside of it to find their villains.'"

☞ The next number of the *Journal* will contain "Chemistry of a Cup of Tea."

ON THE MODE OF MANUFACTURING SUGAR-COATED PILLS AND GRANULES.

Mr. Henry C. Archibald, in an inaugural essay presented to the Philadelphia College of Pharmacy, published in the *Journal of Pharmacy*, gives the following as the process for sugar-coating pills. In view of the extensive use of medicines in this form, it will be of interest to our readers.

The manufacture of sugar-coated pills and granules having, of late, become a source of great profit and trade to the apothecary, the mode of manufacturing them being kept secret, and the views advanced by some of our leading pharmaceutists being wholly inadmissible in preparing them, I have, from long practical experience in their manufacture, determined to make it a subject for an essay. In order to make pills that shall medicinally come up to the standard of the U. S. Pharmacopœia in therapeutic effects, the greatest care requisite in their manufacture is in the selection of the drugs that enter into their composition. For that purpose it is advisable, when you manufacture them largely, to buy the crude drugs, and from them prepare extracts, powders, etc., so as to insure the reliability of the pills, and to keep up for them the reputation they so richly deserve if properly prepared.

The first step in the process of manufacturing pills is essentially as follows: Sufficient mass is made up at one time to be capable of being divided into 2,000 pills, great care being observed to have it of sufficient hardness and tenacity to insure the pills, after formation, against indentation by pressure, and crumbling into irregular pieces; after which, the mass is rolled between two boards, the upper with teeth inserted for cutting the mass, the bottom one having a gauge attached to the sides so as to regulate the sides to suit the mass to be subdivided previous to rolling them out into pills; and further, to insure accuracy, each subdivided piece of mass is carefully weighed on well-balanced scales, thereby preventing the possibility of any pill being larger than another. The pills are then cut by machinery suited to the size of the pill, and, as they are formed, roll into large shallow trays filled with some inert powder, which acts not only as an absorbent of the moisture in the pill, but prevents them, while drying, from becoming irregular and losing their shape. I would state that the trays vary in size, and are capable of holding from 7,000 to 20,000 pills, when spread evenly over the surface. When filled, the trays are removed and kept in a heated room, the temperature of which is regulated, as nearly as possible, to from 80° to 90° F.; when of sufficient hardness, they are separated from the powder by sifting, and a coating of a solution of warm gelatine is placed over them, and when thoroughly diffused over the pills, some inert powder is thrown over them to prevent their adhering together. After the gelatine has thoroughly fixed itself upon the pills, they are thrown into a large circular copper pan, suspended over a fire by means of chains attached to the ceiling, and a thick syrup, made in the proportion of 2 lb. av. of sugar to ℥ xii of water, is added successively with constant attention until dry, and so on until the pills assume a neat and regular appearance. The time it takes to coat pills properly varies much, according to their nature; those composed of resins, which become soft by heat, it takes a longer time, from the fact that you have to lower the temperature of the fire, and consequently a longer time is required to drive off the water in the syrup; but, from experience, I can safely say, that the average time consumed to coat properly a batch of 7,000 pills is from 9 to 10 hours. As thus prepared, the sugar crystallizes regularly upon the pill, and presents to the eye not only a uniform, but a smooth appearance; they are entirely soluble, and will keep for an indefinite period without becoming hard, and consequently more or less insoluble in the gastric juices of the stomach. I present, herewith, some compound cathartic pills, together with granules of morphia, made and coated by the above process, which have been on hand about four months.

Granules are made upon the same principle, by incorporating the alkaloids or salts with some inert powder and gum arabic for its adhesiveness, and are dried and coated in the same way. I could still further enlarge upon the above process, but my sole aim is to present, in as brief a manner as possible, only the chief points in their mode of manufacture.

TOOTH-POWDERS AND MOUTH WASHES.

The teeth should be fairly used, not made to perform the duties of crackers for nuts, nor to rival scissors in cutting thread; for rest assured, the teeth so unwittingly injured will always be the first to part company from their fellows. Cleanliness is absolutely essential for the preservation of the teeth, and they should be well brushed at least morning and evening, that any feculence which may be attached to them, either during sleep from the stomach, or by day from meals, may not be allowed permanently to adhere, causing, firstly, discoloration, then tartar, and subsequently undermining the health of one or more, as from their position they may be more or less liable to corrosion. In order that the teeth should look natural, — that is, retain their natural color, — a dentifrice free from the smallest particle of acid should be used in the morning, and the mouth rinsed with tepid water; for extremes of heat and cold are most highly prejudicial both to their color and durability. The persons who habituate themselves to hot soup, tea, or other drinks, will be sure to suffer in their teeth. Brushes for the teeth should be of medium substance of bristle, and those made on what is called the penetrating principle are best. Children at an early age should be instructed in the use of the toothbrush, and taught the value and importance of the teeth, in order to inculcate habits of cleanliness and a due appreciation of the ornaments of the mouth. A brush properly selected, not too hard, may be used by children of five years of age every morning; and by being part and parcel of the general ablution, and thus directing habitual attention to the teeth, a useful and cleanly habit will be engendered which will probably insure for them proper care through life.

Tooth-powders, regarded as a means merely of cleansing the teeth, are most commonly placed among cosmetics; but this should not be, as they assist greatly in preserving a healthy and regular condition of the dental machinery, and so aid in perfecting as much as possible the act of mastication. In this manner they may be considered as most useful, although, it is true, subordinate medicinal agents. By a careful and prudent use of them, some of the most frequent causes of early loss of the teeth may be prevented; these are, the deposition of tartar, the swelling of the gums, and an undue acidity of the saliva. The effect resulting from accumulation of the tartar is well known to most persons; and it has been distinctly shown that swelling of the substance of the gums will hasten the expulsion of the teeth from their sockets; and the action of the saliva, if unduly acid, is known to be at least injurious, if not destructive. Now, the daily employment of a tooth-powder sufficiently hard, so as to exert a tolerable degree of friction upon the teeth, without at the same time injuring the enamel of the teeth, will, in most cases, almost always prevent the tartar accumulating in such a degree as to cause subsequent injury to the teeth; and a flaccid, spongy, relaxed condition of the gums may be prevented or overcome by adding to such a tooth-powder some tonic and astringent ingredient. A tooth-powder containing charcoal and cinchona bark will accomplish these results in most cases, and therefore dentists generally recommend such. Still, there are objections to the use of charcoal; it is too hard and resisting, its color is objectionable, and it is perfectly insoluble by the saliva; it is apt to become lodged between the teeth, and there to collect decomposing animal and vegetable matter around such particles as may be fixed in this position. Cinchona bark, too, is often stringy, and has a bitter, disagreeable taste. M. Miahle highly recommends the following formula: —

MIAHLE'S TOOTH-POWDER.

Sugar of milk, one thousand parts; lake, ten parts; pure tannin, fifteen parts; oil of mint, oil of anise-seed, and oil of orange flowers, so much as to impart an agreeable flavor to the composition.

His directions for the preparation of this tooth-powder are, to rub well the lake with the tannin, and gradually add the sugar of milk previously powdered and sifted; and lastly, the essential oils are to be carefully mixed with the powdered substances. Experience has convinced him of the efficacy of this tooth-powder, the habitual employment of which will suffice to preserve the gums and teeth in a healthy state. For those who are troubled with excessive relaxation and sponginess of the gums, he recommends the following astringent preparation: —

MIAHLE'S DENTIFRICE.

Alcohol, one thousand parts; genuine kino, one hundred parts; rhatany root, one hundred parts; tincture of balsam of tolu, two parts; tincture of gum benzoin, two parts; essential oil of canella, two parts; essential oil of mint, two parts; essential oil of anise-seed, one part.

The kino and the rhatany root are to be macerated in the alcohol for seven or eight days; and after filtration the other articles are to be added.

A teaspoonful of this preparation mixed in half a goblet of water should be used to rinse the mouth after the use of the tooth-powder. The word dentifrice is derived from *dens, frico* — a tooth, I rub. — Piesse: *Art of Perfumery.*

Universal Pharmacopœia. — At the last meeting of the Pharmaceutical Society the chairman stated that he had received an invitation to send delegates to Paris in August next, for the purpose of compiling a universal pharmacopœia. It seemed to be the general impression of the leading members present that it would be impossible to assimilate the whole of the pharmacopœias.

The system of dieting in cases of diabetes, especially in patients advanced in life, is not always required to be permanently persisted in. It often, and indeed in old people generally, happens that the healthy state becomes thereby so restored, that an ordinary diet can be taken without any appearance of sugar, or only a little, in the urine. This, however, only happens after perseverance for a few months or a year. Dr. Pavy, whose observations the above are, has lately seen a case in a lady sixty-five years of age, where the sugar disappeared from the urine in a week, whereas, previously to following the restricted diet prescribed for her, she had been passing forty-eight grains of sugar to the ounce. — *Dr. F. W. Pavy.*

The Castor Bean. — The culture of the castor bean is much like that of corn, being regarded by many as less laborious and expensive. Good corn land is suited to the castor bean. If not fertile, it should be heavily manured, as the plants are great feeders. The ploughing and dragging should be done in the most efficient manner. Plant when the frost is well passed and the ground has become warm. The hills should be at least four feet apart each way. Some cultivators prefer seven feen. One plant to the hill is enough, but several seeds should be planted to guard against accident. Sometimes a space is left once in four rows wide enough to admit a farm wagon, so as to facilitate harvesting the crop. The ground should be cultivated several times, that the plants may attain a vigorous growth. Scarcely any crop pays better for thorough cultivation than this. Twenty bushels per acre, is a full average yield. The market price is variable. During the past winter the beans in the St. Louis market have ranged from $3.90 to $1.25 per bushel. As the cost of growing does not differ materially from that of corn, the approximate profits can be calculated. At the present depressed condition of the market, an acre of beans would yield about $25, leaving but little margin for profit. The oil is quoted at $2.10 to $2.25 per gallon. As the yield of oil is about 68 gallons per acre, the manufactured oil would amount to about $150 per acre. This gives $4 to the manufacturer to $1 to the producer, a division which cannot be regarded as equitable. Formerly the castor bean was largely cultivated in the southern counties of Illinois, but had become unprofitable previous to the rebellion. This event, causing an advance in price of two hundred to four hundred per cent., revived its culture from almost nothing in 1860, to many thousand bushels in 1864. St. Louis is the great market for the crop, more oil being manufactured there than at any other point in the country. The receipts at St. Louis from all sources during the last year, exceeded 50,000 bushels. — *Prairie Farmer.*

Responsibility of the Chinese Physician. — The physician is greatly responsible for his patients. If he fails to cure, the patient, or his friend, may prosecute him at once. If, through any inattention or mistake, he has caused the death of a person, he must pay the penalty — which penalty generally means the support of the family. If through a fatal medical blunder this happens, he is for ever afterwards prohibited from practising his profession — a regulation that might, perhaps, prove advantageous in other countries. Visits are never charged; they simply charge for the medicine used, and it is always on trust until the patient gets better, — conditions not very favorable for large incomes and great wealth. — Dr. Wiley: *Cinn. Lancet and Obs.*

Gleanings

FROM FOREIGN AND DOMESTIC JOURNALS.

Treatment of Pneumonia in the Edinburgh Children's Hospital. — In all cases of acute pneumonia, the intensity of the fever and the strength of the child, estimated by the pulse and the extent of the lesion, are taken into account before any treatment is commenced. If the disease is in its first stage; if the fever is strong and the pulse good, small doses of wine of antimony and of ipecac are prescribed with a solution of the acetate of ammonia; five drops each wine every three hours if the child is young, more if older. Occasionally small doses of dilute nitric acid and tincture of digitalis are added. When the children are in such a state of prostration as to require stimulants, they are given a mixture of liquor ammoniæ aromatici and of spirits of nitre, with a dessert spoonful of wine every three hours, and milk and beef tea. When the cough is severe, a rare thing in children, it is treated by hydrarg. cum. cretâ, or Dover's powders. As long as there remains any acute symptoms, especially if there be any dyspnœa, hot fomentations are kept upon the chest. During convalescence the treatment is tonic and restorative. — *Bulletin Gen. de Therapeutique.*

Muriate of Ammonia in Milky Engorgements of the Breast and in Lymphatic Tumors. — In a recent clinical lesson at the Hotel Dieu, of Paris, M. Guéneau de Mussy called the attention of the students to several cases in which the muriate of ammonia had been applied to milky engorgements of the breast. As the affection is a very common one, its success is interesting. The manner of application is by preparing poppy poultices, or flaxseed poultices, made with some preparation of opium, and sprinkling them with a solution of the muriate, one or one and a half drachms to the ounce of water. In case of lymphatic ademitis, M. de Mussy has found the following pomade of great service:

℞ Adipis, ℥i.
Ammon. Mur. ℥iss.
Camph. gr. xv. M.

To be applied two or three times a day, and kept covered with cotton batting.

Bromide of Potassi in Epilepsy. — M. Narnias, of Venice, in a note to the Acad. des Sciences, recommends the use of the bromide of potassi in epilepsy occurring independently of any organic lesion. In one case he carried the dose to half an ounce daily; but the patient lost strength, could not walk, and became delirious, which phenomena were attributed partially to the remedy. M. Narnias commences with five grains, three times a day, in water, and gradually increases to thirty or forty grains a day. This salt has been detected in the urine fourteen days after the administration had ceased.

Muriate of Ammonia in Senile Gangrene. — The *Bulletin Medicale de l'Aisne* contains a case of senile gangrene of the foot successfully treated by a foot-bath containing eight ounces of the muriate of ammonia. The sedative action of this salt, which has not been heretofore remarked, was immediately perceived, and the cicatrization was very rapid.

Remedies for Hydrophobia. — M. Maygrier, Secretary of the Agricultural School at Saulsaie, has just published a critical, historical, and bibliographical memoir, upon the remedies for hydrophobia from the sixteenth century to the present time. This is a resumé of the opinions of the most competent authors, and is summed up in four propositions: —

1. Hydrophobia is incurable, and is yet waiting its specific.
2. There is no certain prophylactic for hydrophobia.
3. The best protection lies in a knowledge of the precursory symptoms in the dog, as they are given by Youatt, Boulay, and Sanson.
4. When a person has been bitten by a mad dog, the wound should be at once deeply cauterized with an iron heated to a white heat, or in default of this, by the most powerful caustics, of which the muriate of antimony is the best.

Comparative Mortality among Children brought up Artificially and Naturally. — In the Department du Calvados, France, the mortality of infants brought up by the breast is 10 per cent.; of those brought up by the bottle or otherwise, 30 per cent.

Formulae

USEFUL IN MEDICINE AND THE ARTS.

To Beautify the Teeth. — Dissolve two ounces of borax in three pounds of boiling water, and before it is cold add one teaspoonful of the spirits of camphor, and bottle for use. A tablespoonful of this mixture, mixed with an equal quantity of tepid water, and applied daily with a soft brush, preserves and beautifies the teeth, extirpates all tartarous adhesion, arrests decay, induces a healthy action of the gums, and makes the teeth pearly white. — *Ex.*

Horsley's Torpedo Powder is a compound of chlorate of potassa and nut-galls, in the proportion of three to one by weight; ground and sifted separately to fine powder, and afterward intimately blended by passing together through a series of fine horse-hair sieves arranged one above another. If treated with care, and not brought in contact with combustibles, it is not particularly dangerous, and is of nearly three times the strength of the best gunpowder.

Wall Coloring. — A new wash, said to be almost as durable as paint, and well suited to plaster, wood, metal, or brick, has been invented by Dr. Jacobsen, of Hamburg. He dissolves 50 parts of glue in 150 parts hot water, with 2 parts of a solution of caustic soda, of specific gravity 1.34, and boils After cooling, he adds 50 parts of commercial water glass solution, and then stirs in enough oxide of zinc to give a proper consistency for painting. Grind smooth in a paint mill, if necessary. After the last coat has perfectly dried, a solution containing 10 per cent. of chloride of zinc should be applied. This will give a beautiful gloss and great durability. Earthy pigments not affected by alkalies may be used for color. The mixture must be applied quickly, as it will not keep.

Preservative against Cholera. — (See also *Amer. Journ. Pharm.*, 1866, *p.* 46.) Dr. La Roche, of Kurnik, recommends quinia for this purpose, and states: I believe, that this remedy is of no less value against this disease than vaccination against the smallpox. Adults take, at the approach of the epidemic, twenty-four grains in hourly doses of two grains; afterwards, for three weeks, two grains three times a day, when the dose is diminished to two grains morning and night, and this continued until after the disappearance of cholera. Grown persons may take it in pills, children best in syrup of liquorice root. The regimen must, of course, be a proper one, and the well-known rules for the prevention of cholera must be strictly observed. I also warn earnestly from the repeated use of the so-called cholera bitters, liquors, etc., which are directly deleterious, and increase the disposition to this disease. They are the serpent among flowers. — *Ph. Centrahalle*, 1866, *N.* 40.

Modelling Clay, moistened with glycerine, is recommended for all the qualities of wax except expensiveness and susceptibility to changes of temperature. The clay must first be perfectly dried

Cleansing Casks by Fire is a cheap, short, and effectual mode, much in use in some parts of the world. Rancid pork, lard, and butter casks may be purified by burning straw or shavings in them.

To Wash Calico without Fading. — Infuse three gills of salt in four quarts of water; put the calico in while hot, and leave it till cold, and in this way the colors are rendered permanent, and will not fade by subsequent washing.

Dull Black on Brass is obtained by rubbing the surface first with tripoli, and then washing it with a solution of one part neutral nitrate of tin with two parts chloride of gold. After ten minutes wipe it off with a wet cloth.

To Drive Away Rats. — Coal tar mixed with sand to the consistency of thick mortar, is an effectual stopper to rat-holes. Or, rats may be driven off by catching one, soaking him in coal tar, and then letting him run.

White Liquid Glue. — L. Knaffl macerates three parts glue with eight parts water, adds one half part muriatic acid and three fourths part white vitriol, and digests for 12 hours at a temperature of 65 to 70 R.

Cement for Leather. — Common isinglass melted in water as ordinary glue, with a little alcohol added, and applied hot.

New Marking Ink, by E. Jacobsen. — No. 1. 8.52 grm. crystallized chloride of copper, 10.65 grm. chlorate of soda, and 5.35 grm. chloride of ammonium are dissolved in 60 grm. water.

No. 2. Twenty grammes muriate of aniline dissolved in 30 grm. water, and mixed with 20 grm. mucilage of gum arabic and 10 grm. glycerine. Four parts of No. 2 are mixed, cold, with one part of No. 1, and this mixture is used for marking. The parts marked are held in the vapors of boiling water, which brings out the black color; after which, the cloths on the parts marked are washed.

BOSTON JOURNAL
OF
CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, SEPTEMBER 1, 1867. No. III.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.
RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.
A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Chemistry.

CHEMISTRY OF A CUP OF TEA.

BY THE EDITOR.

A little shrub grows in various parts of the world, principally in China and Japan, which produces leaves of a very remarkable chemical character; and vast numbers of people of all nations have somehow acquired the habit of steeping the leaves in water, and using the infusion freely as a beverage. The plant (*Thea Sinensis*) is a polyandrous evergreen shrub, growing three or four feet high, and bearing a white and somewhat odorous flower. According to botanical classification, it belongs to the camellia family, and is therefore allied to the beautiful flowering shrub which adorns our greenhouses and gardens.

It is certainly a very remarkable and significant fact, that three or four vegetable productions, entirely unlike in appearance and remote in birthplace, should be appropriated, as it were, by the common instincts of millions of people, to the production of an exhilarating and refreshing beverage. Tea, coffee, cocoa, and the *mate* plant (*Paraguayan Tea*), are alike capable of furnishing a principle which seems to meet a peculiar and natural want of the human system. No other plants yet discovered are capable of furnishing this principle.

Long before chemistry was understood as a science, or before it was capable of revealing the nature of the subtle and complex principles of organized structures, tea and coffee had secured their firm hold upon the appetites of vast numbers of the human family; and the poor and the rich, the peasant and the prince, were alike extravagant in their praises of the grateful beverages.

Physicians commenced early to attack them, but then, as now, little heed was given to their warnings. An English medical writer, in 1722, remarks as follows: "Among many other novelties, there is one which seems to be particularly the cause of the hypochondriac disorders, and is generally known by the name of thea, or tea. It is a drug which has of late years very much insinuated itself into our diet, though its occupation is not less destructive to the animal economy than opium and some other drugs which we have learned to avoid." Think of calling tea a *drug*, and classing it with opium! Dr. Gettsom, another physician, in the early part of the last century, wrote a rather sensible tract upon tea-drinking, but his fears of its abuse ran away with his judgment. He thought that excess in its use led to excess in the use of spirituous liquors, and drunkenness was thereby promoted. Old Jonas Hanway, a writer of note, was particularly emphatic in his condemnation of tea. "Men," he says, "seem to have lost their comeliness, and women their beauty, in consequence of the use of tea." Notwithstanding all denunciations, tea-drinkers would have their own way, and its use rapidly increased.

Dr. Johnson speaks of himself as a "hardened and shameless tea-drinker, who for twenty years diluted his meals with the infusion of this fascinating plant; whose kettle had scarcely time to cool; who with tea amused the evening, with tea solaced the midnight, and with tea welcomed the morning."

All investigations among plant structures, all researches in pursuit of satisfactory substitutes for tea and coffee, have resulted in failure.

It was evident to the earliest consumer that they contained some mysterious principle which distinguished them from all other productions in the vegetable world; but it remained for modern chemistry to unravel the mystery, and point out the peculiar nature of these agents. Chemistry has solved many curious problems in the world of organized matter, but scarcely any more interesting than those connected with the tea plant. We learn from its teachings that there is stored up in tea a complex substance identical in composition with that found in coffee, cocoa, and mate. It is called *theine.* This substance in coffee is called *caffeine;* in cocoa or broma, *theo-bromine.* Although the names are different, they are essentially alike in chemical composition. Tea affords a much larger amount than coffee; and the *caffeine* of commerce is in fact prepared by manufacturing chemists from tea. Theine or caffeine is used to a considerable extent by physicians of the homœopathic school, as a hypnotic, or medicine for producing sleep, their theory leading them to employ an agent which causes wakefulness, to cure it. The element nitrogen enters largely into the composition of theine; and wherever we find this predominating in any alimentary substance, we may be sure that its effects upon the system will be of a marked or active character. Theine is prepared in the laboratory upon a large scale from spoiled tea, or that which is damaged in transportation, black tea being preferred, on account of its affording a better yield. One hundred pounds are usually manipulated at once, and from this amount about twenty-six or twenty-eight ounces of beautiful white, silky crystals of theine are obtained.

Besides this remarkable principle, tea contains tannic acid, to which it owes its astringency; a volatile oil, to which it owes its peculiar aroma; a large amount of caseine, and other substances common to all plants.

In order to present more clearly or precisely the chemical nature of tea, we may state that *one pound* of good tea contains about a third of an ounce of theine, two and a half ounces of caseine, one twelfth ounce of volatile oil, two and a half ounces of gum, half an ounce of sugar, half an ounce of fat, four ounces of tannic acid. Mineral matter or ash, water, and woody fibre, make up the remainder.

Caseine, of which there is so large a quantity, it will be remembered, is the nutritive principle of *milk;* vegetable caseine, or legumen, is analogous in principle. Tea is therefore a highly nutritious substance, and fully capable of forming flesh and sustaining life. Peas and beans are

highly concentrated forms of food, and yet analysis shows that the better qualities of tea are as rich in the nitrogeneous element or nutrient principle as are these seeds. Cascine is identical in composition with the muscular fibre and with the albumen of the blood, and is easy of assimilation.

In preparing the infusion, but little of the caseine is dissolved, and also but a small amount of tannin; therefore we throw away in the infused leaves these two preponderating principles. A cup of tea holds in solution the theine, volatile oil, sugar, and small portions of the tannin, gum, and caseine. Why should we not consume the infused leaves, as food? We might do so, and secure a large amount of nourishment; but the presence of so much insoluble tannin would produce astringent effects of an unpleasant character. Remove this, and exhausted tea leaves might at once be regarded as a valuable dietary article.

Chemical examination of a cup of Souchong tea of ordinary size, prepared in the kitchen for family use, showed that the hot water had taken up and held in solution, 1.03 grains of theine, 2.07 grains of tannin, gum, starch, caseine, and sugar, about 7 grains, and small quantities of coloring matter and volatile oil. This may be regarded as a fair exhibit of the amount of vegetable or chemical principles held in a cup of the best quality of black tea, as prepared in families. It will be seen that the amount extracted from the leaves, and which produces such marked exhilarating effects, is apparently minute. This may surprise some who are not acquainted with the wonderful effects exerted upon the system by almost infinitesimal quantities of the vegetable alkaloidal principles. The beautiful white crystals of silky fineness, which the chemist extracts from belladonna leaves, from the calabar bean, the seeds of the tree *strychnos nux vomica*, from the exuding gum of the poppy plant, etc., are deadly in their effects, even when quantities are taken, no larger than can be held upon the point of a penknife blade. The impression was created, several years ago, through the clamor of a crowd of empirics interested in a system of doctoring by the exclusive employment of vegetable decoctions and tinctures, that all deleterious substances and poisons were confined to the *mineral* world; but the dissemination of learning, and a growing intelligence among the masses, has in a measure dispelled this delusion.

Ultimate analysis of theine gives the following result:

Carbon	49.30
Hydrogen	5.58
Nitrogen	28.83
Oxygen	16.29
	100.

It will be seen that the element nitrogen enters largely into its composition, and confers upon it peculiar and distinguishing properties. Altogether, it is a remarkable substance, and capable of influencing the vital processes in a very unusual way. We cannot, however, believe that the peculiar effects of tea are due wholly to the theine. It is undoubtedly the active principle; but in its isolated condition it is incapable of affording all the effects derivable from the infusion of the tea-leaf. The blending of all the constituents soluble in water, is requisite to this result.

In preparing a cup of tea, we employ water heated to nearly or quite the boiling point, as experience has proved this temperature to be necessary to dissolve out the principles desired. The peculiar solvent powers of water are wonderful, not only when considered in connection with tea leaves, but all other substances upon which it exerts specific action. Its solvent powers are wisely controlled and limited, and its physical and chemical relations to all substances, organic and inorganic, are marvellously adjusted. But, however strongly tempted to enlarge upon this point, we can only call attention to its effects upon tea. Its power over tea leaves is limited, and it can dislodge and hold in solution only such principles and portions of principles as are necessary to form the beverage in the highest perfection. Suppose it was capable of dissolving all the tannin, the infusion would be more in place in the vats of the tanner, than upon the tea table. However nourishing and healthful is the caseine or gluten, it would, probably, if the whole amount were present in tea, impair its flavor, and interfere with its characteristic appearance and effects. The adjustment of its solvent powers upon tea is probably perfect, when the conditions under which its acts are understood and adhered to. It is capable, by long-continued boiling, in connection with tea, of extracting an undue proportion of tannin, and thereby rendering the infusion unpleasantly astringent; but no amount of boiling will render one half of the whole quantity soluble.

No chemical substance can be added to tea to improve its flavor or general healthfulness. Some of the alkaline carbonates, like soda, aid the water in dissolving the caseine, but its addition spoils the tea.

If the soil and the conditions of our climate were favorable for the cultivation of the tea plant in our gardens, it would be of but little service to us, unless we were acquainted with the nice methods of drying or curing it. The green leaves, when first removed from the tree, are like the leaves of most other plants, having but little astringency, no odor, or bitter taste. Like coffee, the peculiar characteristics of tea are developed by roasting; and this is a very nice process. The Chinese are so adroit at the business as to be able to prepare a half-dozen qualities of tea from the same leaf. Important chemical changes are wrought in the leaf by the processes of drying and roasting, so that the same leaf furnishes the green and black tea of commerce. As regards the exact physiological effects of tea upon the animal economy, different opinions continue to prevail. It is quite unnecessary to discuss this point. The writer has for a series of years carefully observed its effects upon himself, and is free to state, that it is no matter of wonder with him, that "brain-workers," in all the years since tea was introduced, have regarded it with the highest favor. It has a power to subdue irritability, refresh the spirits, and renew the energies, such as no other agent possesses. When the system is exhausted by labor or study, a cup of tea re-invigorates and restores as no form of food or other beverage can. As regards the ultimate effects of tea-drinking, it can be said that Bishop Huet, of Avaranches, the celebrated scholar, who wrote in its praise at the age of *ninety*, affords by no means a solitary instance of longevity coupled with its free use. Tea saves food by lessening the waste of the body, soothes the vascular system, and affords stimulus to the brain. The young do not need it; and it is worthy of note, that generally they do not crave or like it. Children will frequently ask for coffee, but seldom for tea. To aged people, whose powers of digestion and whose bodily substance have begun to fail together, it is almost a necessity. Like all other blessings, it is liable to abuse, and hence has arisen much of the prejudice against its use. There may be some declaimers against the moderate use of tea, whose consistency or moral sense may not be unlike that of Mr. Henry Saville, who, writing to his uncle, Secretary Coventry, about two hundred years ago, remarked, that many of his friends "had a base unworthy Indian practice, of calling for tea, instead of *pipes* and *bottles* after dinner." If the use of tea is a pernicious habit, we may remark, as did the same writer at the close of the letter to his uncle, "*The truth is, all nations are growing so wicked as to have some of these filthy customs.*"

Chemistry Applied to the Arts.

LIEBIG'S RECOLLECTIONS OF GUY-LUSSAC AND THENARD.

We present our readers with a full report of Baron Liebig's remarkable speech at the International Banquet of Chemists at Paris, as reported in the *Laboratory*. M. Balard having proposed Liebig's health in terms of unqualified admiration, the Baron replied: —

Gentlemen, — I assure you that I am deeply touched and extremely thankful for the sentiments which my honorable *confrère*, M. Balard, has just expressed concerning me. Being called upon in my turn to propose a toast, I will give you one which I am sure will meet with your fullest approbation. I am going to propose a toast to the memory of two of the greatest French chemists — of two of the founders of modern science, whose admirable works have never been surpassed, and still remain our models — of two *savants* who, as men, represent the most elevated qualities of the French nation. You will guess that I allude to Gay-Lussac and Thénard.

You all know, gentlemen, the great discoveries which we owe to the united efforts of these two men, connected by the ties of the closest friendship, and whose works, indeed, have their origin in that very friendship.

You know why their names will always remain inseparable in the history of science. You are fully aware, gentlemen, of the merits of Guy-Lussac, and of Thénard, but there are few amongst you who have had the good fortune of being personally acquainted with these learned men. I feel called upon to pay them my tribute of gratitude by addressing a few words to you. What they both did for me will suffice to show you what they did for many others.

I arrived in Paris, forty-four years ago, as a young student, a mere boy of nineteen years, without any recommendation except my desire for learning, I had brought with me to Paris a small work on the fulminating compounds of silver and mercury, and I addressed myself to M. Thénard to present it to the Academy.

The President of the Academy (for Thénard occupied that position at the time) received the young foreign student with the greatest kindness. The note was read by Guy-Lussac, and Dulong made the report on it.

From that moment I had the warmest friends in Paris. M. Thénard placed me in a laboratory where I might pursue my labors; and my good fortune was at its highest when M. Guy-Lussac admitted me to his house, opened his laboratory in the Arsenal to me, and proposed that I should stay with him to finish my work on fulminating silver and mercury.

This was what decided the aim of all my subsequent works. He used to say to me repeatedly, "You must occupy yourself with organic chemistry, M. Liebig; that is what we are in want of." I believe that I was his first pupil. After me he had my friend Pelouze, whom a cruel malady keeps away from us to-day. [The death of Pelouze occurred soon after the banquet.]

I shall never forget the hours spent in the laboratory of Guy-Lussac. When we had finished a good analysis (you know, without my telling you, that the method and apparatus described in our joint memoir were by him alone) — when we had finished a good analysis, he used to say to me, "Now you must dance with me, as I used to dance with Thénard when we had found something good." And then we danced.

Gentlemen, — You have often heard Thénard called Father Thénard, and he was, indeed, a father to us — a father to all of us, who always offered and never refused to lend a hand to the weak, to assist them to mount the steps of the ladder, and to overcome difficulties.

M. Dumas can say nothing on that head; he was, as he deserved to be, the favorite of Thénard. On this

point there could not be two opinions — he was then the first among us, and he remains the first.

Thus, gentlemen, I give you the memory of Guy-Lussac and of Thénard, the founders of our modern science, and the representatives of the highest qualities of French character.

Artificial Milk. — At the last meeting of the Academy of Medicine, M. Giboust, Professor at the School of Pharmacy, read a paper which we cannot help noticing. He called the attention of the medical world to the description given of the artificial milk invented by Baron Von Liebig, and regretted very much being obliged to enter into a controversy with him. After having reminded the assembly of the composition of this milk, and insisting upon the difficulties attending the preparation of such aliments in places where it might be most necessary, such as with wet-nurses or small families, M. Giboust added that we have at our disposal a natural product which more nearly resembles human milk than does a mixture of cow's milk, flour, malt, lactate, and butyrate of potash. It is cow's milk itself. On an average, human milk contains a little more water, more sugar of milk, less butter and caseine than cow's milk. Thus, by taking the latter, and adding a little sugar and a fifth of its weight of water, we have an aliment, at the disposal of everybody, forming a better substitute for human milk than any artificial compound.

M. Depaul, on his part, declared that he undertook experiments on new-born children, to examine the effects of this artificial milk, the taste of which was, by the by, less agreeable than that of natural milk. Four children were tried. The first two were twins, and born permaturely. In spite of the care bestowed on them, and the nourishment by the artificial milk, they died in two days. The third, born at full time, weighed 3 kilogs. 370 grammes; the mother was ill. The nourishment given was that of artificial milk. At the end of two days, the dejections became green, and on this day the child perished. The fourth infant, born under the same conditions, and nourished with same aliment, died after four days. M. Wurtz promised to write to Baron Von Liebig, to obtain more precise details on the preparation of this milk. — *Chemical News.*

Tobacco. — The Abbé Migne has just addressed a letter to a very honorable director of one of the great seminaries of Paris, condemning the use of tobacco and snuff. This letter furnishes us with an opportunity of relating a fact that is personal to us. Several times in our youth and riper age we have taken up and discarded the use of the snuff-box. In 1861, when writing our mathematical treatises, during our labors with M. Lindelof, for the calculation of variations, and when we commenced the editing of our lectures on analytic mechanics, we used snuff to excess, taking 20 to 25 grammes per day, incessantly having recourse to the fatal box and snuffing up the dangerous stimulant. The effect of this was, on the one hand, the stiffening of the nervous system, which we could not account for; on the other hand, a rapid loss of memory, not only of the present but of the past. We had learned several languages by their roots, and our memory was often at a loss for a word. Frightened at this considerable loss, we resolved in September, 1861, to renounce the use of snuff and cigars for ever. This resolution was the commencement of a veritable restoration to health and spirits, and our memory recovered all its sensibility and force. The same thing happened to M. Dubrunfaut, the celebrated chemist, in renouncing the use of tobacco. We do not hesitate in saying that for one moderate snuff-taker or smoker there are ninety-nine who use tobacco to excess. — *Chemical News.*

Instantaneous Ignition. — At the Royal Palace at Berlin, 40,000 wax candles are instantaneously ignited by one single match. The mode of proceeding is simple enough, the wicks being previously all connected by a thread spun of gun-cotton, on lighting one end of which all the candles are lighted simultaneously, and thus the whole of the seven hundred apartments are illuminated at once. The process is so easy, that the wonder is that it is not more extensively known and generally practised. In Russia, the same ingenious method is employed for lighting up the churches on grand occasions.

Glycerine in the Arts. — A German chemist named Pusher, a native of Nuremberg, reported to the Trades Union of that place, that he met with great success in using glycerine together with glue. While generally, after the drying of glue, the thing to which it is applied is liable to break, tear, or spring off, if a quantity of glycerine equal to a quarter of the quantity of glue be mixed with it, that defect will entirely disappear. Pusher also made use of this glue as lining for leather, for making globe frames, and for smoothing parchment and chalk paper. He also used it for polishing, mixing wax with the glycerine, and using it as an underground for laying on aniline red color. The red was found to exceed all others in which glycerine is not used. The glycerine has also some properties in common with India-rubber, for it will blot out pencil marks from paper so as to leave no mark whatever.

A paste made of starch, glycerine, and gypsum, will maintain its plasticity and adhesiveness longer than any other known cement, and does therefore recommend itself for cementing chemical instruments and apparatus used by pharmacists. — *J. A. Chemistry.*

Cheap Lecture Diagrams. — Prof. Kick, of the Prague Polytechnic Institute, proposes the following way of preparing inexpensive diagram boards for lecture-room purposes. A sheet of stout brown paper is first coated with thin glue, in which is mixed a quantity of lampblack and powdered pumice stone. After the application of two coats of this composition, the design is traced with French chalk, the lines afterward to be gone over with ordinary chalk or colored crayons. To fix the drawing, the inventor, by means of a "vaporizer," or spray apparatus, projects water in a finely-divided state over each line; the glue is thus softened, and allows the chalk to sink into it, and when dry forms a protecting varnish. Diagrams so prepared can be rolled up and rubbed without damage, and corrections may be made with great facility.

By advertisement in the daily London journals, "a gentleman who has lately recovered from a serious illness" has declared his readiness to pay the munificent reward of £2000 to any person who, between the present time and the 1st of July 18[illegible], shall discover a mode of *permanently* and completely extinguishing pain in all, or nearly all cases; the said means being "effectual, harmless, cheap, and easy to apply." Should no such discovery be made, £1000 will be given as awards to such persons as shall have made "discoveries of minor importance, but yet of great service in the relief of pain."

A Miniature Volcano. — Prof. Choutard, filling the chair of Natural Philosophy at Nancy, France, has devised the following experiment, showing the power of Ruhmkorff's induction coil. A quantity of the flowers of sulphur is mixed with a small proportion of iron filings, or, better still, with iron reduced by hydrogen, in which case it is in quite an impalpable state; zinc and copper filings may also be added in small quantities. The mixture, made as complete as possible, is placed on a pane of glass or a dry brick, so as to form a heap two or three centimetres high, and much longer than broad. The ends of the wires of a Ruhmkorff apparatus are inserted into the heap, so as to be two or three centimetres distant from each other. When ready, a current of electricity is sent through the coil, and instantly a violent explosion take's place. A sort of crater is formed, whence magnificent sheaves of fire are seen to issue, displaying colors like a bouquet of fireworks. It is in reality a volcano on a very small scale, having its subterranean noises, as it were, and ejecting boiling lava.

Making a Hat in Fifty Minutes. — At the Paris Exposition is a machine by means of which a rabbit-skin may be converted into a hat in fifty minutes. During the process the hat undergoes six operations. They are lined and trimmed by a sewing machine.

Waterproof Packing Paper. — The following is a German recipe:—Dissolve 680.4 grammes (about 1.82 lbs.) of white soap in a quart of water. In another quart of water dissolve 1.82 oz. troy of gum arabic, and 5.5 oz glue. Mix the two solutions; warm them, and soak the paper in the liquid. Pass it between rollers, or simply hang it up to drip, and then only at a gentle temperature.

Chemistry Applied to Agriculture.

FARMERS' WELLS.

It is well known that in the gradual decomposition of animal and vegetable substances, at or near the surface of the earth, under certain conditions, nitrogeneous compounds are developed. The nitre earths found beneath old buildings result from these changes, although it is quite difficult to understand the precise nature of the chemical transformations which produce them. In the waters of a large number of wells in towns and cities, and also in the country, the nitrates are found at some seasons in considerable quantities. The salts form at the surface in warm weather, and, being quite soluble, are carried with the percolating rain water into the well. In cities and large towns, where excrementitious matters accumulate rapidly around dwellings compacted together, it is difficult to locate wells remote from danger; and hence it might seem that suspicion should be confined to these localities. This, however, is not a safe conclusion. How often do we see, upon isolated farms in the country, the well located within, or upon, the margin of the barnyard, near huge manure heaps, reeking with ammoniacal and other gases, the prolific sources of soluble salts, which find access to the water, and render it unfit as a beverage for man or beast. It may, no doubt, be a convenience to the farmer to have his water supply so situated as to meet the wants of the occupants of his barn and his dwelling; but it is full of danger.

We are under many obligations to one of our Virginia ladies for the following. She is distinguished for her skill and success in wine-making:

To Make Port Wine from the Common Blackberry.

First take a brandy cask (molasses or vinegar casks will spoil the wine), knock out one head, and make a bung-hole as near the other end as you can; set the cask on something that will allow a tub to get under it. Gather the berries, mash them in your hands, and throw them in the cask; cover with a clean cloth to keep out dirt. If the weather is extremely warm, three or four days will be sufficient for fermentation; if cool, five or six will do. Then set a tub under the cask, pull out the spigot, and the juice will run out as clear as water; add to each gallon of juice three pounds of good clean sugar. Set the casks, the bung side up, in the place you intend to keep them, as they should not be moved. A cellar or cool smoke-house is best, allowing space to place a dish under it to catch the wine which runs out; then fill the cask level with the bung; every morning fill up level again. The eighth or ninth day put the stopper in, at first lightly, and at the end of a week press in firmly, and do not move or open it till the spring following; but it is very nice and palatable in the next four weeks. Catawba, Norton Seedling, or the Isabella, makes a splendid wine if the foregoing directions are followed.—*Virginia Farmer.*

A Scientific Farmer. — The *Country Gentleman* publishes some statistics in reference to the farming operations of Mr. Ross Winans, whose lands are situated on the Patapsco river, near Baltimore, Maryland. Mr. Winans has two farms, which together comprise less than eight hundred acres. But on this comparatively small area of ground, he scatters fertilizers in a way that would frighten farmers in this country, putting from $15,000 to $20,000 worth upon it yearly. As his are dairy farms, grass is one of his main crops, and he cuts eighteen hundred tons of hay. He keeps 220 cows, and gets $5[illegible],000 for their milk in Baltimore. It will probably be admitted that Mr. Winans understands cultivating the soil; yet he was not "raised" to the business, but took it up after he had amassed a large fortune by building railroads in Russia.

Boston Journal of Chemistry.

BOSTON, SEPTEMBER 1, 1867.

PREMIUMS FOR SUBSCRIBERS.

☞ Any one sending us the names of *three subscribers*, with advance pay, will be entitled to receive the *Journal, free* for one year.

☞ For *five* subscribers, we will send the *petite microscope.*

☞ For *twenty-five*, we will send, in addition to the microscope, a copy of *Stockhart's Chemistry* for students, the best elementary treatise yet published.

☞ For *one hundred* subscribers, we will send a complete set of chemicals, together with test tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. Downs is general travelling agent for the *Journal.*

Inquiries.—We are constantly receiving letters containing inquiries upon all conceivable subjects. Our desk is heaped up with such letters. Every moment of our time is occupied, and we can answer but very few of these questions, either by letter or through the *Journal.* Only such questions as have a general interest for our readers can be noticed.

☞ Since our last issue the increase of subscribers has been very large. Our edition of fifteen thousand copies proved to be inadequate, and we were obliged to place the forms again upon the press, and strike off another edition.

Prof R. H. Storer's Lectures.—It will be noticed, by referring to advertisement, that Prof. Storer will deliver his second course of lectures upon *Treatment of the Surgical Diseases of Women*, in December. The importance of these lectures to physicians is very great, and is well stated in the resolutions passed by his former class, as published in the *Boston Medical and Surgical Journal* and *New York Medical Record.* Prof. Storer's lectures are addressed to physicians, those in active practice, and contain the results of his own vast experience in this important department of surgery. It is well known that Dr. S. has long made the diseases of women a specialty, and is therefore thoroughly acquainted with the subject. We commend this course of lectures to the attention of our medical friends.

☞ The success of our little volume, *Chemistry of the Farm and the Sea*, published by Messrs. Williams & Co., is as unexpected as it is gratifying. The first edition is already exhausted, and a second will be ready in a few days. It has received the warmest commendations of the scientific, medical, and literary press in all parts of the country. Exceedingly pleasant letters, in praise of the book, have been received from the poet Whittier; Dr. O. W. Holmes; Prof. Gray, of Cambridge; Donald G. Mitchell (Ike Marvel), of Edgewood; Prof. Phelps, of Andover, and some thirty other of our most distinguished scientific and literary men. If it excites a love of science and a respect for its teachings, our highest reward will be met.

WHAT SHALL WE USE FOR WATER SUPPLY PIPES?

This is an important inquiry, and one which concerns the health and welfare of thousands of people. Several years since, we gave, through a medical journal in this city, the results of the examination of Cochituate and other aqueduct waters, which proved that there were local causes operating in many households whereby the water was being contaminated by contact with leaden pipes. The general influence of Cochituate and most other aqueduct waters upon lead is protective; a coating of insoluble carbonate being formed upon the interior surface, which prevents water contact with the unchanged metal. So long, however, as local agencies exist, capable of changing these conditions, no security against lead-poisoning can be felt by consumers.

There is hardly a town or city in this country, supplied with water through leaden service pipes, where there is perfect immunity from lead disease. Indeed, the disease is quite prevalent in some cities where unusual confidence is reposed in the purity of the water.

The proper material for water supply pipes has not yet been discovered or suggested. There are objections to glass-lined iron pipes, on the score of expense, and difficulty of placing in position; gutta-percha communicates an unpleasant taste to the water, and is too expensive. Much can be said in favor of solid tin; although it is more easily corroded than lead, and in many localities is soon destroyed. An impression prevails that the security in the use of tin pipes arises from its not being liable to decomposition from water contact. This is an error. The salts of tin, resulting from corrosive action, are not poisonous like those of lead, and in this consists its safety.

Recently a *lead pipe lined with tin*, has been introduced, and supported by a large number of *certificates* from chemists and others. After careful examination of this pipe, we hesitate to give it our approval. We fear it may prove more dangerous than service pipes constructed wholly of lead. It is certainly unscientific and wrong to bring together two metals unlike in crystalline structure, and allow water contact to take place between them. Voltaic action is thereby promoted, and decomposition results. The lining of tin is quite superficial, and imperfections are liable to occur at many points. At the joints, perfect tin contact cannot be secured, and therefore chemical change must take place rapidly. There are other objections to this kind of pipe, which are perfectly valid, but we have not space to allude to them at present. We shall recur to this subject again in the *Journal.*

Analysis of Street Mud.—Having been employed recently to make chemical analysis of the soil or mud taken from the streets of New London, Connecticut, we found the chlorides largely preponderating among the inorganic constituents. The results gave for each one hundred pounds of the mud,

Chloride of sodium	407.05 gr.
Chloride of potassium	23.33 „
Choride of magnesium	40.28 „

It is quite probable that this condition is due to the water used in sprinkling the streets, it being salt water. About an ounce of salt is contained in a cubic foot of earth as found in the unpaved streets of that town. It would be interesting to know the chemical nature of the mud as found in the streets of our busy city, and we shall soon make analysis of portions taken from different localities, and present the results to our readers.

EDITORIAL SUMMARY.

A new Dictionary of Chemistry is announced in France. This is the first time a dictionary of pure and applied chemistry has been produced in that country.

A volcanic crater opened on the 2d of June, after a week of strong earthquakes, in St. Michael, one of the Azores. Engineers and captains wishing to study the phenomenon have been driven away by the dangers attending their purpose.

Dr. Frankland, in a recent lecture, states that the inhabitants of many of the great cities of England have to burn double the amount of gas, to obtain the requisite light, which they ought to burn. This doubles the gas manufacturer's profits. How is it in this country?

One ton of cannel coal gives 4000 cubic feet of gas.

The *Laboratory* correspondent at the Paris Exhibition remarks, "It is hardly possible to exaggerate the value to Canada of her *prepared peat*, which is on exhibition." We think it is. Prepared peat we have no confidence in as an industrial product. People have been cheated inconceivably by this "prepared peat" humbug. It is time the whole thing was exposed.

In Canada, all petroleum springs which spout up oil soon cease to give it out spontaneously, and pumps are brought into requisition. How long before the pumps will give out?

Water pipes in cities should never be allowed to be used on the intermittent system. If left empty, they become saturated with impurities detrimental to health.

When a person is mortally bitten by the *cobra*, molecules of living germinal matter are thrown into the blood, and so rapidly multiply that in a few hours millions upon millions are produced. Chemical action is interfered with, combustion is extinguished; coldness, sleepiness, insensibility, slow breathing, and death follow. How mysterious is the influence of *poison!*

They have on exhibition, in Paris, "baking powders" made of soda and tartaric acid; and this simple mixture was sent across the channel by English manufacturers as one of the industrial products of Great Britain!

A Mr. Borwich, of England, advertises "*Ozenised* Cod-Liver Oil." Why not advertise "*Moonshine* and Cod-Liver Oil"? We are sometimes inclined to think, in looking over English journals and papers, that they have two empirics there to one here.

A Quarrel among Illustrious Chemists.—The illustrious chemist of Munich, Prof. Liebig, has been attacked in the French Academy of Medicine, by M. Poggiale, M. Depaul, M. Larrey, and other distinguished men of science, in a very severe manner. The question at issue relates to the *artificial milk* recently suggested by Liebig. The French chemists and physicians assert that Liebig's milk is unscientific, and positively hurtful to children, and that its formation is based on an old analysis of milk, which modern research has proved incorrect. This is a heavy charge, and the Baron writes a letter to the Academy, under date of July 12th, in which he attempts to vindicate his reputation. In the debate which followed the reading of this letter, M. Larrey declared that for a long time he had observed, with regret, the name of Liebig in "certificates" and as an advertiser of "Extract of Meat," etc. We share in the regrets of the French physician, and would remark in this connection, that when we see the names of certain chemists in this section used in connection with quack medicine advertisements, quack mining and oil companies, etc., we experience the same kind of regret.

PORK-EATING.

Shall we discard pork as an article of food? The hog is certainly an unclean animal; and it requires an entire forgetfulness of his "habits of life" to enable any one to consume his flesh with a relish. Tens of thousands of hogs are fattened upon garbage, and the most detestable *excreta* of men and animals. How abominable is the condition of this animal as kept in connection with slaughter-houses, manure pens, and depositories for town and city waste! Tons of this "swill" are carried from our great cities every morning, fermenting and loading the air with pestilential vapors, to be fed to great swarms of hogs in the environs. Can clean, healthy muscle and fat be formed from such material? We know that certain agents fed to swine are capable of passing unchanged into the substance of the organism. Coloring matter, like madder, mixed with the food, passes through the assimilating apparatus, and penetrates to the bones. The marrow of the bones in hogs has been found tinged with the coloring principle of madder forty-eight hours after it was administered. Hogs fed upon acorns, afford in the pork an acorn flavor; also those kept under stables give distinct evidence, in the flesh, of the locality from whence they were taken. The Jews charge that terrible disease scrofula, which afflicts the Christian races, to pork-eating. We have recently discovered a new disease, one attended with unparalleled suffering, trichinosis, to have its origin in flesh of swine. Our readers will be interested in an article upon this disease found in another column. Let it be carefully read.

INTOXICATING BEVERAGES.

The trial justices in this State are sorely puzzled to know how to act in relation to the new kinds of "*beer*" which have become fashionable since the passage of the recent liquor laws. We have been consulted regarding their spirituous nature or composition, and asked if they were "intoxicating beverages."

The law specifically proscribes "lager beer," and all "intoxicating beverages." These "root beers," "spruce beers," "Irish beers," etc., have been frequently seized by the State constables, and the venders brought into court; and the question remains, Are they "intoxicating beverages"? Lager beer, which seems to have been named in the act, usually contains from six to ten per cent. of alcohol; these new and weaker beverages from two to five per cent. They certainly would be intoxicating, if the human stomach was capacious enough to hold a gallon or two of the liquids. Enough might be swallowed to produce a considerable degree of "exhilaration," but not intoxication. They are attenuated alcoholic liquids, but can hardly be regarded as "intoxicating" within the meaning of the act. The free use of these often uncleanly decoctions ought to be discouraged; they derange the digestive organs, and create an appetite for stronger liquors.

PRESERVING EGGS.

Several methods have been adopted for preserving eggs, so that they can be stored up when they are plenty and cheap, and brought into use when they are scarce and dear. No plan hitherto proposed has proved entirely satisfactory in families, or among extensive egg packers. Our attention was called, during the past winter, to a method devised by Mr. James Judd, of Illinois, which seemed philosophical, simple, and cheap. We made a single experiment with his "Egg-Preserving Compound," which was entirely successful. We took a few dozens of fresh eggs, placed them in the compound, and allowed them to remain about three weeks. Upon taking them out, the shell appeared to be polished, or covered with a glaze. We found them perfectly sweet after keeping many weeks under ordinary exposure. We then took a half-dozen and placed them in connection with another half-dozen of fresh eggs upon the cross-bar of a window, exposed to the full heat of the sun. They were kept there for a period of six weeks. Upon examination, the preserved eggs were found perfectly sweet; and, used in cake and pastry, no difference could be observed from those just from the nest. The others were completely addled, thoroughly putrescent. This was certainly a triumph for Mr. Judd. This "compound" is a chemical mixture which appears to hermetically seal up the porosities of the shell and prevent access of oxygen. Mr. J. also claims that the sulphur, always present in eggs, is prevented, by the action of this compound, from undergoing those changes which result in the formation of sulph. hydric acid. However this may be, his compound, in a practical trial, proved a success.

Mr. J.'s compound is put up in packages holding sufficient to preserve one hundred dozen of eggs. It is sold for $1.00, and may be had, in the Western States, of the originators, Messrs. Judd and Goodrich, of Chicago.

Styptic Colloid.—This is a new, and exceedingly useful article for surgeons' use. It was suggested by Dr. Richardson, of London. The idea of combining *tannin* with a peculiar collodion, is a happy one. Very many other agents of great service in the treatment of sores and wounds can be combined with it. We manufacture and can supply the *styptic colloid* in any quantity. On another page will be found an article upon the subject.

Medicine and Pharmacy.

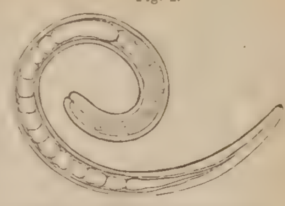
TRICHINA SPIRALIS.

The following account of the origin, nature, and extent of the disease known as Trichinosis is the best we have seen, and will, we think, interest all our readers. We take it from the *American Naturalist*, published at Salem, Mass.

This entozoön is the cause of a serious and often fatal disease of the intestinal canal and muscular system of man, called Trichiniasis, or Trichinosis, which is produced by eating the flesh of swine similarly affected. Before giving an account, however, of the natural history of this parasite, it may be well to state that trichinous pork is not measly pork. Measles in the hog is the eucysted stage of the common tape-worm of man (*Tænia Solium*). Measly flesh being eaten, the little cysts or scolices, as they are called, which consist of the future head of the mature animal inverted, escape from their sacs within the stomach, unless previously destroyed by cooking, and attach themselves by their armed heads to the intestinal walls. From this head are developed, one after another, the joints which make up the body of the tape-worm. The first formed or oldest joints, or proglottides, when sexually mature, escape from the intestinal canal of their host, and, being eaten by swine, the ova they contain are set free. During digestion the egg-shells are dissolved, and the minute embryos find their way into the tissues of their new host, to be again converted into encysted scolices, or measly pork. In this stage the tape-worm is called Cysticercus cellulosæ.

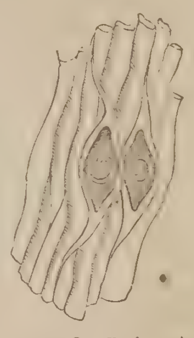
The Trichina Spiralis, on the other hand, does not belong to this order of Cestoidea or encysted worms, but to the Nematoidea or round worms (of which the pin-worm is an example); and its development is much less complicated. If trichinous pork is examined by the microscope, the muscular fibres will be found occupied by minute cysts varying in size from 1-30th to 1-60th of an inch in length, and 1-100th to 1-150th of an inch in thickness; thirty-five thousand of these have been counted in a single cubic inch of muscle; and it has been estimated that an ounce of such flesh would contain three million cysts. Within them may be seen, coiled upon itself in a spiral form, the young worm, which, when removed by pressure, measures 1-25th of an inch in length, and 1-620th of an inch in diameter. The cysts and young are represented in the accompanying figures. (Fig. 1, the young worm; and Fig. 2, the cysts, after Dalton.) If now, such pork is eaten by man, the cysts are dissolved during digestion; and the young worms, unless previously destroyed by cooking, or other process, are set free to enter the intestinal canal. There they lose their spiral form, increase rapidly in size, and become sexually mature in a few days. Both sexes are at first found in equal numbers, but after impregnation the females alone remain; and by the tenth or fourteenth day, the males, which are much the smaller, have all perished. The time required for the development of the embryos is from four to eight days; after which they begin to leave the oviduct in the form of exceedingly small, transparent worms. They may continue to be discharged in immense numbers, however, for six weeks, inasmuch as time is required for the development of the whole number of ova; from three hundred to five hundred in each individual. Immediately after birth, the young leave the residence of the adults, the intestinal canal, and give rise to the first symptoms indicative of their presence. They bore into the intestinal walls, and wander along the areolar tissue, penetrating to nearly all parts of the muscular system. Entering the primitive bundles of this tissue, which they devour as they proceed, they increase in size, and finally coil themselves up and remain quiescent. Sooner or later an oval membranous capsule is formed about them, which eventually becomes cretaceous and opaque, and gives to the muscles a white, sanded appearance. The time required for these processes is various. The wandering begins immediately after birth; but it may be several weeks before the whole brood has found its final resting-place. In this quiescent stage they may remain alive for many years, and after the death of their host may become mature in turn by entering the intestinal canal of some other host.

Fig. 1.



Trichina Spiralis. Magnified about one hundred times.

Fig. 1.



Trichina Spiralis, in cysts, from muscular tissue of ham. Magnified.

The symptoms caused by their presence in man vary according to the number eaten and the stage of development. At first, nausea, loss of appetite, and intestinal irritation. Afterwards, debility, fever, œdema of the face, movements of limbs painful, and sensitiveness of muscles on pressure. Lastly, great inflammation of intestines, with bloody stools, increased muscular pains, partial paralysis of muscles of deglutition, speech, and respiration, and finally, death from exhaustion. If only a small quantity of the trichinous pork be eaten, the symptoms will be mild, and in all cases they will disappear when the worms have become quiescent, or encysted in the muscular tissue.

The history of the trichina is interesting, and may be briefly told as follows. Many years ago it was found in the muscles of man after death, and described by Owen. Subsequently Leidy found it also encysted in the flesh of the hog; and since then it has often been noticed, in dissecting-room subjects, giving a sanded aspect to the red muscular tissue. It was always considered harmless, however; and in 1855, Küchenmeister published a theory that it was only the immature form of Trichocephalus dispar, a minute, thread-like intestinal worm. Experiments conducted by Virchow and Leuckart, however, in 1859, by feeding animals with trichinous flesh, demonstrated the error of this opinion; and also the important facts, that the encysted trichinæ were set free in the intestinal canal, there to become mature; that living embryos were developed within them, which es-

caped to wander in the muscular tissues of the same host, or might be transferred with the intestinal contents to another animal, to become, in turn, the encysted form; and that the cysts were formed within, and consisted of, the thickened sarcolemma of the primitive muscular fibres; not, as had been supposed by some observers, within the capillary tubes.

These results pointed unmistakably to the manner in which man also became infected; but they were still considered of no pathological consequence until early in 1860, when a servant girl died in the hospital at Dresden, after a month's sickness, with symptoms like those above mentioned; and on examination after death, Zenker found the muscular system filled with free and moving trichinæ. He concluded that it was a case of fresh infection, and that the worms had been the cause of her death. A microscopic examination of the contents of the intestine revealed the presence of numerous mature trichinæ of both sexes, the females still containing living embryos. Portions of the muscular tissue of the girl were sent to Virchow and others interested in the subject. The former administered it to a rabbit, which was killed by the wandering of the young brood set free within its intestine; the others, as well as Zenker, fed dogs with the same, but the results corresponded with those previously and subsequently obtained; viz., that trichinæ undergoes only a partial development within their intestinal canal, does not long remain there, and does not wander into their muscular system. It remained to be ascertained where the girl obtained the trichinæ which caused her death. She was taken sick after Christmas in the country, where it was the custom to kill swine for the feast of the season; and Zenker, knowing the frequent occurrence of trichinæ in these animals, concluded that some connection would be found between the disease and the meat. On visiting the place, he found that the farmer with whom she had lived had killed a hog on December 31st, and that the ham and sausages which still remained of it contained numerous encysted trichinæ. He found, also, that the farmer and his wife and the butcher had all been ill with symptoms similar to, though milder than, those the girl had exhibited.

This case, so complete in itself, not only established the connection between trichina in the hog and in man, but demonstrated the existence of an unsuspected and frightful disease, and explained much that had been mysterious in former cases of death from so-called sausage-poison and other unknown causes. It was followed by other epidemics of a fatal character, in several of which the victims were numbered by scores; so that a panic spread over Europe, and the hog seemed doomed to take his proper position as an unclean beast. Scientific commissions have been appointed by many governments to study the disease; and the natural history of this little worm has become of national and political importance, and has received the attention of some of the best scientific observers of the day.

It being established that man gets the disease from swine, these investigations have been directed to the source of infection in the latter animals. Many immature round worms have been found in animals and accused of being trichinæ; but more careful examinations and experiments have subsequently proved their innocence. Among these are to be mentioned worms found in moles, frogs, insects, and angleworms, upon which swine are known to feed. Even vegetables have been laid under suspicion, and particularly a little nematoid worm which infests the beet-root; but this too was found to be zoölogically distinct. Statements have also been made that beef is not free from trichinæ; but there is no just ground for such reports; and the same may be said of the flesh of birds like ducks, geese, and pigeons, which might receive infection by means of the intestinal discharges of trichinous animals; for it has been found impossible to reproduce them by artificial feeding within these animals.

A committee appointed by the Imperial Society of Physicians, at Vienna, has just presented a report on trichinosis, in which it is stated that the real source of infection in swine lies entirely in the rat. In Moravia, thirty-seven per cent. of the rats examined were found trichinized; in the environs of Vienna about ten per cent.; and in Lower Austria the proportion was not more than four per cent. The commission also confirms the results of previous experiments, as to the artificial transmission of the disease from the rat to the cat, to the rabbit, and to the pig by feeding. So far as man is concerned, however, it may be safely stated that his source of infection is practically limited to the hog; and there can be little doubt that the disease is kept up between the two precisely as the tape-worm continues to exist. The report of the Vienna commission, even if corroborated by more extended observations, has only added another source of infection in swine; there still remains the fact that many mature females escape from the intestines after impregnation, and in this way may be eaten by the animals. It is well known, that when the diarrhœa is severe during the first stages of an attack of the disease, the patient is not so severely affected as others who have partaken of the same pork; and this is due to the escape of the parasite before the young are born in great quantity; and such persons, not sick enough to keep the house, are the probable sources of infection in swine. It has, in fact, been noticed by Virchow, that epidemics succeed each other at regular intervals. After infecting themselves in the way just described, the swine are not again killed until the next general slaughtering season comes, when another follows, to be succeeded by others after a similar interval. It may also be possible that portions of trichinous flesh may pass through the human intestine unchanged, and thus be eaten by other animals; or that rats may eat it, and be subsequently eaten themselves by swine. We have seen that dogs cannot be made trichinous by eating diseased flesh, but they may discharge the contents of their intestines containing partially developed trichinæ where swine have access to them; and lastly, it is not impossible that swine may infect each other by intestinal trichinæ alone.

Trichinosis is no new disease. It existed many years ago, and it is undoubtedly as old as the habit of pork-eating; we are only beginning to recognize it. In certain parts of Europe, where raw pork is largely eaten in the form of ham and sausages, and where the habits of swine and their keepers are not very unlike, there is ample opportunity afforded for its spread and frequent occurrence. In our own country, too, there have been numerous small outbreaks, in nearly all of which some of the cases have been fatal. Within the last month, six cases of the disease have occurred in this State, one of which proved fatal. They were caused by eating raw ham. The most careful attention, however, will not prevent the accidental infection of these animals, as the history of some of the epidemics illustrates. Unfortunately, the disease is latent in them, producing no symptoms which cause its presence to be suspected; and the appearances of the flesh after death are not such as to attract attention. It can only be recognized by its effect on those who unwarily eat it, or by microscopic examination.

In some parts of Germany government obliges all pork to be inspected by an appointed person before it is sold; and even the butchers are forming associations among themselves for the same purpose, and are learning the use of the microscope, the present horror of pork affording them leisure for such studies. The inspection, however, should never be intrusted to an incompetent observer, and should be thoroughly performed. One of the latest cases of the disease in Prussia was produced by eating flesh which had passed examination, and subsequent investigation showed that only a portion of the shoulder had been sent for examination, and that other parts were abundantly infected. It has been found that the muscles contain most trichinæ nearest their attachments, and that in ham they occur in greatest numbers in these parts about the lower leg. Every hog should be examined in at least five places before it can be pronounced clean; for the parasites are sometimes distributed in the most unequal manner. In Brunswick, out of twenty thousand swine examined, but two were found to be trichinous: but it will be remembered that each of the two great epidemics in Germany were caused by eating the flesh of one animal alone; but these two animals caused the sickness of five hundred, and the death of over one hundred persons.

The results of the investigations of the Committee of the Chicago Academy of Sciences show, however, that the disease prevails among the swine in our Western States to a much greater extent than in Germany; for of 1,394 animals examined, twenty-eight were found trichinous, or one in fifty. Were the habit of eating raw ham and sausages as prevalent in America as in Germany, it will be seen how frequent the disease might become amongst us. Fortunately, thorough cooking destroys the vitality of the young worms, but it should be carried to complete coagulation of all the juices of the flesh, even to its very centre, to be effectual.

STYPTIC COLLOID.

By Dr. BENJAMIN W. RICHARDSON, M.A., Senior Physician to the Royal Infirmary for Diseases of the Chest.

[The fluid named by Dr. Richardson, "Styptic colloid," is a compound fluid, which is at one and the same time a styptic, an antiseptic, and a complete means of excluding wounded, abraded, or ulcerated parts of the body from the influence of the external air.]

The idea only was wanted to secure the object in view. There was one substance which answered all these indications — I mean tannin. A mixture, therefore, of xlyoidine, a substance resembling gun-cotton, and of tannin, was formed into solution with ether, and from that came what I designated "*zylostyptic ether*."

Brought into practice, the advantages of this solution as a means for stopping hemorrhage at once became obvious. Indeed, as a means for the arrest of hemorrhage, less than the application of a ligature to an open vessel, the spray leaves little to be desired. The extreme cold produced by the evaporation of the ether acts directly on the water of the blood, the tannin solidifies the blood by combining with it, and the cotton acts as a plug: thus every indication for arrest of hemorrhage is secured.

But in observing the action of the styptic spray, I soon became impressed with another fact; viz., that after the application to decomposing and fœtid wounds and sores, the fœtor entirely disappeared, the wounds commenced to heal with great rapidity, and a kind of natural covering appeared to form out of the secretion by its combination with the dressing above it.

This observation has led me to simplify the application still further, until it has come into this convenient form, a mere solution capable of being kept on the table as gum is kept, and of being applied with a soft brush in the same simple way.

The process of manufacture of the fluid is tedious, but sufficiently easy. The object to be aimed at is to saturate ether entirely with tannin, and a colloidial substance, xyloidine or gun-cotton. In the first step of the process, the tannin, rendered as pure as it can be, is treated with absolute alcohol, and is made to digest in the alcohol for several days. Then the ether, also absolute, is added until the whole of the thick alcoholic mixture is rendered quite fluid. Next the colloidial substance is put in until it ceases readily to dissolve. For the sake of its very agreeable odour, a little tincture of benzoin is finally admixed.

The solution is now ready for use. It can be applied directly with a brush, or, mixed with equal quantities of ether, it can be applied in the form of spray. In order to give to the fluid a short name by which it may be known, I have called it "*styptic colloid.*"

The styptic and adhesive qualities of this fluid are easily demonstrated by observing its direct action on blood, on serum, on pus, on albumen. You will see that it solidifies all these by mere contact with them.

To these properties I must also add that of complete deodorization. Here is putrid blood, here putrid ovarian serum, here putrid purulent substance. They are unapproachable when laid on an open surface, but we bring them into contact with the solution, and they are deodorized. Further, the decomposed substance is fixed by the tannin and rendered inert.

In cases of compound fracture, after the parts have been brought into apposition as far as is possible, and fixed in the necessary position, the fluid should be poured slowly into the open cavity, so as to fill it. Then the parts externally should be covered with a layer of cotton wool saturated with the solution.

On open cancer, and on suppurating or decomposing surfaces, the solution may be freely applied with the brush, and afterwards the parts may be covered with cotton-wool saturated with the fluid.

In no case need there be any fear that irritation will follow the application of the solution. On the contrary, the action of it is so purely negative that it might be

considered a sedative. It is not such in the technical sense of the term, but it so effectually covers the wounded and susceptible surfaces as to maintain what is virtually a sedative influence.

After a fresh wound has been once dressed with this solution, it requires but little further treatment. In the case of small wounds, they may be safely left with one dressing. In process of cure the dressing will slowly be thrown off in the form of a thick scale, and ligatures will also spontaneously come away. Even when the wound is very large, as after amputation, it is not desirable to try to open the wound unless there be systemic symptoms. In such case, in order to remove the dressing without pain, the bandage, if it be adherent, must be sponged at the adherent parts with a mixture of alcohol and ether, or with alcohol and water; this will set everything at liberty with ease and cleanliness. Water alone must on no account be used, neither hot nor cold.

COMBINATIONS WITH THE STYPTIC COLLOID.

I have treated so far on the styptic fluid in its simple form. I should add, however, that as a base it combines well with the following medicinal substances, as you will see by the specimens now sent round: —

Creosote. — With the old creosote of the shops the fluid forms an excellent compound. The creosote acts well as an additional antiseptic, and also as a solidifier of albumen. It produces, however, some degree of irritation. The proportion is one minim of creosote to two drachms of solution.

Carbolic Acid. — With pure carbolic acid the fluid also combines. The compound so produced possesses the same properties as the mixture of creosote and the styptic. Five grains of the acid may be added to two drachms of the fluid. The combination is very powerful, but it produces some irritation.

Quina. — The pure alkaloid quina dissolves in the styptic fluid, and forms a good solution in the proportion of one grain to the drachm. The quina adds to the antiseptic power, but, I think, takes away from the adhesive property. Proportion, half a grain to a drachm.

Iodine. — Iodine unites readily with the fluid; and five, or even seven grains of it may be got into the quarter-ounce. The combination is most useful in cases where there is purulent or fœtid discharge from a surface surrounded with indurated tissue. The iodine produces no irritation.

Iodide of Cadmium. — Iodide of potassium and iodide of ammonium do not readily combine with the styptic; but iodide of cadmium, which possesses a similar physiological action, goes up in it readily. Half a drachm of the salt will go up in an ounce of the solution.

Bichloride of Mercury. — The bichloride of mercury is soluble in the solution, and the compound, in the proportion of the one twentieth of a grain to one drachm of the styptic, is a most useful application in indolent syphilitic ulcers. I think this application would also be useful in lupus.

Morphia. — Morphia goes up well in the solution; and in irritable painful ulcer, a compound of morphia and the styptic, in proportion of half a grain of the alkaloid to a drachm of the fluid, is of service. Pain is at once relieved, and healing is promoted. This compound on cotton would be good for a stopping of a hollow tooth to relieve toothache.

All the other narcotic alkaloids in their pure form go up in the solution, — atropia, aconitina, and the rest. I have, however, no experience as to the value of such combinations in practice. This experience has yet to be learned.

HEALTH OF WOMAN.

We were consulted some time ago by an elegant lady of fashionable life on account of two of her beautiful daughters, who were as sylph-like and symmetric as fashion could make them, but who showed too plainly that their forms and constitutions were as frail as debility could mar them without actually manifesting some specific form of disease. "Oh, what shall I do for my beautiful girls!" exclaimed the mother. "Give them strength," I replied. "And how shall that be done?" said she. "Let them make their own beds, carry their own water up stairs and down, and sweep their own rooms, and perchance the parlor and drawing-room, go to market and bring baskets of provisions home, garden, wash, and iron!" Looking at me with surprise, she said, "What sort of minds would they have, what sort of bodies?" I answered, "They would have as healthy and happy ones as your servants. You now give all the health and happiness to your domestics. Be merciful to your daughters, and let them have a share."

Work, without useful aim or end, is not occupation nor employment. When the tread-mill was introduced as a mode of punishment, the wretched prisoners felt themselves more degraded by "doing nothing," as they called it, than by their crimes. How many ladies in fashionable life are doomed for years to feel the bitterness of "doing nothing"! What wonder if they are nervous, irritable, and diseased. Useful work, or satisfactory employment, is as essential to the health of the mind as to that of the body.

The first and strongest principle of our nature is that of rectitude, or what ought to be. Every human being is possessed of this lofty but awful feeling — the deep sense of rectitude or propriety. A feeling which is never satisfied, is a perpetual source of misery, like hunger unappeased, or appetite uncatered for. Can any woman, surveying her body, or considering her mind, seriously conclude that she is not called upon for any useful work, or necessary contribution to society? and that to be adorned and admired is all her duty and her destiny? This would exclude her from the republic of mind and morals, and class her with pet animals and flowers. — *Dr. Dixon.*

A CASE OF RESUSCITATION AFTER TWO HOURS' APPARENT DEATH BY DROWNING.

The following, from the *Medical Press and Circular*, is apparently an authentic statement, and is very important, as showing the necessity of persistent, long-continued efforts, to resuscitate persons supposed to be dead from drowning. At this season of the year, a larger number of accidents occur in the water from the general practice of bathing and swimming. From this statement it appears that a person recovered after being *two hours* in the water. It is made by John Dennan, Esq.

On the afternoon of Tuesday, the 15th instant, about a quarter past four, I received, in the absence of Mr. Obré, a summons to view a dead body just withdrawn from the ornamental waters in Regent's Park.

While on the way, I entered somewhat minutely into the particulars with my guide, and on my arrival determined to examine the subject very carefully.

The man was apparently *quite dead*, and I heard the following statement; viz., — That he had left his abode in perfect health, and joined in the general amusements on the ice, and was one of those at some distance from the shore when the catastrophe occurred. I particularly observed that the patient was intensely cold, from having been immersed some minutes, and having struggled in the water for more than half an hour. There was neither breathing nor heart's action, the pupils dilated, the jaws clenched, and the limbs contracted, so much so that the clothes had to be cut off before anything could be done to the patient.

A frothy mucus covered the mouth and nostrils, the body was much swollen, and I had it placed on an incline at an angle of about 35°, as the body was so very cold. I commenced, with the assistance of two men who brought him home, to try to restore warmth by degrees, rubbing the chest and limbs thoroughly and swiftly with ice and snow, cleansing the mouth and nostrils from time to time, and adopting Sylvester's method of artificial respiration for more than two hours. After a quantity of frothy mucus was discharged, slight signs of animation were perceptible, though so faint that I almost despaired.

I then had him well wrapped in blankets, placing large tins of hot water at the feet, and mustard poultices on the chest, while the body was well rubbed with warm flannel under the blankets. I continued this treatment for three quarters of an hour, at the same time continuing to imitate the movements of breathing. A decided improvement then took place. The patient's jaws relaxed, and he appeared to breathe more freely. I then administered two teaspoonfuls of warm water, which caused him to vomit slightly. As soon as he commenced breathing freely I was able to give him a little warm tea, which he apparently relished. I may here observe that I could not induce him to take spirits.

The patient was now placed in a warm bed prepared for him, soothed to sleep, and all undue excitement prevented.

The patient was feverish for one or two days, but on the following Friday I had the pleasure of receiving a visit from him.

ON CARBOLIC ACID IN DIPHTHERIA.

By Charles Sedgwick, Jun., Esq., Hollingbourn, Maidstone.

[Mr. Sedgwick has been in the habit of using diluted carbolic acid as a gargle in cases of diphtheria and ulcerated tonsils, for the last four years. Although of a disagreeable taste he has not found that patients object to it after the first application, as it generally affords such great relief.]

I usually give it in the form of a gargle, but in children by swabbing the throat out freely with it on a piece of sponge. When the disease has been taken early I have not failed in a single case, but have lost some where it had gone too far for medical treatment to be of any service. Carbolic acid has a decided effect upon the false membrane thrown out. The following is the form I usually prescribe: —

℞ Acidi carbolici	♏xx.
Acidi acetici	ʒss.
Mellis	ʒij.
Tinct. myrrhæ	ʒij.
Aquæ	q. s.
Ut fiat gargarisma	℥vj.

The carbolic and acetic acids to be well shaken together, the mel. to be added with the aqua gradually. With it I usually give tinct. ferri and quinine. — *Medical Times and Gazette, Feb.* 27, 1867, *p.* 216.

Borates. — F. P. le Roux. — Equal equivalents of calcined magnesia and boric anhydride, heated to whiteness, melt readily together, forming a slightly green, strong, and light glass. Rapid cooling is necessary to obtain it amorphous and transparent. Three equivalents of boric anhydride and one equivalent of suboxide of copper, melted together and poured on an iron plate, form a glass, the surface of which has a different colour from the interior.

Other borates behave in a similar manner; most of them form glasses of different colours, according to whether, after melting, they are cooled slowly or rapidly. — *Comptes R.* lxiv. 26.

Cantharidin. — Professor Dragendorf has found in cantharides a volatile body which acts on the organism in a similar manner to cantharidin. Fresly-powdered cantharides are moistened with water and distilled; the portion going over below and at 100° C., which has an acid reaction, contains the new body. — *Pharm. Zeitschr. f. Russl., Jan.* 1867, i.

[*Communicated.*]

Messrs. N. & Co.:

Permit me to send you a few recipes, that in my practice have proved almost specifics: —

FOR FEVER AND AGUE.

℞ Port Wine	O i.
Red Peruvian bark, pulv.	℥i.
Sulphate of quinine	ʒi.
Aromatic sulph. acid	gtts. lx.
Mix.	

Shake the mixture well before using. Dose — One teaspoonful every six hours.

PILL FOR COSTIVENESS FOR THE AGED.

℞ Podophyllin	gr. iii.
Pulv. ipecac	gr. iii.
Solid ext. dandelion	℈ii.

Make sixteen pills. Dose — One at bedtime.

FOR NURSING SORE MOUTH — DIPHTHERITIC SORE THROAT.

℞ Chlorate of potash	ʒii.
Boiling water	f. ℥x.
Muriatic acid	gtts. xl.
Creosote	gtts x.
Alcohol	f. ℥ss.
Mix.	

Use as a gargle.

David Rice, M.D.,
Leverett, Mass.

TREATMENT OF HAY-FEVER.

BY W. ABBOTTS SMITH, M.D., M.R.C.P., ETC.

With respect to the effects of medical treatment, about which nearly every writer on hay-fever appears doubtful, Dr. Smith sees no reason for thinking that the symptoms may not be generally very much mitigated. He believes that, except in cases where the predisposition is strongly marked, or where the affection has been allowed to get too complete a hold upon the system, careful avoidance of the exciting causes, and judicious treatment, will succeed in eradicating the disorder, or, at all events, reduce the attacks to a minimum, whether as regards their severity or their duration. In treating hay-fever, as in treating other affections, it is worse than useless to attempt to find a specific remedy for all cases, or to treat all by the same medicines. The treatment may be divided into two parts; viz., the prophylactic, and the curative or palliative. The former will consist chiefly in the avoidance of the exciting causes of the disorder, such as the aroma of ripe grass or newly-made hay and of strong-smelling flowers, etc.; protection from the heat of the sun, especially about mid-day, and only a moderate amount of out-door exercise. Removal to the sea-side is sometimes found beneficial, especially in those cases in which the febrile or asthmatic symptoms predominate. When the affection has actually made its appearance, warm fomentations, with either water or decoction of poppies, will relieve the swelling, pain, and irritation of the conjunctivæ and eyelids. Glycerine or cold cream should be applied occasionally to the interior of the nostrils by means of a camel-hair brush or a feather. The frequent inhalation of the steam of hot water (either simple or medicated), and of different sedatives, in the form of atomized fluid or spray, will be found valuable in relieving the unpleasant tickling sensation felt in the mucous membrane of the nasal and other air passages. Small pieces of ice, dissolved at frequent intervals in the patient's mouth, often avail more than anything else in obviating the heat, dryness, and tickling sensation felt in the roof of the mouth, the palate, and fauces. The following remedies are the best for internal administration: lobelia, in full doses of the tincture, three or four times a day; the preparations of opium, especially the tinct. camph. co.; and the other principal sedatives and antispasmodics. Tobacco-smoking sometimes effects wonders in diminishing the severity of the paroxysms. Bromide of potassium, or of ammonium, in five or ten grains, or even larger doses, according to the age of the patient and the intensity of symptoms, given in infusion of quassia or gentian, will prove efficacious in cases where the irritability of faucial or bronchial is extreme. When the patient's constitution requires invigorating treatment, quinine, quassia, and gentian, or the preparations of iron, zinc, and arsenic, and other mineral tonics, may be administered. In all cases it will be found judicious to prescribe an occasional saline cooling aperient. Lowering depletives must be carefully shunned. The diet should consist of nutritious, easily-digested food, with pale ale, sherry, or claret at lunch and dinner. All vegetables, excepting potatoes or salads, should be avoided, as well as tea, for which coffee, cocoa, or chocolate may be substituted.

Formulae

USEFUL IN MEDICINE AND THE ARTS.

PARISIAN pine apples are made by saturating turnips with a sirup which the confectioners know very well how to manufacture. The resulting fruit is said to be delicious, and is quite popular among the Exposition visitants. In this city, a few days since, it was testified in court that the jellies sold as made from strawberry, pine-apple, and other fruits were all formed out of apple jelly, colored and flavored with essences to suit the name.

PROF. PANCOAST'S RECIPE FOR BEEF-TEA.—Take a pound of beef, carefully freed from fat, from the loin or neck, and cut it into small pieces, as large as the end of the thumb. Then add five grains of unbroken black pepper and a little salt, care being taken not to spoil it by making it too salty, as is often done. Pour on a pint of cold water, and simmer on the fire for forty minutes. Take out the meat, squeeze all the juice from it through a linen bag into the tea, which then boil for ten minutes.

To CUT glass to any shape, without a diamond, hold it quite level under water, and with a pair of strong scissors clip it away by small bits from the edges.

A PUTTY of starch and chloride of zinc, hardens quickly and lasts for months, as a stopper of holes in metals.

A WHITE paste, adhesive to all surfaces, is said to be made as follows:—A solution of 2½ ounces of gum arabic in two quarts of warm water, is thickened to a paste with wheat flour; to this is added a solution of alum and sugar of lead, 720 grains each, in water. The mixture is heated and stirred about to boil, and is then cooled. It may be thinned if necessary, with the gum solution.

To PURIFY water, by a process promulgated by a Mr. Booth, of Birmingham, put in it a neutral solution of bi-sulphate of alumina, in the proportion of one ounce to 435 gallons. The sulphuric acid of the sulphate decomposes the bi-carbonate of lime in the water and forms an insoluble sulphate of lime instead. The hydrate of alumina being set free, forms with the organic matter in the water another insoluble compound. Both these fall to the bottom, and the remaining freed element, carbonic acid, lends an agreeable quality to the water.

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, OCTOBER 1, 1867. NO. IV.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.
RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.
A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Chemistry.

CHAMPAGNE WINE.

Robert Tomes, formerly U. S. Consul at Rheims, France, has written a very pleasant book called "*The Champagne Country*." We make from it the following extract, descriptive of the vineyards of Verzenay, the gathering of the vintage, and the pressing of the grapes:—

As we drove up the hill into Verzenay, we were surrounded on all sides by the vineyards. These rolled, in regular succession of green wave, to the right and left, as far as the eye could reach. The color of the foliage of the vines was, however, toned by that of their supports of oak. The light-purple hue of these, brightened by the sun, threw over the undulating but uniform surface of green a warm blush, and gave to the wide stretch of vineyard the appearance of a Scotch moor in the full bloom of its heather.

Every hill was alive with busy vintagers, who, crouched among the low vines, were moving quick in their work. The road was thronged with carts, donkeys, and laborers, passing with empty and loaded baskets to and from the vineyards. Groups of men, women, and children were gathered along the edges of the field, and were intent upon their various occupations. Some were sorting the fruit, some filling and emptying, and others lifting great baskets to the patient backs of man and beast.

It was a cheerful scene of labor; but there was nothing in it to remind me of the many vintages I had beheld in the gas-light of the Comic Opera. I neither recognized the plumed cap, velvet doublet, pink hose, and silver buckles of my stage acquaintance; nor the elaborate coiffure, diamond cross-laced petticoat, the well-filled and extensively displayed silk stockings, and high, red-heeled little shoes of his sweetheart. There was no love-making as far as I could see; and I certainly heard no one singing songs composed by Verdi or Donizetti.

I saw nothing but a great number of coarse laborers hard at work. There was nothing in their dress to distinguish them from the same class in any other part of the world. They were all in their working-day suits,—the men in shirt-sleeves and straw or felt hats, and the women in tow-cloth petticoats and ugly coal-scuttle bonnets. There was great quietude and deep devotion to work. I could see that the laborers were in earnest; and it was not surprising, for most of them, being proprietors, were working for themselves. The only picturesque objects were the donkeys munching their food, with their noses in a bag,—for there was no thistle or any weed, or even a blade of grass, at the roadside. The wine-grower takes care that not a particle of soil shall be lost, and he is the cleanest as well as the most industrious and economical of cultivators.

After making our way with some difficulty through the narrow streets of the village of Verzenay, unusually thronged with a crowd of carriages and carts and people, brought thither by the vintage, we found by good luck a spare place under a decayed shed for our tired horse.

Verzenay is situated toward the summit of a hill, from which you look down upon declivity after declivity of vineyard. It contains about five hundred houses and twelve hundred inhabitants, each one of whom is an owner of land, and all are thriving. There is not a poor man in the place, and, as the notice I saw everywhere displayed, "La mendicité est defendue dans Verzenay," indicated, begging is not even permitted.

Strolling down the hill I had a nearer view of the vintagers whom I had passed in driving up to Verzenay, and could learn something of the details of their work. Men, women, and boys were passing regularly along the rows of vines, plucking the grapes. Each one carried an ordinary market-basket of osier, which hung by its handle on his arm, while with a hooked knife (called a *serpette*) held in his right hand he cut off the bunches of grapes and placed them carefully in it. The basket, when full, was emptied into a larger one at the roadside, and the laborer returned to his work of plucking.

The grapes thus gathered were now sorted by a group of women and girls seated around a tray of open wicker work, like the cover of a gigantic basket. These pull off the decayed, unripe, crushed, or otherwise spoiled grapes, which are allowed to fall through the interstices of the tray into a receptacle below, while the bunches thus purified are carefully put into panniers, which when filled are lifted upon the patient donkeys and borne into Verzenay.

No grapes are used in making what is termed first-class wine that have not been thoroughly examined and sifted of all spoiled and inferior fruit. The latter, however, especially if of a famous vintage, like that of 1865, is not lost, but used to make ordinary wine, or to distil into common brandies.

The grapes, on reaching Verzenay, are immediately taken to the wine-presses and pressed. The whole product of the vintage has already been sold some weeks before its commencement to the chief wine manufacturers of the country, who are all obliged to buy their grapes. Some of them, it is true, have vineyards of their own, but not of sufficient extent, or in such positions as to supply them with the quantities and qualities of grape they require.

The product being thus the property of the manufacturers, is carried at once to their wine-presses at Verzenay. When the baskets arrive, they are emptied into a great wooden measure, called a *caque*, which is roughly estimated to hold one hundred and twenty pounds weight. Each proprietor brings in his supply himself, and eagerly watches the measurement of his load. As each measure is filled, a tally is kept by half a dozen at the same time, in the rudest way, by chalk marks on the door-posts or on a convenient cask lying near.

There is an old saying in Champagne, that when they cry "thief," every one at Verzenay takes to his heels. *Lors qu'on crie "au voleur," tout le monde de Verzenay se sauve.* I was not surprised, therefore, to find that an old woman—rough, blowzy, and dirty, it is true, but, as I was told, a landed proprietor in her own right, and with a product of her vineyard of forty panniers at least, or two hundred dollars worth of grapes, that year—had marked seven, when every one else had marked only six baskets as the number she had delivered.

The wine-presses are very much like those used in our country for making cider, although they are never worked, like the latter, by horses. As different classes of wine are obtained according to the degree of pressure, this can only be properly regulated by the discreet force of men's hands.

As soon as the *caque* or measure is filled, its weight estimated, and its number marked, it is emptied on the floor of the wine-press. These wine-presses can hold from five to ten thousand pounds of grapes at a time. When their floors are well covered, the fruit is first trampled down with the feet and smoothed into a uniform layer about two feet and a half thick. This is covered with planks, and the machine being adjusted, its pressure is carefully applied. The grapes are thrown in

in bunches with their stalks. The *tannin* which the latter contain is deemed an essential element of the wine, as it gives solidity to it and renders it durable.

The juice flows into a gutter at the base of the press, and thence through a spout, guarded, to prevent the escape of the skins and pulps, by a large wicker basket, through which it passes into the tub or vat below. From this it is dipped out with buckets and poured into ordinary wine barrels, if it is to be moved to a distance; or if to remain stationary, into large hogsheads.

The juice of the first and second pressures is alone used for the manufacture of the finest champagne; that of the third for the inferior grades; and the fourth and fifth for ordinary red wines, or for distillation into a common brandy. The juice, as it comes from the press, has a very light pink color, which it loses entirely in the course of its fermentation. Thus the red or black grape, without the use of any artificial means of bleaching, produces the clear amber-colored champagne wine we all admire. Great care must be taken, however, to keep the juice of the red grape free from the skins and pulp.

The refuse of the grapes is left by the pressure in the form of a solid cake about a half a foot in thickness. This is either cut with a spade into small square blocks, and dried for fuel, or broken up and mixed with stable manure, to fertilize the vinefields.

The vintage, which generally lasts at least a fortnight, is carefully watched and superintended by the wine manufacturer. He is present during the whole time, and keeps his eye upon every detail of the operation, — the plucking and assorting of the grapes, the weighing and recording of the measurement, the pressing in all its degrees, and the filling of the barrels. He is not willing to intermit his daily carefulness until the delicate fluid is safely cellared in his establishment at Rheims, Epernay, or elsewhere. When it is said that if a few crumbs of bread should fall among the grapes, they would, by the fermentation of the gluten they contain, produce ammonia, and spoil the flavor of the wine, the necessity of watchfulness can be appreciated. The laborers accordingly are expected to refrain from taking their meals near the grapes destined for the wine-press.

Some of the large manufacturers have small villas by the side of their wine-presses at Verzenay, where they remove with their families, and remain during the vintage. I saw the great man of Rheims, its mayor and *deputé*, and the chief partner of the house of Veuve Clicquot, busily superintending the work in his wine-press. He was so disguised in shabby working-day suit and apron that I hardly recognized him. I could see at the same time, as I accosted him among his vats and barrels, his wife and maid plucking flowers for the bright parterres of the pretty cottage near by, and in the stable-yard a grand emblazoned carriage and well-fed coachman and liveried varlets lounging about.

I was invited everywhere to partake of the grapes, of which baskets brimming full surrounded me on all sides, and I did so freely. As I saw the luscious fruit had attracted the honey-sucking bees in swarming multitudes, I at first hesitated to share their tempting feasts; but after several timid attempts, finding that I was unharmed, I became more bold, and thrust my hand into the abounding heaps with confidence. The bees seemed so sated with sweetness that they had become too kindly to wound, or so intoxicated with the vinous ferment of the fruit that they wanted the power, if they had the inclination, to sting.

The grape is of the Pinot* variety, a small round one, of a deep purple color. Its taste was almost too sweet and luscious, and I felt after gorging myself with it that I was almost sated to sickness. I was especially recommended to try the small shrivelled grapes, which had already been dried into raisins by the excessive heat of the season. These were even more sweet than the others.

I recollect that on tasting the grapes of the same vineyards, but of the subsequent vintage, that they were so acrid and astringent that I could not swallow them. Such was the difference between the effect of the sunny season of 1865 and that of the cold rainy one of 1866. The crop of the latter year was, though abundant, so poor in quality that not a manufacturer who cared for the reputation of his wine would buy a solitary grape of it. Not a bottle of good champagne wine can ever be made of the meagre, acrid juice of that vintage. It will, however, be probably mixed with better liquor, or so smothered with syrup or puffed up with gas by a plentiful ferment as to disguise its original defects, and be sold by makers of inferior character as the best of champagne. There will be drinkers, too, who, satisfied with pop and sweetness, will be content with the noise, gas, and sugar they will get for their money. All good judges, however, with their suspicions excited by the excessive sweetness and effervescence, will probably be contented with a single sip, or if disposed to make further experiment, will soon discover, on trial, the thinness and crudity of the fluid, and its total want of all vinous quality. It will have the strength of brandy, for this will be plentifully added, but it will not have the body and flavor of wine.

Every one was talking of the excellence of the vintage; and there was not a man, woman, or child in Verzenay who was not rejoicing in the successful result. Grapes had never brought so high an amount, having been sold at about twelve dollars and twenty cents the *caque* of one hundred and twenty pounds, or ten cents per pound, nearly double the average price. The people of Verzenay, some twelve hundred in all, had divided among them about two millions of francs, or four hundred thousand dollars, which they received for the superb crop of 1865. Thus each adult, male and female, of the place, had pocketed on an average three hundred and thirty-three dollars, and every one was swelling with the consciousness of wealth. The whole product of the vineyards of Verzenay, if those which belong to the great manufacturers are included, was estimated at the value of six or seven hundred thousand dollars.

Though the vintage was equally good in all parts of La Champagne, the grapes grown in Verzenay, producing the wine which is the main constituent of that combination known as *vin mousseux* (champagne wine), are always in the greatest demand, and accordingly bring the highest prices. The *caque* of one hundred and twenty pounds, which sold at Verzenay for sixty francs, was bought elsewhere for forty and forty-five. It takes forty *caques* to make six ordinary barrels of juice; so each, of Verzenay grape, cost four hundred francs, or eighty dollars!

The knowing ones said that the wine of 1865 would compare with that of 1822 for precocity, with that of 1849 for quantity, and with that of 1846 for quality. There had never been, since 1811, a grape so ripe, so sugary, and one harvested under such favorable circumstances of weather. It was agreed, however, that the juice of 1865, excellent as it was, would never be such as was obtained in the exceptional comet year of 1857, and which is the basis of the celebrated wine of 1858, the best ever made. The grape of 1855 was said to have been too rapidly matured by the hot sun, and consequently too replete with sugar to have the delicate qualities of the more slowly developed fruit of 1857.

Still beset with memories of the opera house, I asked if the day was not to close with the feast and dance, but I was answered that all were so wearied with their work that they would seek at early sundown repose in unromantic slumber.

Toward evening, however, whether it was the effect of the vapor of the new wine which filled the atmosphere, or the drinking of the old which flowed freely everywhere, or merely the natural exhilaration which comes with the satisfaction of having completed a hard day's labor, I observed a growing excitement. Men and women were arguing loudly and energetically, and the rude swains were philandering with and kissing the "sunburnt daughters of labor."

I found myself, too, becoming the object of a warmth of affection I would have preferred to have dispensed with. Brawny arms, stained red with wine to the shoulder, were wound about my neck, and stuffy hands sticky with grape juice thrust into my grasp.

As the sun began to set we took our departure from Verzenay, inspired by the cheering influences of the prosperous vintage of 1865, which will be freshly remembered for years to come in the flowing cups of every jovial and grateful son of Bacchus.

*The varieties of black or red grape generallyc ultivated are the *Morillon* and *Pinot;* those of the white are the "golden plants of Ay" and the *Epinetes.* From these alone is manufactured the best champagne wine. In addition to these there are the *Gouens*, called in the country *Marmot*, which produce a white grape, and the *Meuniers* and the *Fromentis*, whose fruit is red. These latter give only an inferior wine, consumed in the country.

THE EMPEROR NAPOLEON'S OYSTER FARM.

We are certain our readers will be interested in the following account of artificial oyster cultivation in France, communicated to the *American Naturalist* by F. W. Fellowes. We copy from that interesting and instructive journal.

In a previous article having briefly described the generation of the oyster, the writer will, in the present one, give an account of the cultivation of this favorite mollusk as practised in France, and notably at the imperial, or model *parcs* in the *bassin d'Arcachon.*

This bay was apparently intended by nature for an oyster farm, and its rich, firm, muddy bottom has *always* yielded them in vast quantities until about 1840, when, to the regret and astonishment of the fishermen (who had mercilessly dredged them up at all seasons, and had killed the goose that laid the golden eggs), their mine was found to be exhausted; fine, full-flavored oysters that had been heretofore bought for three or four sous the hundred, now readily sold for three francs and upwards; and even with these prices the oystermen were starving.

In 1859, Professor Coste, by order of the emperor, passed the summer at Arcachon, and studied the then unknown subject of oyster cultivation, located the now flourishing and successful *parcs*, and addressed a report to the emperor urging the immediate replanting of these exhausted beds. The following year his suggestions and plans were carried out, under the immediate supervision of this naturalist, with surprising and satisfactory results. Here are nearly two thousand acres of excellent bottom for growing oysters, *uncovered* by the tide for an average of two hours at each low-water; and, with the mild winter climate of the southerly coast of France, this circumstance is of priceless value, as it enables the laborers to work among, and even handle the oysters at will, and renders the term "oyster farm" specially applicable to this locality.

A *parc* is regularly laid out like a market garden, into squares of say two hundred feet, a path goes all around and through them, a post is fixed on the corner with the number of the lot painted on it, and a record is kept by the superintendent of what size, quantity, and quality of oysters are planted on each, and his books and stocks are inspected at stated intervals. Common curved tiles of baked clay, costing less than a sou apiece, have — after experiments with various contrivances — proved to be the most practical method of catching the drifting "spat." These tiles, or *tuiles* as they are called, were used at first just as they came from the kiln; but it was found that so large a proportion of the "spat" followed with its young shell the inequalities of the surface, grew so firmly to it, and were destroyed in separating them from the tile, that another ingenious plan was adopted. The tiles are dipped into a kind of cement containing sand and hydraulic lime, which, drying in a few minutes, coats them with an evenly rough surface in every way attractive to the "spat." When it is desirable to remove the oysters, a chisel, fashioned to follow the curve of the tile, is easily introduced between it and the oyster, which drops off uninjured.

About the middle of May these tiles are arranged in piles, ten feet long, five feet high, and five feet wide, which structures are called *ruches* or *les ruches tuillées.*

These tiles are piled in various ways; usually they are placed with the concave roof uppermost, each layer running transversely across the layers beneath it. The sides of the tiles do not touch, but are separated by about three inches of space, and often, though not always, adult oysters are laid along in these spaces. When the *ruche* is otherwise completed, heavy stones are placed upon the top to make the mass more solid and safe to resist the action of the stormy waves. Oysters are strewn all around these *ruches*, which are regularly separated from each other by a space of fifteen feet. Between the *ruches* bundles of faggots, or *fascines*, bound together in the middle with galvanized wire, are suspended, about one foot from the bottom, by a cross piece made fast on two low posts. When the drifting "spat" is ready to adhere to a suitable object, a very large proportion of it is caught by, or seeks refuge in one or the other of these friendly asylums, and safely grows to the usual merchantable size.

One of Professor Coste's early experiments was with a

box a yard square, perforated with holes, containing two shelves with bottoms of coarse wire-cloth, Sixty adult oysters were placed on these shelves and on the mud on the bottom. The sides and top of this box — made in pieces to take apart — were roughed up with an adze to attract and secure the "spat," but this plan was abandoned for two reasons; first, the unavoidable expense, and, secondly, it was found that the "spat," when first evolved, is not ready to adhere to anything, however suitable, but must swim about for a few days; and so the enormous quantity of little ones, given out by the mother oysters in the box, escaped through the holes and located themselves elsewhere. The tiles and the faggots are now in universal use. By the middle of August the oysters have finished their reproductive labors, and begin to fatten again, having become very poor during the summer; but the tiles and faggots are not taken up until a month later. By that time, all the "spat" has located itself, and the *ruches* are carefully taken apart, each tile being laid down in the same position as in the *ruche*, side by side in long furrows or ditches prepared for them.

There they are allowed to remain until the following summer, when the oysters on the upper side of the tiles are removed and planted in beds, hollowed out about three inches deep, running the length of the *parc;* while the tile is then turned over with the roof-side downwards, and the oysters on the other side are left to grow as they at first fixed themselves, unless, being too much crowded, they grow upon each other, and in irregular shapes; in this case they are thinned out. The writer saw many thousands of tiles in rows, with oysters three years old, and of handsome size, still growing where they first were "set;" but usually they are all removed to the beds the second year, and the tiles, after being redipped in the cement, are again piled as before.

The faggots are taken to some enclosures, which are called *claires*, which are made of solid mason-work, water-tight, where the water can be admitted and excluded at pleasure, and where the waves can have no power, and are there unbound and left to themselves to grow until large enough to be separated from the branches, which is usually six to eight months, when they are treated like those grown upon tiles.

At the end of the third year, the oysters have attained the most desirable size, and are ready for the market. Those grown in the imperial *parcs* are not sold, but are consumed by the emperor, presented by him to crowned heads and friends, either for use or to stock their private *parcs*, or abandoned to the poor fishermen, who, on a certain day, are allowed to gather them.

The princess Batichiochi, a near relation of the emperor, has a large farm in the bay of Quiberon, and sells oysters to supply the Paris restaurants and others, in large quantities; and, though her farm was only in its third year, it was, as the superintendent remarked with pride and pleasure, more than paying expenses; but *next year! "mais l'année prochaine nous ferons des belles affaires, allez!"*

The sale of the yearling seed is made a special business by some oystermen, and they bring from four to six francs the thousand. They are put up in round baskets with a small hole in the top, and are kept, at the season of sale, suspended from scaffoldings erected over the water for the purpose, so that the baskets are never above the surface.

The French oyster-growers are very particular that the oysters taken up for market shall lie for five or six days in the *claires*, before forwarding them to the consumers; this is done in order that all mud and impurities shall be washed out in the pure sea-water, and the oyster is certainly whiter and handsomer for this clean bath.

The *Marennes*, or green oyster, is colored by being placed in *claires* when the tidal water is let out at certain intervals; a confervoid growth is induced which gives the highly-prized color and flavor, and doubles the value of the oyster.

The *Ostende* oysters are placed in wooden vats, and are frequently tossed and tumbled about by women with rakes, thus breaking off the thin edge of the new growth of shell, and forcing it to grow more round and deep. Labor, in this country, is much too high to make a remunerative cultivation of the oyster in this manner practicable.

Oyster-growers recognize their own *tuiles* by a sort of trade-mark, which, by French law, it is forgery to imitate. After the *tuille* is moulded, and while still soft, a hole is punched in the top, either round, square, triangular, or of any desired shape; this private mark is recorded in due form, and wherever a tile bearing it is found, it is the unquestioned property of the one who has, so to speak, put his sign manual upon it. Our own laws protecting the oyster-grower need considerable alteration and improvement, especially in the State of Connecticut, where the oyster interest is a very large one; but our legislators, when the subject is properly put before them, will no doubt see the justice of giving the same protection to the marine, as to the cereal farmer, when each invests his money, and conducts his business equally in accordance with the law.

Chemistry Applied to the Arts.

PROGRESS IN THE INDUSTRIAL ARTS IN ENGLAND.

James Young, Chemical Works, Bathgate, said that his experience accords with that of Dr. Lyon Playfair. So formidable did the rate of progress of other nations appear to many, that several meetings of jurors, exhibitors, and others, took place at the Louvre Hotel on the subject. The universal impression at these meetings was, that the rate of progress of foreign nations, in the larger number of our staple industries, was much greater than our own. But it must be stated that a large number of our first-class machine and other manufacturers are not exhibitors in Paris, whereas, other nations, he believes, have taken care to bring forward their very best; still, the great progress of other countries is evident. The reason for this increased rate of progress is the excellent system of technical education given to the masters of workshops, sub-managers, foremen, and even workmen.

England for a long time excelled all other countries in the finish of her machines; but now we find that foreign machine makers are rapidly approaching us in finish, and, having skilled and intelligent labor cheaper than ourselves, are progressing in all the elements of manufacturing.

The writer uses his own case as an illustration. Originally he was a working man, but he has succeeded in increasing the range of manufacturing industry. The foundation of his success consisted in his having been fortunately attached to the laboratory of the Andersonian University in Glasgow, when he learned chemistry under Graham, and natural philosophy and other subjects under the respective professors. This knowledge gave him the power of improving the chemical manufactures into which he afterwards passed as a servant, and ultimately led to his being the founder of a new branch of industry, and owner of the largest chemical manufacturing works of the kingdom. It would be most ungrateful of him if he did not recognise the importance of scientific and technical education in improving and advancing manufactures. Many men without such education have made inventions and improvements, but they have struggled against enormous difficulties, which only a powerful genius could overcome, and they have been sensible of the obstacles to their progress. Stephenson, who so greatly improved locomotives, had to be his own instructor; but he sent his son Robert to Edinburgh University, and the son did works at least as great as the father, and with far less difficulty to himself.

A Municificent Lady poorly Rewarded. — A noble widow, Madame de Clercq, spent £140,000 in order to render the commune of Oignies, in the Pas de Calais, in which she resides, a terrestrial paradise. She has constructed at her own expense a vast church, an asylum, a school, and work-room for girls, a boys' school, a house of patronage for youth, an asylum for the aged, cheap dwellings, etc.; she has founded courses of studies for adults, Sunday-schools, a library, a club, recreation and exercise rooms, with medical consultation, a savings bank, etc. A group of neighbouring roads has also been organized and kept in repair, more than 400 acres of land have been cleared and let out to 550 families, a coal mine has been sunk, and water supply given to the town, now numbering 1,800 souls, all at the expense of this lady, to whom the jury have awarded the humble prize of a silver medal!

Nitro-Glycerine in Blasting. — A correspondent of the Nevada *Gazette*, who has recently visited the summit tunnel on the Central Pacific Railroad, writes that the contractor thinks they are going ahead with the tunnel fully twenty-five per cent. faster by the use of nitro-glycerine than they could by using powder. The small holes required for the oil can probably be drilled in less than one third the time required for larger ones necessary in using powder. The oil does much more execution than powder, as it always breaks the rock from two to sixteen inches beyond the hole, and also throws out a much larger body. The oil, in hard rock, shows a strength five times greater than powder, pound for pound. It is made upon the spot, and is considered much stronger, as well as safer, than that imported. They have now been using it for several months, and have never yet had a premature explosion, or any other accident; and not a single blast has missed fire since the Chinaman commenced filling the cartridges. The work upon this road seems to have fully set at rest the superiority of nitro-glycerine over powder, both for economy and safety. Of course this applies to the oil made upon the spot, and not to the imported article.

Clarifying Action of Sulphate of Alumina on Turbid Water. — Whatever be the nature and quantity of the earthy substances held in suspension in turbid water, it becomes fit to drink in from seven to fifteen minutes if to each litre there he added .04 grammes of finely-powdered alum, care being taken to agitate the liqud when the alum is introduced (this is about ⅔ lb. per ton of water). If potash alum is used, the alum is decomposed into sulphate of potash, which is all dissolved by the water, and sulphate of alumina, which, by its decomposition, purifies the water. The alumina separates in an insoluble form, and carries down with it as it precipitates the matters which render the water troubled, and the organic matter. The acid attacks the alkaline and earthy carbonates, and transforms them into sulphates. The water becomes slightly richer in bicarbonates and free carbonic acid, whilst all organic matter is destroyed. Seven parts of sulphate of alumina will purify as much water as ten parts of rock alum or potash alum, and the sulphate of alumina does not introduce any alkaline sulphate into the clarified water. — *Technologiste*, vol. xxiv., p. 197.

A New Cement and Building Material. — In a communication to the French Academy of Sciences, M. Sorel describes a new cement, being a basic hydrated oxychloride of magnesium. It is obtained by slacking magnesia with a solution of chloride of magnesium in a more or less concentrated state. The denser the solution, the harder it becomes on drying. This magnesium cement is the whitest and hardest of all those known to this day, and it can be moulded like plaster; in which case, the cast acquires the hardness of marble. It will take any color, and has been used by the inventor for mosaics, imitations of ivory, billiard balls, etc. The new cement possesses the agglutinative property in the highest degree; so that solid masses may be made with it, at a very low cost, by mixing it up on a large scale with substances of little value. One part of magnesia may be incorporated with upwards of twenty parts of sand, limestone, and other inert substances, so as to form hard blocks; while lime and other cements will hardly admit of the incorporation of two or three times their weight of extraneous matter.

By means of these artificial blocks, buildings may easily be carried on in places where materials for the purpose are scarce. All that is required is simply to convey a quantity of magnesia and chloride of magnesium to the spot, if there be none to be had there, and then to mix them up with sand, pebbles, or any other matter of the kind close at hand; blocks can be made of any shape, and imitating hewn stone. This magnesian cement may be obtained at a very low cost, especially if the magnesia be extracted from the mother ley of salt works, either by M. Balard's process, whereby magnesia and hydrochloric acid are obtained at the same time, or else by decomposing the ley, which always contains a large proportion of chloride of magnesium, by means of quicklime, which by double decomposition yields magnesia and chloride of lime containing a certain quantity of chloride of magnesium, and which, with the addition of various other cheap substances, may be used for whitewashing.

How to Produce Stoneless Fruit. — At a late meeting of the Agricultural Society in India, the Rev. Mr. Firminger communicated a plan by which the stones of fruit may be reduced or made to disappear, and the pulp increased in size and flavor. At any time during the cold season, select a branch that is to be used afterwards for inarching. Split it up carefully, somewhat less than a span long. From both halves of the branch thus split, scoop out clearly all the pith; then bring the split halves together again, and keep them bandaged till they have become thoroughly united. At the usual time, the beginning of the rains, inarch the branch thus treated upon suitable stock, taking for the place of the union the portion of the branch just below where the split was made. Upon a branch of the tree thus produced, a similar operation is performed, and so on for successive seasons, the result being that the stone of the fruit becomes less and less after each successive operation. This process has been applied likewise to the grape vine at Malaga, and plants thereby have been produced which bear the finest fruit, without the slightest vestige of a stone within them. — *Mining Press.*

The Queen's English at Paris. — The following is a literal copy of a handbill which has been extensively circulated in the Exhibition by a Spanish firm: "Blacking, ocly, and resinous, titled the emperor of the blackings, black ink, and of all colours to write with of D. J. G . . . . member of the national academy of Great Britain. This Blackings is knoconed to be the most useful for the conservation of the shes, for its brilliancy, solidity, and complete discomposition of the black animal. Mr. J. G. dus a present of £20 sterling to the person that will present hum a blacking in paste, that will reunite the same conditions, as the Emperor of the Blackings."

Chemistry Applied to Agriculture.

WHEAT.

We have just harvested and threshed our summer wheat, and find the yield to be a little rising thirty bushels to the acre. The berry is plump and full, and in color is not affected by the season. As we look upon our bins filled with the noble grain, we ask ourselves, "Why is the cultivation of this cereal so generally neglected in New England?" Farmers have the impression that their lands have lost some element or elements essential to its growth, and therefore it must uniformly fail. This is true in part. Analysis of the wheat plant, both of the straw and berry, shows that it is peculiarly rich in lime, and also in the phosphatic and nitrogeneous elements. These cannot be found in sufficient quantity in our worn-out soils, and therefore the wheat plant languishes. But we can restore such soils to fertility, so as to get highly remunerative returns in wheat. We dressed our wheat field with pure bone dust, well rotted, 500 lbs. to the acre, and with it we mingled about 50 lbs. of nitrate of potassa. This gave us splendid results. Doubtless, a thorough dressing of well seasoned barn-yard manure would have furnished a sufficiency of the needed elements to have met the wants of a single crop; but we prefer the lime and salts, as being directly applicable to wheat on most lands, and rendering a crop certain. With flour at sixteen dollars a barrel, it is a pity farmers should not raise at least a home supply of wheat. We obtain the most delicious sweet bread from *our* wheat, ground fine, in an old-fashioned stone mill. We keep it out of the *bolt*, as it is certain we cannot improve upon nature in adjusting the parts of the grain to be used as food. More attention should manifestly be given to wheat-raising in this section of the country. So long as the high price of flour continues (we are of the opinion that the days of cheap flour are past), it is the most profitable crop. The kind of seed that appears best adapted to our soils is what is known as the "Black Sea" variety. This is a summer wheat.

Multum Pluvium. — We have had a season of unexampled wet, and almost every thing, in the line of vegetables and fruit, are stricken with mildew. How effectually the present season spoils the theories of those who charged our late seasons of drought to the denuding of our fields of forest trees! Many good people really began to feel that we should have no more rain until we cultivated extensive forests thoughout the country. The absurdity of such speculations was made apparent by investigating the history of the past. Some of the most protracted and severe droughts recorded, occurred in the days of the early settlement of New England, when unbroken forests extended from Cape Cod to the Canadas. The changes that man is capable of making in the physical aspects of a country have but little to do with the rain-fall or other meteorological influences.

Cause of Failure of Fruit Crop. — I wish to say to *Albert*, of Mass., who inquires, through the *Journal*, why "blight" in blossoming fruit-trees is caused by the lightning of a thunder-storm, that a heavy fall of rain (with or without lightning) upon blossoms, just when the pollen is ready to be diffused through the air and upon the stigmas, will beat down to the ground a portion of this pollen, and will be very likely to destroy a part of the remainder by the well-known action of endosmosis, distending and finally bursting the walls of its cells and discharging their contents. This, of course, would interfere, more or less, with the fertilization of the pistils and their consequent development into fruit.

The popular word "blight" is a vague term, not well suited for use in scientific investigation, and likely to mislead if carelessly employed. R. H. W.

Vitality of Seeds. — The manner in which species of the floral kingdom are accidentally disseminated over wide regions, is shown by the fact that, in the Exposition gardens, a great variety of plants foreign to France have spontaneously sprung up under the walls and around the building. The seeds from which these new acquisitions to the natural flora have germinated, were conveyed to Paris in the packing of the articles sent from various countries. The several plants around the house of "Gustavus Vasa," which are peculiar to the country of that monarch, from their rare beauty, are attracting considerable attention.

Boston Journal of Chemistry.

BOSTON, OCTOBER 1, 1867.

☞ Any one sending us the names of *three* subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For *five* subscribers, we will send the *petite microscope.* For *twenty-five*, we will send, in addition to the microscope, a copy of *Stockhart's Chemistry for Students*, the best elementary treatise yet published. For *one hundred* subscribers, we will send a complete set of chemicals, together with test tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. Downes is general travelling agent for the *Journal.*

☞ The edition of No. I., 2d volume of the *Journal*, is now entirely exhausted, and we can no longer supply them to our new subscribers. Also, the first numbers of Vol. I. are exhausted. After supplying all our old subscribers with the first number of the present volume, we put aside several thousand copies, enough, we supposed, to meet the wants of new subscribers during the year; but, much to our surprise, they are gone before the issue of the October number. It will make a break in the second volume to future subscribers, but we cannot help it, unless we incur the large expense of having it put in type again. This we cannot promise to do, but will say, that, if our list increases as rapidly during the next eight months of the year as it has in the last three, the number will probably be reprinted.

☞ We have just issued a new and *descriptive catalogue* of the medical and chemical products of our laboratory, which we will be happy to send to any physician or druggist who may express a desire to receive it.

☞ Our next number will contain the "Chemistry of a Pint of Kerosene."

☞ By a perusal of the article, "Pharmacy of the Late American War," some idea may be obtained of the immense quantities of medicines and surgical appliances demanded in war. *Sixty-two thousand pounds* of Epsom salts, and more than 2,000,000 roller bandages issued from one establishment!

☞ The postage on the *Journal* is only twelve cents per annum, payable in advance. Several subscribers have written, saying they are required by postmasters to pay two cents on each number. They can correct this error.

CHEMICAL ATOMS.

What is true in chemical theory? Are we to have the great fundamental principles upon which chemistry as a science is based, undermined? The recent important lecture read before the Chemical Society, London, by Sir Benjamin Brodie, awakens strong doubts, in the minds of many, of the correctness of our ideas regarding chemical theory. In the discussion which followed, the most distinguished chemists unhesitatingly sided with the lecturer. His remark that "Dalton's theory of atoms is inadequate for present purposes — is, in fact, erroneous," forms the key-note to his speculations. He also adds that "chemistry has got on the wrong track — off the rails, in fact;" meaning by this, that all was wrong in chemical theory, and that it could be no longer used to elucidate the work carried on by chemists.

The whole science and language of chemistry, as at present understood, rests upon the theory of ultimate atoms in matter; and the law of definite proportion has been supposed as fixed as that of gravitation. It is a bold innovation to attempt to subvert what has so long been regarded as unchangeably fixed; and not a little startling to hear so distinguished a chemist as Dr. Frankland declare he did not believe in "atoms."

After all, it seems to us this whole matter may be very easily comprehended. Chemists engaged in research, in practical laboratory manipulation, have long been troubled with the doctrine of *atoms*, as popularly understood. Chemical phenomena, philosophically viewed, hardly admit of a belief in their existence; indeed, the human mind is wholly incompetent to grasp the idea. It cannot comprehend the atomic theory, any more than it can the idea of infinite space.

The question whether atoms exist, has indeed but little significance in a chemical point of view; as a topic of metaphysical discussion, it is not out of place. If we were asked if we believed in the existence of certain indivisible particles of matter called atoms, we should reply "No." On the other hand, we should express belief in a state of matter so peculiar that it undergoes no further division in chemical metamorphoses. We might declare that we *did* and that we *did not* believe in "atoms." It would depend upon the sense in which we wished to be understood.

In chemistry, we must assume, hypothetically, the existence of atoms, in order to a clear explanation of chemical phenomena. What kind of a text-book to introduc

in schools would that be, which clouded and confused the mind of the young student with metaphysical abstractions belonging to the new system? Atoms or no atoms, chemical *facts* are *facts*, *laws* are *laws*; and we have only to seek the best form of ideas and the simplest language in which to enforce them. In assuming the existence of atoms, we rid ourselves of many difficulties, and make plain great and fundamental laws.

Chemistry of the Sun.—It is now very certainly known that the metals, gold, silver, lithium, and several others, do not exist at the sun. Nothing has yet been developed in the spectra of the solar ray, proving that the constitution of the sun, in its elementary constitution, differs from terrestrial bodies. We know there are many lines in the spectrum, the nature of which are not understood; but the same may be said of terrestrial spectra. We are still in the dark as regards a knowledge of all the elements belonging to our earth. Four new elements have been discovered, within the last five years, by the aid of the spectroscope; and doubtless there are others of which we have no knowledge.

We have to record the death, since our last issue, of two highly distinguished physicians and surgeons in this city,—Dr. James Jackson and Dr. J. Mason Warren. The former died, not from specific disease, but as the flame of the candle expires when the last atoms of wax are consumed. This venerable man and beloved physician filled many positions of honor and trust in the city, and was long connected with the Medical Department of Harvard University as Professor. He has gone to his reward. Dr. Warren died from a complication of diseases connected with the abdominal viscera. Intus-susception and cancer were the immediate causes of his death. We infer that his whole life has rather been one of physical and mental suffering. We happened to be in Europe during his visit there in 1856, and saw something of the mental disquietude under which he suffered for many weary weeks. Notwithstanding these disturbing influences, Dr. Warren performed a vast amount of professional labor; and the illustrious line of surgeons of which he was the latest representative, has had additional lustre shed upon it by his services. He was kind, genial, and self-sacrificing in private life, and socially and professionally his loss will be deeply felt.

Electrical Science.—An hour recently spent in the laboratory of Mr. Moses G. Farmer, of this city, was one of much interest. Mr. F.'s special department of research, is *electricity*; and no experimenter is more indefatigable, persevering, or competent. We have been pleased to see that justice has been done him in some of the reports of foreign scientific bodies, as regards priority of discoveries. He is emphatically an original *thinker* and ingenious manipulator. In the department of thermo-electricity, he has made some important discoveries. We have before alluded to his new form of thermo-electric battery; this he is now endeavoring to turn to new practical uses, in precipitating metals, producing light, and propelling machinery.

Death of Faraday.—Sir Humphrey Davy was once asked what he regarded as his greatest discovery. He replied, "Michael Faraday." By recent advices from Europe, we learn of the death of Faraday, full of years and full of honors. The career of this extraordinary man is so interesting that we shall present in our next number a brief memoir, illustrating how the poor, uneducated London boy became the world-renowned experimenter and chemist.

Manufacture of Iodine.—Recent improvements in the mode of manufacturing this substance from sea-weed, afford nearly double the yield over the old methods.

Formerly, the "tangle" was incinerated, or burned, and the ashes leeched; now, it is placed in large iron retorts and distilled, and all the volatile products secured; among them, iodine and bromine.

The sea-weed, treated in this way, affords a large yield, as nothing is lost by volatilization. A peculiar charcoal remains, which is used for a variety of purposes of much importance in the arts. For bleaching and deodorizing purposes, it is even superior to the best animal charcoal. Constant improvements are being made in the manufacture of chemical products in the industrial way.

Medicine and Pharmacy.

CHEMISTRY AND THE MEDICAL PROFESSION.

Although the students at most of the metropolitan medical schools enjoy the privilege of being taught chemistry by chemists of acknowledged eminence and talent, it is rumored that even at the examinations of the University of London, to which none but the best students subject themselves, the answers to the chemical questions are often anything but satisfactory. And if we were to infer from this that the great mass of medical students enter upon their professional careers with a very meagre knowledge of the facts, and a very confused notion of the principles of chemistry, we believe we should only be arriving at a conclusion which has long ago been accepted and lamented over by many of our best teachers. It hardly needs very much acquaintance with disease or doctors to see that chemistry has two distinct and important relations with the medical art. On the one hand, inasmuch as almost every malady has its chemical side, and since an acquaintance with the properties of chemical substances is absolutely indispensable for the correct diagnosis of many, not only medical but also surgical cases, and for the pharmaceutical treatment of all, the practitioner who neglects chemistry in his student years goes halting all his life. On the other, for an art like that of medicine, straining to the very utmost scientific methods and scientific ways of thought, and depending for its success almost entirely on a correct appreciation of the right manner of dealing with natural phenomena, the value to the medical man of a training, however brief and imperfect, in the more finished and perfected sciences of chemistry and physics can hardly be overrated. Of two things so important, it is, perhaps, an invidious task to say which ranks first. But when the mental condition of the majority of the new students who flock up to the hospitals every October is borne in mind, it almost seems as if no language could be too strong with which to insist upon the benefits of scientific training. Coming from schools where they have most likely learnt only a little Latin and less Greek, corrupted in many instances, and damaged for intellectual labor by the routine idleness of an apprenticeship, all but utterly ignorant of the facts and entirely ignorant of the principles and spirit of science, and yet puffed up by premature professional feelings, from few sources could there be gathered material more raw or less hopeful for a scientific teacher to mould into accurate and vigilant students of nature.

Upon this material the professor of chemistry has to work under peculiar disadvantages. His time is limited; while the space over which he has to travel in his lectures is exceedingly wide. If he taught nothing but chemistry, he would find but few moments to spare; as it is, he is obliged to devote many lessons to simple physics, or else his more purely chemical lectures would be unintelligible to his hearers. Most of his class think chemistry an imposition set upon them by examining boards, and listen to him grudgingly, while they interrupt him without a single pang of conscience. And even of those who hear him gladly, the majority are taken away from him just as they are becoming hopeful, or hindered day by day by the more imperious demands of the study of anatomy.

Of the vast importance of anatomy, both as a most salutary intellectual training and as an altogether indispensable knowledge, there can, of course, be no question; but, surely, it is neither wise nor profitable to allow it to swallow up all other studies. If it is clear—and the experience of most teachers seems to have made it tolerably clear—that it is impossible for the student who enters upon his studies intellectually poor and needy, to make himself master of anatomy, and at the same time proficient in chemistry, one other thing is also clear—that the examining boards and the authorities of the various schools should join together in attempting to enforce a preliminary chemical and physical training before the student comes within the iron grasp of anatomical studies. We know nothing which might more profitably engage the attention of the newly-founded Teachers' Association. Were general education carried on in anything like a rational manner, a lad might at once pass from the higher classes of a school to distinct professional studies, already trained in physical and chemical science. But, as schools are now, it becomes the duty of medical institutions to see that their students have gone through a second schooling before, and not while they are busy in the dissecting-room. A change of this kind would be as beneficial to chemistry as to the medical profession. The teacher of chemistry would spend all his forces on his own subject, and cease to make annual excursions into the territory of physics; while physics, being taught separately, would be taught fully and well. How much a knowledge of physics is wanted by medical men, may not only be imagined by *a priori* reasoning, but very readily seen by studying a few medical writings.—*London Laboratory*.

[*Communicated to Boston Journal of Chemistry.*]

CASE OF NEPHRITIC CALCULUS.

BY EPHRAIM CUTTER, M.D.

[Weighing seven and a half grains, lodged in the right ureter, complicating delivery, death, congestion of lungs, great dilation of right ureter, expansion of right kidney, abscess in the same. Read before the Middlesex East M. Society.]

Mrs. Eustis Cummings, 28 years of age, sanguine temperament, expected to be confined with her fifth child, Dec. 21st, 1863. She was a small, healthy, symmetrical woman.

November 18th she sent for me, supposing that she was in labor. Her pains were intermittent, occurring once in ten or fifteen minutes, and were referred to the right lumbar region. They were not intense. The os was high up, and undilated, and evidently unaffected by the pains. The case was considered as a false alarm, and she was kept with a few one-grain opium pills to lull off the pains till the full time. She was seen on the 19th and 21st. She had some pains; there was no alteration in the condition of the os uteri. Her sufferings were not severe, but she was confined to her room. On the 23d she sent down, and my father answered the call. He found her easier, and examined the os, and told her she was not going to be sick, and left. He was summoned again the same night, and did not find her condition much altered, but staid with her all night to pacify her friends. She complained of pain in the right hypochondria mostly. At one time it was very severe, and only relieved by the inhalation of chloroform. She took physic, and the bowels were freely opened. For the most part the pain was relieved by opiates. It was considered by my father a spurious case of labor, and the pain connected with the uterus. She continued in this half-way state until Dec. 6th, when she was delivered of a healthy living male child, in an easy labor. She continued to do well for seven days, when she was taken again with the old pain. Of course it was considered to have nothing to do with the utero gestation. We looked for some other cause, but were unable to distingish between intus-susception, or nephritic calculus. The same means which had relieved the pains were employed, but they continued to increase in severity, with no intervals. The pulse was regular, the bowels were tender; there was some tossing to and fro. She begged for the chloroform again, after having several grains of the solid opium in pills, one grain of the valerianate of morphia, without relief. I went home and consulted my father. We thought it best to administer half a grain of the sulphate of morphia dissolved in water by subcutaneous injection, and to follow with chloroform by inhalation. The solution was introduced by a subcutaneous injec-

tion inside of the middle of the right leg, near the tibia. The effect was very prompt. In a few minutes she fell asleep, and continued all right till morning, a space of eight or nine hours, in a comatose condition, pulse normal, respiration four times a minute, deep jerking, stertorous. The effect of the imperfect oxygenation of the blood soon became manifest in the leaden countenance and livid lips which, on the appearance of morning light, were so deathly that I thought it high time to counteract the poisonous effect of the medicine. A tub, a pailful of ice-water, and a coffee pot, were brought. After about two pailfuls of the ice-water had been poured upon her head and face, she opened her eyes and manifested signs of consciousness. But she soon relapsed into the comatose condition again, from which the cold douche would rouse her. She was shaken and marched across the apartment, and about noon she came out of the influence fully, and we hoped her troubles were over. About two o'clock, on December 15th, she was seized with pain in the chest, and oppression of breathing and general prostration, which continued until death, about noon.

At the autopsy the next day, the lungs were found engorged with blood, the heart filled with clots both sides, the right kidney was evidently twice the size of the left, the ureter leading from it was enlarged, contorted, and distended. It was nearly three quarters of an inch in diameter, largest next the kidney and tapering down to nearly the normal size at the bladder. About one inch from the bladder, a calculus was found impacted in the ureter. This was in two portions, both together weighing seven grains, evidently of the uric acid variety. The upper part of the kidney was invaded by an abscess of the size of a hen's egg. The pelvis of the kidney was distended with urine and pus; cut into these was found some fatty degeneration. There was some urine in the bladder. Elsewhere, the appearances were nearly normal. This case forms an interesting companion to that shown to the society in October last, when both ureters were enormously enlarged by an obstruction at their vesical termination, caused by an hypertrophy of the vesical coats.

P.S. — Mrs. C. had an attack of this pain last summer. The dose of morphia given by subcutaneous injection may appear large; but my father a short time before gave two grains of the sulphate of morphia by a separate subcutaneous injection in the course of two hours without effect.

PHARMACY OF THE LATE AMERICAN WAR.

Many are the lessons taught by the late civil war in America, but we think that its magnitude is altogether inappreciable, even by the amount of a national debt incurred in such a short space of time. We propose to take another stand-point for estimating this magnitude, with the assistance of the lately-published proceedings of the American Pharmaceutical Association. We must premise that, owing to many pressing reasons, chiefly from the inferiority of the drugs, and the high price charged by the contractors for the army medical service, the government was induced by the Surgeon-General to form pharmaceutical laboratories at the commencement of the year 1863. Two large laboratories were built, one at Philadelphia, the other near New York, and statistics are given for the information of all who take interest in pharmacy on a large scale.

Before giving a short notice of this laboratory at Philadelphia, we must mention that the quantities given were used by one of the two belligerent parties during about half the time of the war, and issued from one only of the two laboratories.

The quantities of drugs taken and bandages used, therefore, during the whole time of the war would certainly be underrated if those given were multiplied fourfold.

The labor at this Philadelphia laboratory was commenced, by a force of three young ladies, we are told, by the manufacture of bedclothes, towels, drawers, and shirts. In a short time the work was increased to such an extent that seventy-two sewing-machines and some 250 "hands" were pressed into service.

It is said that a full detail of the internal arrangements and work done would require too much labor, from the materials for such a report being so scattered, and so they will be forever lost. We very much regret this, as many more pretending reports issued from America do not possess a tithe of the value that such a valuable chapter of medical history would possess.

Attached to the building were a counting-house, shipping, receiving, and packing departments, a glassware department, another for tin cases and boxes, wash-house, stoppering room, steam boilers and engines, and an analytical room.

For converting the crude drugs into the chemical and pharmaceutical products needed, were provided,— 1st, A mill-room for pulverizing (coarsely or finely) and drying; 2d, a still-room, for the preparations for which steam could be used; 3d, a furnace-room; 4th, an ether house, a separate building, for the manufacture of chloroform and ether; 5th, a filling department, in which female hands only were engaged, and with which the manufacture of isinglass plaster, pills, and bandages was connected.

When the work was commenced, a large stock of substances, afterwards provided from the laboratory, already existed; besides, medical purveyors brought much from the market afterwards. So an accurate estimation of what was really consumed cannot be given.

Of course there was much interested opposition to the working of this scheme.

And now "to count our gains," bearing in mind the limitations before given. From March, 1863, to September 30, 1865, were actually issued from the large Philadelphia Laboratory of Pharmacy, etc., 2,318,928 roller bandages; 34,465 yards of isinglass plaster; "alcohol fortius," 141,436 quarts; precisely 3,175,248 opium pills; and 1,292,232 pills, containing each three grains of sulphate of quinine. 6,645 lbs. of opium were used in powder, and a quantity of all the following drugs was issued, in every case exceeding 10,000 lbs. by weight. We arrange them in order of quantities, not to serve as an estimate of what drugs were most frequently used, for such would be very fallacious, as a dose of one compound might be a drachm, of another a few grains; but, with this allowed, a fair notion may be given of the general order in the use of the several drugs.

As might be almost expected from the largeness of the dose and general utility, old-fashioned Epsom salts carries off the palm. The quantity of sulphate of magnesia used was 62,611 lbs.; the next highest number is given for linseed-meal, viz., 55,627 lbs., followed closely by simple ointment, 50,097 lbs. These numbers are by far the highest; the next to them in order are *sinapis nigræ pulvis*, 31,429 lbs.; *syrupus scillæ*, 29,863 lbs.; solution of chlorinated soda, 26,935 lbs.; chloroform, 25,300 lbs.; spirits of nitrous ether, 21,834 lbs.; and so we might prolong the list to some length.

We may observe, as curiosities of pharmacy, during a severe civil war, the issue of 10,594 lbs. of black pepper, 10,257 lbs. of powdered gum arabic, 14,029 lbs. of copaiba balsam, and 3,391 lbs. of sulphur.

Ether in America largely replaces chloroform as an anæsthetical remedy, and so we are not unduly surprised at the amount of 16,308 lbs. prepared.

These figures are rather hard to realize as the requirements of a medical department during the time of war, for little more than two years and a half, from one establishment. We can only give the statistics presented to the eminent members of the Pharmaceutical Association of America, which has on its roll many of the leading medical names of the United States. These wholesale results tend to show that at critical times in a nation's history a demand has only to exist for the greatest efforts to be made. After the whole of the expenses were paid, the saving to the government was found to be $766,019.91. —*Chem. News.*

Animal Grafts. — A French naturalist, M. Vulpian, cut off the tails of tadpoles, and saw them not only live but *grow* for ten days, indifferent to all theories of nervous centres, digestive apparatus, or circulatory systems. But the member that seems to have the strongest dose of the "vital principle" is the tail of a rat. This is the very ideal of life, and here, if anywhere, we ought to locate the seat of vitality. The following experiment was made by Mr. Bert. He dried a rat's tail under the bell of an air pump, and in immediate proximity to concentrated sulphuric acid, so as gradually to deprive it of all moisture. Then he placed it in a hermetically sealed glass tube for five days. At the end of this time he subjected it for a number of hours to a temperature of 98 degrees centigrade in a stove, and subsequently sealed it a second time in his tube. Four days more having elapsed, he united this tail by its cut extremity, to the freshly cut stump of a living healthy rat, and quietly awaited the result. His success was as complete as it was marvellous. It commenced to expand and perform the natural duties of a tail, and three months afterwards he demonstrated, by a second amputation and careful injection, that it was furnished with proper vessels and was a living part of the second rat!

The Prudent Live Longest. — In a very careful and laborious *Appendix to the Eighteenth Annual Report of the Prudential Assurance Company*, by Henry Harben Esq., is given the experience of the Company in the industrial branch for the years 1864, 1865, and 1866; and the author ingeniously compares the Company's statistics with those issued by the Registrar-General. The experience is this; that among the artisan and small tradesmen class of lives, the numbers exposed to risk were in the proportion of 48.3 male to 51.7 female, in this respect assimilating to the proportions of the general population of England and Wales; that the rate of mortality during these three years was 21.67 per 1000, whereas, in all England and Wales it was 23.63 — the difference in favor of the Prudential Company being 1.96 per 1000. Since it is the most prudent of the working classes who insure their lives, these facts brought prominently forward by Mr. Harden tend to verify the old saw that "the prudent live longest."— *Brit. Med. Journal.*

Treatment of Sea-Sickness. — The numerous remedies for this nuisance, so far as they have any beneficial effects may be reduced to two classes: — 1st. Stimulants to the mucous membrane of the stomach, and to the nervous system. Essential oils, chloroform taken internally, brandy, aromatics, and other irritants seem to occupy the attention of the nervous system somewhat, and have a moderate tendency to obviate the nausea. A strong mental impression has the same effect. 2d. Cathartics, which act on the portal circulation, and are very positive in their influence. Persons very subject to sea-sickness often take a voyage in entire comfort by the following precaution: — Take ten grains of blue mass the night before embarking; follow it the next morning with a brisk cathartic of Seidlitz powders. A voyage at sea is almost always constipating in its effects, and a repetition of the medicine once or twice on the passage may be necessary. — Dr. Edmund Andrews, in *Chicago Med. Examiner.*

GLYCERINE.

By Joseph Adolphus, M. D., of Hastings, Michigan.

In writing this article, I am aware that but few are ready to receive the facts herein stated, inasmuch as glycerine has merely been regarded as a matter of but secondary import. It must not be considered out of place when I observe that glycerine stands next to cod oil as a restorative agent, *especially in the cases of children's complaints. What cod oil is to the adult, glycerine is to children;* at least, in a great measure. The clinical facts below recorded are from my own practice. I am altogether strongly inclined to the restorative doctrine, because I have reaped the richest harvest of curative success for practising it. Furthermore, I am not a firm believer in the doctrine, that the blood is the chief and only source of nutrition, repair, and reconstruction. However, I shall not digress further from my subject, but shall at some future period disclose my views on the latter subject.

Though glycerine has been before the profession for many years, I am not aware that that attention has been paid to this important remedial agent that its merits deserve.

Its excipient properties excel all other known solvents, because of its universality. Thus 100 parts of glycerine will dissolve

Acidum arsenicum	20.0	Brucia	2.25
" arseniosum	20.0	Alum	40.0
" boracic	10.0	Arsenite soda	50.0
" benzoic	10.0	" potass	50.0
" tartaric	30 0	Carb. soda	99.0
" citric	30 0	Carb. ammon.	20.0
" tannic	50.0	Chlor. potass.	3.5
" oxalic	15.0	Chloride sodium	20.0
Argenti nitrat.	100.0	" barium	10.0
Bromine	100.0	" zinc	50.0
Iodide of iron	100.0	Borate soda	60.0

Chloride of iron	100.0	Phosphorus	0.3
Monosulph. potass.	100.0	Persulphuret potass.	25 0
Hydrarg. biniodide	0.3	Muriate ammon.	20.0
" bi-chlor.	7.0	Sulphur	0.3
" cyanid.	27.0	Sulphate iron	25.0
Iodine	1.0	" zinc	36.0
Iodide of sulphur	1.6	" copper	40.0
" potassa	25.0	Mono-sulphuret soda	100.0
" zinc	50.0	" " lime	100.0
Cyanide of potass.	32 0	Muriate morphia	20.0
Quinia	0.5	Acetate "	20.0
Strychnia	0.25	Sulphate "	20.0
Morphia	0.45	Sulph. atropia	33.0
Veratria	1.0	" strychnia	22.5
Cinchonia	1.5	Carb. of iron	60.5
Sulph. quinia	2.75	Oxide of lead	20.0
Atropia	3.0	Salicine	40.0
Nitrate strychnia	4.0	Santonine	35.0

All the deliquescent salts and vegetable acids are soluble in it to a great extent.

Chemically, glycerine is a compound of a radical known as *glyceryl*, having a formula of $C^6 H^7$, in union with 5 eqs. of O, and 1 of water; its formula is, therefore, $C^6 H^7 O^5 + HO$.

It is perfectly neutral and bland, and has the capacity of diffusing itself freely over and through organic matter, incorporating itself between organic molecules, by which it is absorbed and appropriated. All organic substances, from the hardest bone to the finest connective tissue, are penetrated by it, with such diffusive force as to make heir minute structure astonishingly transparent. The blood and pus globules, when suspended in glycerine, become quite transparent, and show up their nuclei readily, heir cell walls becoming more thin and transparent, and inally dissolved. Epithelial structure is admirably delineated by its agency; so are the fasciculi of striped nuscular fibre. Thin sections of bone, soaked in it, eveal, in admirable style, its corpuscles. All organic ubstances, soaked in glycerine, are thoroughly preserved, oth as to form, integrity, and softness.

Applied externally to burnt surfaces, mixed with subnit. bismuth, it forms the very best application I have ver used for children or adults. One part starch (Beruda arrowroot is best) and five of glycerine, heated up o 190° F., being constantly stirred, makes the most greeable basis by which to apply nit. silver, and other alts to the eye, ear, and skin. When spread over dried rganic membrane, it diffuses itself rapidly over it, and is peedily absorbed into its intimate structure. This property of glycerine depends doubtless on the affinity that possesses for organic molecules, penetrating to them nd becoming a nutrient plasma to living tissue. When pplied to false membranes, it diffuses itself between iem and the morphological tissue beneath, causing their peedy detachment.

Thus, in diphtheria, I have repeatedly applied it with brush, either alone or with tannin dissolved in it, to the lse membranes, which would be detached in a few ours. So, also, in croup. The surfaces being so modified as in a great measure to cease to reproduce them. urnt and blistered surfaces often produce false memranes, which induce severe constitutional symptoms, in onsequence of the irritability of the surfaces. Glycerine id morphia speedily remedy them, soothing the nervous ritation, and modifying the vital condition of the parts. pplied to suppurating surfaces which are painful and oduce an ichorous pus, glycerine dressings change the normal condition by arresting the degenerating process, rough its antiseptic and astringent properties. Applied enlarged glands, and injected into abscesses, it meets ery indication, either alone or with iodine, etc., dislved in it. I have injected it into syphilitic buboes, inging about a healthy state of their walls, and healing their interior. I have used it as an application to the uteri in ulcerations, indurations, and chronic inflamations of that organ, conjoined with iodine, or iod. tass., or morphiæ acet., or tannin, just as appearances emed to require, with most excellent effects. Applied large cervical glands in scrofulous children, with line, it dissipates them far more speedily than when iodine is otherwise applied. Malignant ulcerations, iched with the following caustic, are better remedied n when otherwise treated, —

℞ Iodine,
Iod. potass., āā ℥ss.
Glycerine, f. ℥ viij. M.

When diluted with a larger portion of glycerine, and lied to carbuncles, buboes, and furnucles, in their fortive stages, it will dissipate them altogether, or modify m. Painted over abscesses of different types, it either causes the absorption of their contents, or checks in a measure their progress. Injected into the rectum in diarrhœa and dysentery, diluted with starch, it soothes the irritated mucous membrane in a remarkable manner, and will often alone bring about a cure.

But it is its internal usefulness in the treatment of children's diseases of low, cachectic, strumous, asthenic conditions, that glycerine displays its great superiority. I have repeatedly witnessed its capacity to fatten children. Thus: 1st. An infant six months old, recovering from a severe diarrhœa, kept quite emaciated and pale. Glycerine was ordered for it, and in a few days a change was remarked in its appearance for the better, and in four weeks it weighed eight pounds heavier. 2. A child, sixteen months old, had its head covered with one continuous scab, — porrigo. This was a family complaint, and resisted all manner of treatment for a very long time in all the other children. In the above case I resorted to glycerine, both internally and externally. A cure was effected in three months. 3. A girl, seven years old, recovering from rubeola, retained her cough, emaciation, and nervous irritability. Dullness over apex of left lung; roughened breathing. No doubt the case was chronic pneumonia. Glycerine, as a last resort, was ordered in teaspoonful doses in water, three times a day. Recovery in six weeks. 4. A strumous boy, much emaciated, had hacking cough and night sweats. Pulse frequent. Sleep disturbed. Abdomen tumid and enlarged. Cervical glands swollen. Bowels irregular. Fecal discharges clay-colored. His case was such, that no one expected any more than a partial palliation. After other treatments had failed, I ordered glycerine in teaspoonful doses, in which were dissolved four grains of ferri ammon. cit., and one half of a grain of quinia, four times a day. This he continued for a year, and was in remarkably good health three years after. — *Am. Jour. of Pharm.*

Gleanings

FROM FOREIGN AND DOMESTIC JOURNALS.

Chemical Treatment of Lead Colic. — Many methods have been recommended from time to time for the chemical treatment of lead poisoning, but nearly all have been found subject to some objection. M. Guibout, of the Hôpital St. Louis (Paris), advises the use of flowers of sulphur and honey, in equal parts, beginning with ℥iss of the mixture a day, in three doses. When the diarrhœa appears, which is usually on the second day, the doses must be gradually diminished, but continued until the disappearance of all signs of lead poisoning. From nine to thirteen days of this treatment are usually required. After this, tonics and cold douches should be employed against the anemia and pains in the limbs, and feebleness, which always persist during a longer or shorter time. The elimination of the lead is effected by its union with the sulphur in the form of sulphate of lead, which is driven from the intestine with the diarrhœaic discharges. M. Lutz, the head apothecary of the hospital, is the author of this treatment.

Antidote to the Cyanide of Potassium. — The cyanide of potassium, recommended by Nousseau for external application in neuralgia, etc., and in common use in photography, is a violent poison, and one for which no antidote has as yet been discovered. A writer in the *Journal de Chimie* gives a case in which the protosulphate of iron appeared to destroy the effect of the poison.

Action of Bromide of Potassium. — The conclusions of MM. Eulenburg and Gottoman, as to the physiological action of bromide of potassa, i. e., that it paralyzes the head and the central nervous system, are disputed in the French Acad des Sciences, M. Laborde sustaining the idea that its first action is upon the spinal marrow, and that this action results in the annihilation of reflex manifestations.

Cement. — A cement particularly adapted for attaching the brass-work to petroleum lamps, is made by Puscher, by boiling three parts resin with one of caustic soda and five of water. The composition is then mixed with half its weight of plaster of Paris, and sets firmly in half to three quarters of an hour. It is said to be of great adhesive power, not permeable to petroleum, a low conductor of heat, and but superficially attacked by water. Zinc white, white lead, or precipitate chalk may be substituted for plaster, but they harden very slowly.

Choice of Mineral Waters. — Dr. Roubaud, in an article upon the use of mineral waters, says: "Physiology is the best counsellor, and the practitioner will always find in it a sure guide, if he will recall the mission of each emunctory; viz., that of the intestine is to expel the excrements of digestion; that of the urinary system to expel the products of combustion of azotized substances, such as animal food; and, finally, that of the skin and respiratory passages is to expel the excrementitial products of the combustion of starchy food. All successful medication by mineral waters must be based upon these physiological facts. — *Gaz. des Hop*, April, 1867.

Treatment of Neuralgia through the Nasal Passages. — The attention of the medical profession in Paris is being called to the treatment of neuralgia by the nasal passages. M. Raimbert has just made a communication to Acad. des Science, upon the use of a mixture of powdered white sugar and muriate of morphia, or of morphine (gr. xx. to gr. i.), in dental, sub-orbital, and frontal neuralgia and headaches of all kinds, to be taken as snuff.

Disinfecting Powder. — ℞ Permanganate of potash; powdered carbonate of lime; powdered starch, aa, equal parts. M. — A painless dressing for badly smelling wounds, such as ulcerated cancer of the breast, etc. — *Jour. de Chimie.*

Depilatory Powder of the London Hospitals.

℞ Quicklime . . . . ℥i.
Yellow sulphite of arsenic . . . . ℈ii.
Powdered starch . . . . ℥i.

M. Add a little water, and apply to the spot from which the hair is to be removed. A few minutes suffice to produce this result.

The quantity of atmospheric electricity at noon is much greater in winter than in summer, the relation being about ten to one. This augmentation of electric force proceeds in a manner almost parallel with the number of days of frost and fog, and inversely as the number of days of thunder, elevation of temperature, and actinic power.

Cinnabar of a beautiful vermilion color is found in an unusual form in Idaho, being abundantly spread throughout a gangue so massive, compact, and homogeneous that specimens may be cut and polished like marble.

Charcoal from the shell of the cocoa-nut is said to possess an extraordinary power of absorbing gases. If this be true, it would be valuable in the treatment of wind on the stomach.

Formulae

USEFUL IN MEDICINE AND THE ARTS.

ALTERATIVE LAXATIVE PILLS.

BY GILMAN DAVEIS, M.D.

In the course of a long practice, extending over nearly thirty years, I know of no want that I have more constantly felt than that of some means by which the bowels could be kept in regular order without producing irritation or debility; especially in females and in sedentary gentlemen, who, with the necessity of unremitting brain-work, cannot, or at any rate do not allow themselves sufficient recreation and exercise to keep the system in a healthful state. To meet this want I prepared, three years since, the following formula:

℞ Pil. aloin cum ferro . . . . gr. xxiv.
Ext. nucis vom. alc. . . . . gr. vi.
Pulv. ipecac. . . . . gr. vi.

M. Fiant pil. No. XVIII. Dose, a single pill.

The pills are small, about one half the usuall pill size. One of these, taken each night, keeps the bowels in a regular condition, operating without pain, and of course chiefly by its tonic power; while the whole system gently but surely feels the strengthening effect of the iron and nux vomica.

I think the formula cannot fail to comend itself to those who have considered the causes of this torpor of the bowels in the class of patients to which I have referred; and I am sure no one will be disappointed who will give the pills a faithful trial. — *Boston Med. and Surg. Journal.*

Scouring Drops for Removing Grease.—I. Alcohol (pure), six ounces; camphor, two ounces; rectified essence of lemon, eight ounces.

II Camphene, three ounces; essence of lemon, one ounce. Mix. Some direct them to be distilled together.

III. *French.* Camphene, eight ounces; pure alcohol, one ounce; sulphuric ether, one ounce; essence of lemon, one dr.

IV. Spirits of wine, one pint; white soap, three ounces; ox-gall, three ounces; essence of lemon, a quarter of an ounce.

To Render Paper Waterproof.—Dissolve eight ounces of alum and three ounces and three quarters of white soap in four pints of water; in another vessel dissolve two ounces of glue in four pints of water. Mix the two solutions and make the mixture hot. Immerse the paper in the mixture, and then hang it up to dry, or pass it between cylinders. The alum, soap, glue, and gum form a sort of artificial covering which protects the surface of the paper from the action of water, and to a certain extent from fire. This paper will be very useful for packages which may be exposed to the inclemency of the weather.

To Fix Pencil Writing.—Pencil writing may be fixed almost indelibly as ink, by passing the moistened tongue over it. Even breathing slowly over the lines, after writing, renders them much less liable to erasure than when not subjected to that process. This fact may be of importance to persons who may wish to carry a memorandum book for a long time. In ordinary use the pages of such a book often become very much defaced by the erasure and diffusion of the pencil marks over the entire surface of the paper. A trial of the experiment will readily satisfy any person of the utility of the idea.

Red Ink, which, it is said, will not lose its beautiful bright color after hundreds of years:—

℞ Best cochineal carmine,	gr. iv.
Liquor ammonia,	℥ iii.
Gum acacia,	gr. x.

First put the carmine and liquor ammonia into a suitable vial; then add the gum acacia and allow it to dissolve, when the ink will be ready for use. A. S.

Welding Composition.—For iron, steel, or both together, calcine and pulverize together 100 parts iron or steel filings, ten sal ammoniac, six borax, five balsam copaiva or copœiba. One of the pieces is to be heated red, carefully cleaned of scale, the composition is to be spread upon it, and the other piece applied at a white heat and welded with the hammer.

Glauber's Salts for Spots in the Cornea.—M. Luca, surgeon of one of the Neapolitan hospitals, says, in a communication to the French Acad. des Sciences, *en resumé*, the sulphate of soda in solution (in water), or still better in a fine powder, causes partial or total opacity of the cornea to disappear. The treatment must be continued for some time.

Artificial Black-Lead Pencils.—Melt together fine Cumberland black lead in powder and shellac. This compound is to be repeatedly powdered, and remelted until of uniform composition; it is then sawed into strips and mounted as usual. Pencils thus made are uniform, and there is no waste of material.

To take Impressions from Coins.—Make a thick solution of isinglass in water, and lay it hot on the metal; let it remain for twelve hours, then remove it, breathe on it, and apply gold or silver leaf on the wrong side. Any color may be given to the isinglass instead of gold or silver, by simple mixture.

Blacking Cakes.—Take tragacinth, one ounce; neatsfoot-oil, ivory black, deep blue, prepared from iron and copper, two ounces of each; brown sugar and water, of each four ounces. Mix well these ingredients, evaporate the water and form your cakes.

Chilblains.—Cut an onion in slices, and with these rub the chilblains thoroughly two or three nights, before a good fire, and they will soon disappear.

Alum and plaster of Paris, well mixed in water, and used in the liquid state, form a hard composition, and a useful cement.

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, NOVEMBER 1, 1867. No. V.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.
RECEIPTS.—No receipts for subscription moneys will be given unless paid
: the office. The arrival of the *Journal* will be evidence that subscriptions
:e received.
A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Chemistry.

MICHAEL FARADAY.

We promised, in the last number of the *Journal*, to give a brief account of some of the incidents in the life of Michael Faraday, the great chemist, who died in London a few months since. His parentage, birth, and early life, afford so much encouragement to the indigent, obscure, but resolute, industrious youth of our country, that these incidents should be widely published. His origin and life is but a counterpart of that of his distinguished friend and patron, Sir Humphrey Davy. In carefully studying the lives of all the great men through whose labors chemistry has been wrested from the hands of the superstitious and empirical, we are surprised to find that nearly all started in life without means, without education, without friends. Poor obscure boys were they all, but possessed of a natural enthusiasm and love for science, and also an indomitable courage and perseverance. Who, that might have chanced to see that ungainly boy, with strange contortions of countenance, hanging on the door-gate of Mr. Borlase's house in Cornwall, would have ventured to predict the future eminence and renown of the man? When Mr. Davies Giddy Gilbert took the hand of the poor boy, and asked who he was, he was told that "he was a son of Davy, the carver, and very fond of making chemical experiments."—"Indeed, and is that all he has to recommend him?" A lad "wasting his time in foolish chemical experiments," up in the garret of Mr. Borlase, the surgeon-apothecary, to whom he was apprenticed, instead of compounding medicines in the shop below, would hardly attract patronage among the influential and the wealthy. But Mr. Gilbert befriended him, and had the high satisfaction of feeling, in later life, that he was the early benefactor of Sir Humphrey Davy.

Davy, in turn, became the early friend and patron of the unknown and struggling boy, Faraday. He was born in London, Sept. 22d, 1791, and was the son of a poor blacksmith. His education, if it may be called such, was of the most rudimentary description. He was sent to a common day-school, and picked up some knowledge of reading, writing, and arithmetic. The common day-schools in England, at the present time, are poor enough; but in those days the teachers and the schools were very inferior and superficial; and so young Faraday must have graduated with but a slender stock of erudition. At thirteen, he was apprenticed to Mr. Riebau, a bookbinder in Blanford Street. It was during his apprenticeship that his mind took a decided bent towards scientific knowledge; and he spent all his intervals of leisure, and all his slender store of pocket money, in buying books and apparatus necessary for the investigation of natural science. He succeeded in raising money enough to purchase a book upon electricity, and from this learned how to construct an electrical machine. This he did from a common glass vial, using the roughest and crudest materials in the various parts; but he had the proud satisfaction of obtaining the "spark" upon the first trial. This success made him more ambitious; and he constructed another, with a proper cylinder, and of considerable power, and presently his humble room began to be embellished with quite a variety of apparatus; and, before his master was aware of what was transpiring, his apprentice became the proud possessor of all the knowledge then before the world relative to electrical force.

Boys of this character, in no age of the world have long remained in obscurity. When once the foot has rested upon the portals of the temple of science, the doors are opened in some mysterious way, so that the enthusiastic worshipper may enter at his will. A Mr. Dance observed what young Faraday was doing, and obtained permission for him to attend four lectures by Sir Humphrey Davy, in the Royal Institution. This was the first great event in his career, and from it must be dated all his subsequent advancement and prosperity. In 1829, Dr. Paris wrote a note to Faraday, asking him for a statement of the circumstances by which he became connected with the Royal Institution. He returned the following charming autobiographical letter:

TO J. A. PARIS, M.D.

Royal Institution, Dec 23, 1829.

MY DEAR SIR,—You asked me to give you an account of my first introduction to Sir Humphrey Davy, which I am very happy to do, as I think the circumstances will bear testimony to his goodness of heart.

When I was a bookseller's apprentice, I was very fond of experiments, and very averse to trade. It happened that a gentleman, a member of the Royal Institution, took me to hear some of Sir H. Davy's last lectures in Albermarle Street. I took notes, and afterwards wrote them out more fairly in a quarto volume. My desire to escape from trade, which I thought vicious and selfish, and to enter into the service of science, which I imagined made its pursuers amiable and liberal, induced me at last to take the bold and simple step of writing to Sir H. Davy, expressing my wishes, and a hope that if an opportunity came in his way, he would forward my views. At the same time, I sent the notes I had taken at his lectures.

The answer, which makes all the point of my communication, I send you in the original, requesting you to take great care of it, and to let me have it back; for you may imagine how much I value it.

You will observe that this took place at the end of the year 1812; and early in 1813 he requested to see me, and told me of the situation of assistant in the laboratory of the Royal Institution, then just vacant.

At the same time that he thus gratified my desires as to scientific employment, he still advised me not to give up the prospects I had before me; telling me that science was a harsh mistress, and in a pecuniary point of view but poorly rewarding those who devoted themselves to her service. He smiled at my notion of the superior moral feelings of philosophic men, and said he would leave the experience of a few years to set me right on that matter.

Finally, through his good efforts, I went to the Royal Institution early in March of 1813, as assistant in the laboratory; and in October of the same year, went with him abroad as his assistant in experiments and in writing. I returned with him in April, 1813, resumed my station in the Royal Institution, and have, as you know, ever since remained there.

I am, dear sir, very truly yours,

M. FARADAY.

The following is the note of Sir Humphrey Davy alluded to in Faraday's letter:

To Mr. FARADAY.

SIR,—I am far from displeased with the proof you have given me of your confidence, and which displays great zeal, power of memory, and attention. I am obliged to go out of town, and shall not be settled in town till the end of January. I will then see you at any time you wish.

It would gratify me to be of any service to you. I wish it may be in my power.

I am, sir, your obedient humble servant,

H. DAVY.

By apparently a short step, the quondam bookbinder's apprentice had now become an apprentice to science, and was favored with the friendship of one of her most distinguished votaries. At this stage, it may be well to glance backwards, and contemplate for a moment the true position of chemical science at this time. Although but little more than half a century has elapsed, it will be seen that this was before the discovery of many of the metals, and consequently before much progress was made in the arts. It was also before the discovery of electro-magnetism. In short, chemistry, at this date, had few claims to be called a science. What a rich field for discovery was open to the young experimenter, and how well he improved it! His first published researches were upon the relations between electricity and magnetism,—a subject of uncommon interest in 1820, as Ersted had that year made known his great discovery of electro-magnetism. He published a paper entitled "New Electro-Magnetic Motions," and another, "A Theory of Magnetism," in 1821. In 1823, appeared his paper "On the Condensation of Muriatic Acid into the Liquid Form." It was, however, in "Researches in Electricity" that he won his greatest fame. He commenced the publication of these treatises in 1831, and continued them for a period of nearly thirty years, publishing one or two each year. Some of the most important discoveries are contained in these papers, and show him to have been one of the greatest investigators of natural laws the world has ever seen.

How strange must Faraday's eventful life have seemed to him in his later years! Starting from poverty and obscurity, without the education which the schools confer, he was, during the period of a full half-century, the companion of the learned and the great, who sought his acquaintance from all parts of the civilized world. The late Prince Albert loved to steal away from the vexations and cares of state, and hold, in Faraday's study, familiar conversations upon matters of science with this venerable man. He was always simple, sincere, unostentatious. He had no hankerings for places and honors. Such, in brief, was the career of Faraday, the blacksmith's son; and such may be the history of many of the youth who may read these pages. Chemistry in our country, in its industrial applications, opens a wide field for intelligent research; and the honors to be won are as accessible and numerous almost as they were fifty years ago, when Faraday left the shop of the bookbinder to experiment at the Royal Institution.

THE CLOTHES-MOTH.

BY A. S. PACKARD, JR., M. D.

For over a fortnight we once enjoyed the company of the caterpillar of a common clothes-moth. It is a little pale, delicate worm, about the size of a darning needle, not half an inch long, with a pale horn-colored head, the ring next the head being of the same color; and has sixteen feet, the first six of them well developed, and constantly in use to draw the slender body in and out of its case. Its head is armed with a formidable pair of jaws, with which, like a scythe, it mows its way through thick and thin.

But the case is the most remarkable feature in the history of this caterpillar. Hardly has the helpless, tiny worm broken the egg, previously laid in some old garment of fur, or wool, or perhaps in the haircloth of a sofa, when it proceeds to make a shelter by cutting the woolly fibres or soft hairs up into bits, which it places at each end in successive layers, and, joining them together by silken threads, constructs a cylindrical tube of thick, warm felt, lined within with the finest silk the tiny worm can spin. The case is hardly round, but flattened slightly in the middle, and contracted a little just before each end, both of which are always kept open. The case before us is of a stone-gray color, with a black stripe along the middle, and with rings of the same color round each opening. Had the caterpillar fed on blue or yellow cloth, the case would, of course, have been of those colors. Other cases, made by larvæ which had been eating "cotton-wool," were quite irregular in form, and covered loosely with bits of cotton thread, which the little tailor had not trimmed off.

Days go by. A vigorous course of dieting on its feast of wool has given stature to our hero. His case has grown uncomfortably small. Shall we leave it and make another? No housewife is more prudent and saving. Out come those scissor-jaws, and, lo! a fearful rent along each side of one end of the case. Two wedge-shaped patches mend the breach; caterpillar retires for a moment; re-appears at the other end; scissors once more pulled out; two rents to be filled up by two more patches or gores, and our caterpillar once more breathes freer, laughs and grows fat upon horse-hair and lamb's-wool. In this way he enlarges his case till he stops growing.

Our caterpillar seeming to be full-grown, and hence out of employment, we cut the end of his case half off. Two or three days after, he had mended it from the inside, drawing the two edges together by silken threads; and, though he had not touched the outside, yet so neatly were the two parts joined together, that we had to search for some time, with a lens, to find the scar.

To keep our friend busy during the cold, cheerless weather,—for it was in midwinter,—we next cut a third of the case off entirely. Nothing daunted, the little fellow bustled about, drew a mass of the woolly fibres, filling up the whole mouth of his den, and began to build on afresh, and from the inside, so that the new-made portion was smaller than the rest of the case. The creature worked very slowly, and the addition was left in a rough, unfinished state.

We could easily spare these voracious little worms hairs enough to serve as food, and to afford material for the construction of their paltry cases; but that restless spirit that ever urges on all beings endowed with life and the power of motion, never forsakes the young clothes-moth for a moment. He will not be forced to drag his heavy case over rough hairs and furzy wool, hence he cuts his way through with those keen jaws. Thus, the more he travels, the more mischief he does.

After taking his fill of this sort of life he changes to a pupa, and soon appears as one of those delicate, tiny, but richly variegated moths that fly in such numbers from early in the spring until the fall.

Very many do not recognize these moths in their perfect stage, so many are they, and vent their wrath on those great millers that fly around lamps in warm summer evenings. It need scarcely be said that these large millers are utterly guiltless of any attempts upon our wardrobes: they expend their attacks in a more open form on our gardens and orchards.

We will give a more careful description of the clothes-moth which was found in its different stages, June 12th, in a mass of cotton-wool. The larva is white, with a tolerably plump body, which tapers slightly towards the tail, while the head is much of the color of gum-copal. The rings of the body are thickened above, especially on the thoracic ones, by two transverse thickened folds. It is one fifth of an inch long.

The body of the chrysalis, or pupa, is considerably curved, with the head smooth and rounded. The long antennæ, together with the hind legs, which are folded along the breast, reach to the tip of the hind body, on the upper surface of each ring of which is a short transverse row of minute spines, which aid the chrysalis in moving towards the mouth of the case, just before the moth appears. At first the chrysalis is whitish, but, just before the exclusion of the moth, becomes of the color of varnish.

When about to cast its pupa-skin, the skin splits open on the back, and the perfect insect glides out. The act is so quickly over with, that the observer has to look sharp to observe the different steps in the operation.

Our common clothes-moth, *tinea falvifrontella*, is of an uniform light buff color, with a silky iridescent lustre, the hind wings and abdomen being a little paler. The head is thickly tufted with hairs, and is a little tawny, and the upper side of the densely hirsute feelers (*palpi*) is dusky. The wings are long and narrow, with the most beautiful and delicate long silken fringe, which increases in length towards the base of the wing.

They begin to fly in May, and last all through the season, fluttering with a noiseless, stealthy flight in our apartments, and laying their eggs in our woollens.

There are several allied species which have much the same habits, except that they do not all construct cases, but eat carpets, clothing, articles of food, grain, etc., and objects of natural history.

Successive broods of the clothes-moth appear through the summer. In the autumn they cease eating, retire within their cases, and early in spring assume the chrysalis state.

Careful housewives are not much afflicted with these pests. The slovenly and thriftless are overrun with them. Early in June, woollens and furs should be carefully dusted, shaken, and beaten. Dr. T. W. Harris states that "powdered black pepper, strewed under the edge of carpets, is said to repel moths. Sheets of paper sprinkled with spirits of turpentine, camphor in coarse powder, leaves of tobacco, or shavings of Russia leather, should be placed among the clothes when they are laid aside for the summer; and furs and other small articles can be kept by being sewed in bags with bits of camphor wood, red cedar, or of Spanish cedar; while the cloth lining of carriages can be secured forever from the attacks of moths by being washed or sponged on both sides with a solution of the corrosive sublimate of mercury in alcohol, made just strong enough not to leave a white stain on a black feather." The moths can be most readily killed by pouring benzine among them, though its use must be much restricted from the disagreeable ordor which remains. The recent experiments made with *carbolic acid*, however, convinces us that this will soon take the place of all other substances as a preventive and destroyer of noxious insects.—*American Naturalist.*

Chemistry Applied to the Arts.

HOW THE HUGE ARMOR-PLATES FOR WAR SHIPS ARE MADE.

The London Times gives the following graphic description of the method of making one of the fifteen-inch iron plates for war ships. We are confident it will interest all our readers:—

The plate was not quite ready at the time appointed, and during the short interval of delay the works were inspected. It is almost impossible to describe the aspect of Cyclopean activity which they presented. The huge space of lofty workshops, covering more than twenty-three acres of ground, were, above, all dim with smoke, below, all dazzling with the blinding glare and heat of furnaces. Everywhere ponderous flywheels were spinning round with a loud hum through the gloom; everywhere steam hammers were falling with a shock, upon the solid earth, that made the walls vibrate, and people near them jump under the tremendous concussion. No place seemed free from steam or flame or melted iron. The dark nooks would suddenly become bright as furnace doors were lifted and emitted their long light-looking flames of dazzling white vapor, and disgorged a mass of seething metal, which men, almost clad in light steel armor, wheeled away and shot under the steam hammers, the first stroke of which sent jets of melted iron rushing in trains of firelike meteors in all directions. Sometimes one came on groups of men who were saturating in water the rough bands of sacking in which they were enveloped before going to wrestle with some white-heat forging: sometimes on men nearly naked, with the perspiration pouring from them, who had come to rest for a moment from the puddling furnaces, and to take a long drink of the thick oatmeal and water, which is all that they ven-

ture on during their labor, and which long experience has proved to be the most sustaining of all drinks under the tremendous heats to which they are subjected. On every side the glare, the smoke, the din, and steam are alike deafening and blinding. On every side are masses of melted iron running down troughs, or great blocks of it heated to a glow that is almost melting, being welded and knocked away into myriads of sparks and jets of refuse under the blows of the hammers. Most uncomfortable of all are the slabs of armor plate and blocks of steel ingots, which, half cooled, and of a dull slate color, lie about everywhere. From those in a bright red glow the visitor can guard himself, for he sees them; but from those which are partly cooled, but yet hot enough to scorch the flesh from the bones when closely approached, there is little safeguard, as one hurries out of the way of seething puddle blooms or open furnaces, which diffuse such an intense general heat around that little extra warning is given by the treacherous masses of half-cooled slabs till the danger is almost too near to be avoided. After seeing and suffering under seeing such scenes, the visitors were conducted to the armor rolling mill, where the monster plate was to be drawn. The process of drawing it is simple, but peculiar. The plate, when laid in the furnace, rests upon little stacks of fire bricks, so that the flame and heat play equally round it, till all is glowing white and the successive layers have settled down into one dense mass. A great deal of the success depends upon the time at which the plate is drawn and the amount and length of time to which it is to be heated. All this is regulated by the chief roller and chief furnace-man, who are paid wages which many eminent professional men might envy — wages amounting from £1,200 to sometimes £2,000 a year. On Friday, as the time for "drawing" approached, these officials opened the furnace doors, and approaching close to them with only the shelter of a lump of wet rag held loosely before their arms and faces, peered into the blinding glare from time to time with as much care and apparently as much indifference as if they were looking into the tube of a telescope. Suddenly, at a signal from the furnace-man, the bands of workmen, to the number of about sixty, arranged themselves on each side of the furnace, as near to it as they could bear the heat. Then the doors were opened to their fullest, and what had been a glare before and what had been a heat were quite eclipsed by the intense light and fervency with which the long tongues of flame leapt forth. In the midst of this great light lay a mass even whiter than the rest. To this some half a dozen men drew near. They were all attired in thin steel leggins, aprons of steel, and a thin curtain of steel wirework dropping over their faces like a large long visor. All the rest of their bodies were muffled in thick wet sacking. Thus protected, they managed, with the aid of a gigantic pair of forceps slung from a crane above, to work as it were amid the flames for a few seconds, and to nip the huge plate with the forceps. The signal was then given, and the whole mass of iron, fizzing, sparkling, and shooting out jets of lambent flame, was by the main force of chains attached to the steam rollers, drawn forth from the furnace on to a long wrought-iron car. The heat and light which it then diffused were almost unbearable in any part of the huge mill, but the men seemed to vie with each other to approach and detach the colossal pinchers which had drawn the iron forth. More than a dozen attempts were made on Friday before this was effected, and more than a dozen of the best and most skilful workmen were driven back one after another by the tremendous heat and glare. At last all was made clear. The forceps, then red hot from their grip of the plate, were drawn away, the chains cleared from the rollers, and, with a great hurrah, the other workmen seized the chains attached to the iron truck, and drew it to the incline by main force, where it was left by its own weight to run into the jaws of the rolling mill. It was then *sauve qui peut* among the workmen, who rushed for shelter in all directions as the mass was nipped between the rollers, and wound rapidly in amid quick reports like those of dull musketry, as the melted iron was squeezed by the tremendous pressure of the mass, and flew out in jets of liquid fire on all sides. In spite of all the care and all the skill which the best workmen can use on these occasions, they cannot always escape the splashes of melted iron, and the burns inflicted are numerous and often severe. The turning of the rollers crushes the plate through to the other side, where it rests for a minute on a wrought-iron truck similar to that on which it was brought from the furnace. The action of the rollers is then reversed after they have been by the action of screw levers brought closer together by about an inch. These again nip the plate and drag it back in an opposite direction, and again and again does the mass go forward and backward, each time passing between a smaller space between the rollers, till, as on Friday, the whole of the huge thickness was reduced to a compact mass fifteen inches thick, in less than a quarter of an hour. During every stage of the process, quantities of fine sand are thrown upon the plate, and this literally takes fire as it touches the flaming surface, and covers it as it melts with a coat of silica, or with a glaze like that of earthenware. After every discharge of sand, — and these go on almost incessantly, — buckets of water are thrown upon the plate and explode in clouds of scalding steam; and when these are partly dissipated, men rush forward and with wet besoms with handles twenty feet long sweep off whatever little scraps of oxidation may have taken place. Thus every time the plate passes through the mill the sand is scattered, the water thrown, and the surface swept, and at every roll the chief roller of the establishment runs forward, and, under the shelter of wet cloths, measures with a gage its thickness from end to end. On Friday the required dimensions were obtained, as we have said, by less than a quarter of an hour's rolling; and a plate 15 inches thick, the product of the labor of nearly 200 men and of the consumption of nearly 250 tons of coal, was shot out by the rolling mills and left to cool. When this had been effected two large rollers of iron, each weighing 15 tons, were placed upon it by the cranes, and moved slowly backward and forward, and, eventually, as the plate cooled, were left upon its ends to keep the whole perfectly level. Nothing further now remained in order to complete it as the finest specimen of armor-plate manufacture ever attempted, but to plane off its rough ends and edges. The flat surfaces on either side, which form what is called the skin of tne plate, are never interfered with, for the action of the steel rollers leaves them literally almost as smooth as plate glass.

A MONSTER BALLOON.

Much interest is felt in Paris in the great balloon constructed by M. Giffard. The following, from the *Chemical News* correspondent, is a clear description of the machine and method of inflating it: —

The great news of the day is the inauguration, on the 7th inst., of the anchored balloon of M. Henry Giffard, the celebrated inventor of the injector for steam engines. He has spent more than £4,000 upon the realization of the greatest experiment of modern times. Having rented a plot of ground adjoining the extensive engine factory and machine works of M. Henry Flaud, he has erected an immense cylindrical screen of canvas fixed upon vertical poles. In this he has constructed a balloon 69 feet in diameter, holding 210,000 cubic feet of gas, formed of two webs of closely woven linen, cemented together by several layers of American black india-rubber varnish, the whole being covered with drying oil, so as to prevent any of the effects of osmose or diffusion. Two series of gigantic apparatus have been constructed on the same spot, for the production of pure hydrogen. The first is composed of 100 barrels, each containing 155 lbs. of dilute sulphuric acid, with a large quantity of iron turnings, capable of furnishing, each, 350 to 400 cubic metres of gas. The second apparatus is a steam generator, by aid of which the steam is decomposed, by passing over red-hot charcoal or incandescent coke, into pure hydrogen and carbonic acid gas; the hydrogen is separated from the mixture by the aid of quicklime, which absorbs the carbonic acid gas and leaves the hydrogen pure, dry, and cool, to be conducted by a main pipe to the upper part of the balloon. With this second series the hydrogen only costs twopence per metre cube (or about 4s. 9d. per 1,000ft.) but the preparations are not quite completed. In a trial on the 9th inst. the balloon was inflated with hydrogen resulting from the action of sulphuric acid, and the operation was finished in 8 hours, whereas the filling of the balloon with gas procured by the decomposition of water took 48 hours. The former process gave also 3,500 cubic feet of mother-water of sulphate of iron, collected in a vast subterranean basin, which can be sold to be evaporated by chemical manufactures, and which are sufficient to disinfect the cesspools of a whole quarter of Paris. Inflated on Saturday, the balloon had lost almost nothing of its gas on Monday; and on Thursday, the 12th, when we visited it, the total loss of hydrogen was only 2,100 cubic feet, or a hundredth part of the total volume of gas with which the balloon had been inflated. The osmose or the diffusion is really prevented. The closing of the upper and lower valves, ingenious beyond description, is absolutely hermetical. We need scarcely remind our readers that the cable, 984 feet long, by which the balloon is attached to the earth, is coiled and uncoiled by two different steam engines, which the mechanician can stop or set at work at will by means of cocks which serve for the distribution of the steam.

The inflation being terminated, the balloon, containing 210,000 cubic feet of hydrogen gas, was retained by the ballast; at each of the 70 ropes of the group were attached ten sand bags weighing each 33 lbs.; and in spite of this weight of 22,100 lbs. the car was more than 3 feet from the ground, so great was the ascensional force. A rather strong wind, that may be estimated at 33 feet per second was then blowing, but it did not prevent the balloon from rising in a vertical direction. These experiments, suspended for some days, were to have been renewed on Saturday last. This organization of a view of Paris from a height of 984ft. reflects great credit on M. Giffard.

CONSOLIDATED COAL-DUST.

Many attempts have been made from time to time to utilize that material known as coal-waste, which, in our mining region, has been thrown aside until the waste heaps, so accumulated, have threatened to rival in extent and elevation the natural mountains among which they find themselves. Such attempts have as yet, to the best of our knowledge, proved unsuccessful in a commercial point of view, in this country; though a very different result has been obtained abroad. Thus, in an article by M. L. Gruner, Ingénieur en Chief des Mines, which appeared in the October number of the *Bulletin de la Sociéte d'Encouragement pour l'Industrie Nationale*, it is stated that in France some twenty establishments are carrying on this manufacture, and produce yearly 500,000 tons; in Belgium some seven manufacturers turn out 400,000 tons; while in other countries the product, though less, is very considerable.

We have not before us the data which would render possible such a comparison as might explain the very different success attained in this country and abroad; but we know that in some cases the fault lay in the costly nature of the machinery employed, and in other cases it was to be found in the friable nature of the product obtained, which rendered its transportation troublesome and expensive. We have now before us specimens of consolidated coal-dust, labelled "Gerard fuel," and remarkable for several peculiarities, which makes us think that the process by which they are produced will not share the fate of its American predecessors. These specimens are cubical, some of them measuring about 1·5 inch on each edge, others about four inches. They may be thrown violently on the floor without sensible injury, and are thus proved to possess all requisite consistency, while their process of manufacture, which we shall proceed to describe, looks well in other respects. The coal-waste is carefully screened, by which means it is stated that 30 per cent of good coal may be secured. The finer particles are then crushed between rollers of chilled iron, and are then mixed in a machine, much like that used for tempering clay with coal tar, steam being also admitted, and flour added, according to the patent, but not found to be important in practice. From the mixer, the hot, wet, tarry dust passes into the moulder, where plungers force it into moulds with movable ends; so that, when each block has been formed, the end is raised, and a second and further push of the plunger throws out the finished cube. The cubes so formed are packed closely in iron boxes, and run into an oven, where they are heated to a temperature which distils off as illuminating gas all the hydrocarbon of the coal-tar. From all that has been published abroad on the subject, it seems that experience has demonstrated the efficiency of the following points of treatment: —

1st. The thorough pulverization and wet mixing. 2d. The use of coal-tar as a cement. 3d. The baking after compression. The process just described involves these

points, and certainly produces most excellent results. If, on practical trial, it shall prove to possess the last but all important requisite of economy, it cannot but render the manufacture of artificial fuel here, what it is abroad, a regular and profitable branch of industry.—*Jour. Frank. Inst.*

A NEW AND BRILLIANT LIGHT.

Some months ago, Professor Frankland gave a particularly interesting series of lectures "On Coal Gas," at the Royal Institution, in the course of which he made some very important statements, which, if corroborated by the results of future experiments, will revolutionize existing ideas as to the source of light in ordinary flames. Some of Dr. Frankland's experiments are of the deepest interest, and deserve our attentive consideration as photographers.

In the course of his lectures, Dr. Frankland soon falls foul of the generally received explanation of the source of light, by the combustion of an ordinary gas flame. We all know that the prevailing idea is that the luminosity of the flame of common coal gas is altogether due to the liberation of solid particles of carbon in the flame, and their subsequnt ignition. The light, then, is the result of the incandescence of *solid* matter, and not of a gas. On the contrary, Dr. Frankland asserts that the luminosity of these flames is due to the ignition of *gaseous* and not solid matter. This novel view is supported by a number of very striking and important experiments, into the details of which we shall not now enter; suffice it is to say that the learned Professor's object was in every case to obtain a highly luminous flame, which could not, by any possibility, contain solid matter in a state of intense ignition. In pursuing this search, he has been most successful, and found not only what he wanted, but has drawn attention to a method of producing a flame of high photographic power.

When bisulphide of carbon is warmed so that it freely gives off vapor, and then is ignited, it burns with a pale blue flame, giving but very little light. If now a jet of the gas, which we obtain by the action of nitric acid on copper filings, be allowed to play through the burning vapor, a brilliant and intense bluish light is obtained, almost rivalling the magnesium light in power, but much more bearable by the eyes than the latter. We need scarcely remind our readers that the gas above alluded to is the peroxide of nitrogen, which is very easily made and preserved. We may now mention a method which we have found very useful for the production of the light on a very small scale.

A light bottle is taken, of about a pint capacity; it is fitted with a cork, through which passes a glass tube. The latter is bent to a right angle a little above the cork; the free end is drawn out so as to form a tolerably fine jet, and this extremity of the tube for about four or five inches from the end is bent like the letter U, the jet looking directly upwards. The only other essential vessel is a test-tube or narrow beaker, into which the U-tube can easily dip. When we wish to procure the light, fragments of copper—either plate or wire—are placed in the bottle, and a mixture of one part strong nitric acid and two of water, poured in; the cork carrying the glass tube is then replaced, and the bent portion of the latter is allowed to dip into the little beaker, which has previously been placed in a vessel of warm water. As soon as gas comes off freely through the jet, some bisulphide of carbon is poured into the beaker. The hot water with which the latter is surrounded quickly vaporizes the bisulphide; when set fire to, this burns at the mouth of the beaker with its usual blue lambent flame; but from the gas jet, upwards, for an inch or more, according to the pressure, a brilliant cone of light arises, which is possessed not only of great illuminating power, but also of very considerable chemical energy. Of course this flame can be kept up until the gas ceases to be evolved from the copper and nitric acid, or until the bisulphide of carbon has been used up. It is necessary to observe that the current of gas should always be tolerably rapid, and the bisulphide well heated in order that the best effects may be obtained.

Bisulphide of carbon, when burning, gives off abundance of fumes of sulphurous acid, and it is advisable to have the vapors from the jet carried away by a little extemporized chimney. With this precaution, there need be no trouble experienced.—*British Journal of Photography.*

Chemistry Applied to Agriculture.

THE POTATO DISEASE.

Recent advices from Europe inform us that the celebrated experimenter and agriculturist, M. Georges Ville, has discovered the cause of the potato disease. He says the cryptogamia are the *result*, not the *cause* of the rot. At the experimental grounds of Vincennes, he has plots of potatoes divided into parts touching each other. The first is luxuriant, and has not a sick leaf; the next is attacked by the malady; the next is like the first; the fourth is diseased. These experiments, M. Georges Ville asserts, prove his entire ability to produce or avoid the disease at will. *How* he accomplishes these most important and desirable ends, he has not yet informed us.

Of the truth of his statement, that cryptogamia result from, rather than cause the rot, we have not the slightest doubt. During the present season we have had good opportunity to study the potato disease; and we have been led to entertain views regarding it, differing essentialy from those generally entertained. It certainly does not arise from any peculiarity of the seasons. No matter whether it be wet or dry, cold or hot, the result is the same. The disease is independent of all meteorological influences. We have had potatoes grow upon high land and low land, and on soils of medium and extreme moisture, and all were affected alike.

By the second of August the fever set in, and in a very few days the work was done. We incline to think the disease partakes of the nature of zymotic diseases generally. It seems to be caused by a peculiar kind of ferment, which corresponds with the ferment of fever, or diphtheria, as is manifested in the human system The vital processes are suddenly arrested in the plant, and the chemical changes interfered with, by the appearance of a disorganizing ferment. The temperature of both the potato and the vine is sensibly higher when the disease first commences, than before or a few days after its appearance. The shock to the plant strikingly resembles that of scarlatina, or diphtheria, or malarial fever, as affecting children or adults. We do not know the sources from whence arise zymotic diseases affecting the human family; neither do we understand the same as affecting plant life. There is a strange diversity or perversity in the course of morbid changes or conditions; and if M. de Ville can give us reliable information relating to the matter, he will receive the thanks of millions. It would not surprise us if, as a remedy, he proposed the use of the alkaline sulphites. A little of the sulphite of lime, placed in the hill at the time of planting, or a drenching of the vines during growth with a solution of the sulphite of soda, may be a cure for the deplorable potato malady.

GRAPES.—Our Concords did not ripen well this year. We have a vineyard of about six hundred vines, which afforded a large crop; but a peculiar disease attacked them, early in August, which spoil more than one half. Some of the largest and finest grapes in the clusters turned red, without softening, and these did not ripen. The attack was unlike that of mildew, and was of a nature we are at a loss to understand. Can any of our grape-growers give us information regarding it? The mildew attacked the Delaware vines in the vineyard, but not the least trace could be seen upon the Concords. Grape wood does not appear to be ripening well in this section, and we fear the effect upon the crop another year.

KEYES' TOMATO.—This new variety of tomato, alleged to be earlier than any other, very prolific, and free from disagreeable odor, has been fully and fairly tried this season, and the general verdict is against it. We have given it a fair trial by the side of other varieties; and we found it to be no earlier, no better, and less prolific, than the most common kinds. We are surprised that Mr. Hovey, who introduced the plant, should persist in recommending it as he does in the last number of his *Magazine of Horticulture.*

STRAWBERRY BEDS.—There is danger of placing upon strawberry plants too much covering in the autumn. We are inclined to think that beds are oftener injured in this way than by scanty protection. Leaves afford a too compact and warm covering; the same may be said of straw and chaff. The best material, undoubtedly, is evergreen boughs. Procure from the pine or hemlock a quantity of twigs, and cover the beds; and in the spring you will be surprised at the vigorous appearance of the plants when the protection is removed.

TOP-DRESSING GRASS LANDS IN THE FALL.—We have found, from repeated trials, that the autumn is much the best time to place fertilizers upon grass lands. The late fall rains dissolve what is soluble in manures, and carry the salts to the roots of plants, ready to be consumed as soon as the warm sun of spring loosens the frost. The crop is thereby rendered earlier and larger.

☞ From fields ploughed and sown with timothy and red-top, late in October, the past year, we cut, in July of this, two tons of cured hay to the acre. Turning over green sward in the fall, and seeding it down to grass, we have found to be a most excellent practice; and for this labor, the farmer secures rich returns.

Boston Journal of Chemistry.

BOSTON, NOVEMBER 1, 1867.

☞ Any one sending us the names of *three* subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For *five* subscribers, we will send the *petite microscope.* For *twenty-five*, we will send, in addition to the microscope, a copy of *Stockhart's Chemistry for Students*, the best elementary treatise yet published. For *one hundred* subscribers, we will send a complete set of chemicals, together with test tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. Downes is general travelling agent for the *Journal.*

☞ Having been absent from the city for a considerable time during the past month, we have not been able to fully prepare the essay, "Chemistry of a pint of Kerosene," for this number of the *Journal.* It will appear in the next.

☞ It will be gratifying to many of our readers, druggists, and physicians, to know that we have established a depot in New York, for the products of our laboratory, at Messrs. NICHOLS & HOADLEY's, 56 Pine street. All the chemicals and pharmaceuticals of our manufacture may be procured upon the same terms as at Boston.

☞ Our subscribers must pay postage on the *Journal*, IN ADVANCE, to the postmaster, where it is received. The papers of several subscribers, who have paid in advance, have been returned by postmasters as "refused." Upon inquiry, we learn they had neglected to pay the 12 cents advance postage, probably from some misapprehension.

☞ "A Self-Binder" has been invented, which we have found very convenient in binding the copies of the *Journal*, as they appear. Hardly one of our subscribers wishes to lose numbers, or have them soiled, so that they cannot be bound. By the use of the Binder, advertised on the last page, they can be kept clean, and rendered as convenient as a book. By writing Messrs. Covert & Co., all information, as regards price, etc., will be obtained.

SCIENTIFIC JOURNALS.

We have been several times asked by chemical friends, why we did not make the *Journal* the vehicle for the dissemination of the facts and principles of pure or abstract science. We have replied, Because of two important considerations: first, the number of those interested in matters of pure chemical science in this country is not sufficiently large to support a journal; and, second, if there were enough to afford bare support, its influence and usefulness would be unimportant and narrow.

Even in England, where chemistry and the physical sciences have been for so many years fostered and cultivated, a journal devoted to the abstract science of the schools cannot be supported. The *Laboratory*, one of this class, established in London a few months ago, gives notice in its issue of Sept. 26, that it will shortly cease to exist, for want of patronage. It remarks: "There has been no lack of help in the conduct of the *Laboratory*, but it would seem that the number of persons interested in pure science is too limited to support such a journal." This publication has been filled with able papers from the most distinguished teachers and scholars in England, France, and Germany; and yet it cannot exist. The *Chemical News*, a journal of much more popular character, has managed to sustain itself for a considerable number of years. It has, however, a comparatively small circulation, about half as large as this *Journal*, which is but a few months old. The character of the *News* is not sufficiently popular to receive support in this country. It has recently been republished here, and we hope it may succeed; but we fear not. The time may undoubtedly arrive when publications devoted to pure science will be demanded and sustained, but it is not yet. The work before us is to create a taste for science among those who are without interest, or indifferent to its teachings. An *appetite* must be created, especially among the youth of our country, for a better, higher, and more instructive class of reading; and, in order to effect this, scientific facts and principles must be presented in a form attractive and readily understood. Technicalities and all abstract reasonings must be avoided. The simple truths and facts of science, presented in a familiar way, never repel, but, on the contrary, attract readers among all classes, and the effect of such reading is most salutary and useful. Many a young man has had his attention turned to the study of pure science, by the perusal of some popular or familiar scientific treatise, and many a depraved or perverted taste, in matters of reading among adults, has been corrected or purified through the same agency.

The *Journal of Chemistry* aims to be useful, to afford instruction, and to disseminate information among the large numbers who have so generously come to its support, thereby creating a respect for science, and inciting to a more extended and systematic study of its principles.

Potash from Wool. — The French chemists are utilizing a very important waste product, obtained from raw wool. It is found that sheep secrete, and lodge in the wool, a peculiar acid called "suintic acid," and that this holds in combination large quantities of potash. It is found that no less than 33 per cent in weight of the raw merino wool is composed of this substance; and, as it is readily washed out in cold water, the sheep-raiser are encouraged to wash their fleeces, and sell the aqueous solution to the chemists, who extract from it the potash. Much larger quantities are found in the fine wools than in the coarse. An ordinary fleece of fine wool, weighing 4 kilogrammes, will yield 200 grammes of potash. The wool manufacturers of Rheims, Elbœuf, and Fourmies, wash annually 27,000,000 kilogrammes of wool. This would yield over 1,200,000 kilogrammes of pure potash, which would be worth, at present rates, $400,000.

We have in this country probably more than 50,000,000 sheep. If the potash from this number of fleeces could be saved, it would add very considerably to the industrial products of the country. Our sheep, however, are mostly coarse wools; and consequently the yield of "suintate of potash" would not be so large.

"I wish to procure a portable gas apparatus for use in my dwelling in the country. Will you give your views regarding the utility and safety of those machines designed for making gas out of gasolene? "J. S M."

There is no machine for manufacturing *gas* out of gasolene. The numerous machines advertised, which are moved by a weight, and in which light naphthas are used, do not make *gas*. A gas is a fixed body, existing in a permanent aeriform state. What passes through the apparatus in question is a condensable *vapor* mixed with air. The highly volatile liquids distilled from petroleum are agitated with common air, and this is made the vehicle for conveying the vapor to a burner. They should be called vapor-machines, not gas-machines.

We were the first in this country to construct and put in practical use this kind of apparatus. This we did in 1850. We did not regard the idea as very hopeful or practical, at that time; but improvements have been made since, and lighter naphthas distilled, so that, at the present time, in some localities the apparatus works very well. If your house is kept warm, and the pipes not exposed to cold, you may get along very comfortably with the apparatus, provided it is well constructed. It is as safe as any lighting apparatus can be. The naphtha must be handled with care, and the apparatus kept in good condition. The larger sizes work better than the smaller.

☞ We have recently examined some very interesting specimens of copper ore, containing silver, from Lake Superior. It is indeed a curious circumstance that these two metals are found associated, and yet entirely distinct. The copper exists as copper; the silver as silver. The copper is found in amygdaloidal trap. This is an igneous rock, and must have been melted. How could the copper have been present without becoming fused with the rock, and by gravity passing in a mass to the bottom? How could the silver and the copper be melted together without forming an alloy? How came these metals in the position in which they are found? Geological chemistry has never satisfactorily answered these questions.

☞ There are many essays written upon subjects connected with natural history, of great interest and usefulness. We shall not hesitate to place in our columns articles of this character, when they come under our notice. The description of the clothes-moth in this number is worth reading.

☞ The essay, "Chemistry of a Cup of Tea," published in the September number of the *Journal*, has been so extensively copied by the leading journals of the country, that we think it must have been placed before half a million of readers. The *Scientific American*, of New York, and the *Congregationalist*, of this city, have together introduced it to probably fifty thousand readers. We are pleased to have our articles copied, if due credit is given.

BOOK NOTICES.

Chemistry By William Thomas Brande, D.C.L., F.R.S., of her Majesty's Mint; and Alfred Swaine Taylor, M.D., F.R.S. Philadelphia: Henry C. Lea. 1867.

This is a second American edition of Brande's well-known Chemistry, thoroughly revised by Dr. Taylor. We are pleased to see so sensible and plain introduction to the science and practice of chemistry, placed in the hands of students. The treatise is well adapted to medical men and students, as by its clear statement of principles, and strict avoidance of all abstractions and speculations, it does not distract and confuse those who are engaged in the study of other departments of science. We fully indorse the views expressed by Dr. Taylor, in the preface to this edition, regarding the new views of chemical philosophy, and feel that he has done a good service in presenting the work to students, in its present form.

The Cambridge Course of Elementary Physics. Part First. By W. J. Rolfe and J. A. Gillet. Boston: Crosby & Ainsworth.

The plan pursued by the authors, in preparing this text-book, is somewhat novel, and, we think, worthy of commendation. It really embraces what is usually presented in treatises upon chemistry; but the facts and principles are placed more properly under the head of physics. The compilers of the work are experienced teachers, and well understand what is needed in the school-room. The leading principles of chemical science are presented in this treatise, in a simple and clear manner, and the methods of illustration adopted are ingenious and practical. Elementary Chemistry can be successfully taught only by experimental illustration; and the authors seem to have been impressed with this truth. As a text-book for high schools, this work is worthy the attention of teachers and committees.

Weights and Measures. — Our vicious, unscientific system of weights and measures, ought to be discarded, and the metric system introduced all over the country. It is so much better, more convenient, and uniform. We hope the work of introducing it will speedily be undertaken. It seems a formidable work to radically change all our weights and measures; and indeed in some respects it is: but it can be done.

Let school-committees order the study of the metric system in our schools, and require examinations in it as a part of the closing exercises. Let government introduce it so far as it can, into official business, and thus compel postmasters, custom-house officers, etc., to study and understand it. It will not be long before it will begin to attract attention; and if the rising generation are well instructed, a dozen years will hardly pass away before the work is accomplished.

Medicine and Pharmacy.

[*For the Boston Journal of Chemistry.*]

Mr. Editor, — I read in your valuable paper (the Oct. number), that a writer in the *Journal de Chimie* had found that "protosulphate of iron" appeared to destroy the effect of the poison from the use of "cyanide of potassium." I made this valuable discovery several years since, and have since used it in my department, where the constant use of the potassium is necessary, and which causes such painful sores on the flesh of those individuals employed on my work. My reasons for wishing you to publish this article is the fact that my experience has shown me that protosulphate of iron, connected with raw linseed oil, is much more effectual in healing these sores caused by the potassium. Had it occurred to me that many others were like afflicted with myself, I should have made known this remedy to the public long ago.

S. Jennison,
Foreman of the Gilding Department, "American Watch Works," Waltham, Mass.

MODERN MIRACLES.

The latest sensation in Paris is a Zouave, by name Jacob, who occupies the humble position of "second trombone" in the Imperial Guard at Versailles. He claims to possess the power of healing by touch, or, rather, by the simpler method of *ordering* his patients to be well. The lame, the halt, and the blind, have thronged the doors of the two houses where he has been holding his daily *seances*, to such an extent, that the street in front was obstructed, and a score of policemen were necessary to keep the crowd of applicants from rendering the thoroughfare wholly impassable In every direction, cripples were seen hobbling on their crutches, paralytics carried on their beds, the blind led by their children, and the worn-out carried by their friends, all striving to gain admittance to the presence of the miraculous healer. They were let in by batches of thirty, their canes and crutches thrown in one corner of the room, and they were ranged on a long bench. Then a man about forty years of age, with dark hair, and dark, keen eyes full of light, of medium size, slight figure, but evidently of considerable muscular power and remarkable self-command, would appear, and walk slowly up and down the room. This was the Zouave, Jacob. Occasionally, he would stop before some unfortunate cripple, and tell him to go away, as he could do him no good. The inspection finished, suddenly, in a loud, peremptory tone, he would order the others to get up and walk. Was he not promptly obeyed, with violent gesticulation, and not unfrequently with a good round oath, he harshly ordered them out of the room. The story goes, that few or none but struggled to their feet, straightened their long unused limbs, and went away rejoicing. No charge was made, as he healed without money and without price.

Such is the account that has been going the rounds of the papers the last few months, doubtless familiar to many of our readers. Angry denials of it, furious assertions that it is "impossible," avail nothing in presence of dozens, perhaps hundreds who have been benefited or cured by him. Nor is it the part of calm science to indulge in such tirades against facts. We see no reason to doubt such incidents; indeed, so far from being incredible, they are not even rare.

Peter the Hermit, St. Bernard, and a hundred other prominent personages of the Romish Church, have unquestionably, by their touch and voice, caused the lame to walk, and the crippled to dance. So have, within the present century, the disciples of Edward Irving, and of Swedenborg. These facts are as clearly established as any in cotemporary history. By the admirers of these persons, they are attributed to the specially imparted power of God; by their opponents, to the power of the devil. The intelligent physician, who can rise above theological quibbles, sees in them curious nervous phenomena, very obscure as yet, but paralleled by numerous cases in his own experience. Two years ago, we saw in the Illinois State Lunatic Asylum, a man, muscular and perfectly well in body, who, for three months, had not so much as turned over in bed, or moved a single voluntary muscle, so far as known. It was his second admission. Previously, he had lain for fourteen months in this condition, and then, one day, quietly got up, dressed, and went about his business. We had once under our care a strongly-built young soldier, free from any visible disease, yet who, on the least touch, would scream and writhe, apparently in the acutest pain; and who sought to avoid any movement, on account of the pain it gave him. A lady, a neighbor (but not a patient) of ours, had been in bed for twenty-seven years, and for six, had never so much as lifted a spoon to her mouth, on account of "spinal complaint," her physician said. She was carried to a celebrated quack, a year or two ago, who rubbed her and "mellowed" her, and then ordered her to get up and walk. She did so, and has walked ever since. Such cases are commonplace to physicians. The cures effected seem to depend directly upon a change in the innervation of the part and system, brought about by the action of a powerful will upon a ready recipient. The action of the nervous force in one body upon another system of nerves, controlling and affiliating them to itself, is shown strikingly in mesmerism, in animal magnetism, in the phenomena of "spiritual" media, and in the power of silently calling up similar thoughts to our own in others' minds. That the nervous force, or, as it has been called, the "odic force," not only can evoke in other nervous ganglia sensations as analogous to the original as the secondary to the primary electric current, but can also exert a direct influence on material substances, cannot now be questioned.

In this imparted nerve-power, in this sudden impression on the nervous ganglia, starting them out of a long habit of exercising certain cells only, and bringing all into unobstructed normal activity, lies the secret of miraculous cures. Such cures are, of course, not always permanent, as the ganglia readily fall back into their habit of limited activity; and they are chiefly confined to nervous diseases, as we can conceive of only a few cases where the imparted activity would stimulate the secreting functions to the extent of removing deposits, arresting organic changes, or limiting abnormal processes. Nevertheless, the numerous well-authenticated cures of scrofula by the royal touch, admonish us that at present we are not able to set boundaries to the beneficial effects of imparted nerve-power.—*Med. and Surg. Reporter.*

New Form of Antiseptic for Local Use.—The liquor *carbonis detergens* is recommended. It is an alcoholic solution of coal-tar, containing, we presume, the carbolic, phenic, and other acids, with dark tarry matter, and differing from carbolic acid, as the liquor cinchonæ does from quinine. It readily mixes with water, forming a permanent emulsion, and in various strengths is available as a mouth-wash, a gargle, an injection for fetid uterine discharges, cancer, retained placenta, etc.; gonorrhœa in the female, foul ulcers, sloughing sores, and all maladies dependent in, or complicated by, parasite beings, lice, fungi, etc. It is also used combined with soda.—*Buffalo Med. and Surg. Journal.*

Coating of Pills.—There is much ingenuity wasted in the coating of pills. Our apothecaries have "swung round the circle," and revived an old and exploded practice of coating them with silver or tin. This is an abominable plan. Both chemistry and therapeutics are at war with it. Collodion protects the pill from solution in the stomach. Sugar and gum are the only legitimate materials. At best, however, there is but little use in coating pills. Any properly educated person can swallow an uncoated pill without tasting it. It comes natural to boys to swallow cherry stones, and everybody can take down grape seeds by the pound. Only by some trick or perversion of the apparatus of deglutition can difficulty arise; and this may be corrected by discipline. It is extremely unfortunate for a chronic patient to be unable to swallow pills. Some medicines can scarcely be administered in any other form, and many a dose, otherwise nauseous, may be smuggled into the stomach in this form, without awaking from slumber the gustatory sentinels. Parents should always see to it that their children do not grow up with the distressing trick of shutting down the gullet against a friendly pill.—*Pacific Medical and Surgical Journal.*

Pepsin.—The physician before using pepsin in his practice, should assure himself of its purity by testing, as there are many spurious articles found in commerce. It should be completely soluble in water. The indications for its use are: first, deficient secretion of the gastric juice; second, imperfect peristaltic movement of the stomach and intestines; third, too short a stay of the food in the stomach. One or two grains of pepsin are sufficient for a dose. Dr. Hollman has found it very efficient in anæmia, chlorosis, atrophy, and debility from loss of blood or from severe sickness; it may be given alone, or combined with opium, or tonics, or other remedies; if given alone, it is mixed with a little sugar or milk.—*Druggists' Circular.*

Fly-Paper.—In consequence of the sometimes fatal effects caused by the use of paper prepared for the destruction of flies, a cotemporary suggests a substitute which is devoid of danger, and though effective in its working, shows mercy to the entrapped. It is formed by moistening blotting paper with a concentrated solution of quassia. The prepared paper is moistened with water, the unsuspecting victims being attracted to it in great numbers for the purpose of quenching their thirst, but soon appear to be struck dead, and may be easily destroyed before the effects of the anesthæsia have passed off.

CONCERNING MAN.

Wonders at home by familiarity cease to excite astonishment; but thence it happens that many know but little about the "house we live in"—the human body. We look upon a house from the outside, just as a whole, or unit, never thinking of the many rooms, the curious passages, and the ingenious internal arrangements of the house, or of the wonderful structure of the man, the harmony and adaptation of all his parts.

In the human skeleton, about the time of maturity, are 165 bones.

The muscles are about 500 in number.

The length of the alimentary canal is about 32 feet.

The amount of blood in an adult averages 30 pounds, or full one fifth of the entire weight.

The heart is six inches in length, and four inches in diameter, and beats seventy times per minute, 4,200 times per hour, 100,800 per day, 36,772,000 times per year, 2,565,440,000 in three score and ten; and at each beat two and a half ounces of blood are thrown out of it, one hundred and seventy-five ounces per minute, six hundred and fifty-six pounds per hour, seven and three-fourths tons per day. All the blood in the body passes through the heart in three minutes. This little organ by its ceaseless industry,

In the allotted span
The Psalmist gave to man,

lifts the enormous weight of 370,700,200 tons.

The lungs will contain about one gallon of air, at their usual degree of inflation. We breathe on an average, 1,200 times per hour, inhale 600 gallons of air or 24,400 gallons per day. The aggregate surface of the air-cells of the lungs exceeds 20,000 square inches, an area very nearly equal to the floor of a room twelve feet square.

The average weight of the brain of an adult male is three pounds and eight ounces, of a female two pounds and four ounces. The nerves are all connected with it, directly or by the spinal marrow. These nerves, together with their branches and minute ramifications, probably exceed 10,000,000 in number, forming a "body guard" outnumbering by far the greatest army ever marshalled!

The skin is composed of three layers, and varies from one fourth to one eighth of an inch in thickness. Its average area in an adult is estimated to be 2,000 square inches. The atmospheric pressure being about fourteen pounds to the square inch, a person of medium size is subjected to a pressure of 40,000 pounds! Pretty tight hug.

Each square inch of skin contains about 3,500 sweating tubes, or perspiratory pores, each of which may be likened to a little drain-tile, one fourth of an inch long, making an aggregate length of the entire surface of the body of 201,166 feet, or a tile-ditch for draining the body almost forty miles long.

Man is made marvellously. Who is eager to investigate the curious, to witness the wonderful works of Omnipotent Wisdom, let him not wander the wide world round to seek them, but examine himself. "The proper study of mankind is man."—*Cin. Journal of Commerce.*

Nitrate of Potassa in Intermittent Fever.—Dr. Sawyer, of Illinois (*Cincinnati Lancet*), found this salt more effectual than quinia for the cure of intermittent fever. He gives ten grains at a dose, and deems it a specific in ague, having "never failed to arrest the paroxysm, if uncomplicated." Patients thus treated are less liable to relapse than after quinia. "In the cold stage, if administered in a full dose, and the patient be placed in bed and wound with blankets, he will in a few minutes experience considerable heat, which will be followed by copious perspiration, and every unpleasent feeling will vanish.

Inhalation of Lime in Croup.—Dr. Willis, in the *Philadelphia Medical and Surgical Reporter*, describes a case of croup in a boy aged seven years, to whom an emetic was given on the evening of attack, without relief. Next morning an emetic of alum was employed, and immediately after its operation a vessel containing slaking lime was placed under his mouth and nostrils. "In a very short time the respiration was quite easy, and the cough had lost its alarming ring. A combination of squills and antimony was given every two hours, and the inhalation resorted to whenever the cough became hard and dry. Slight febrile excitement continued for a day or two, but on the fourth day he was well."

BROMIDES OF POTASSIUM AND AMMONIUM.—It would give us pleasure to learn the experience of such of our readers as may have tried the bromides in their practice. That of potassium, more especially, still continues to occupy a large space in therapeutic inquiries, with much conflict of testimony regarding its value. We must confess to much disappointment in its use. In a very small number of cases among many in which we have employed it, have we discovered marked hypnotic effects. Of the bromide of ammonium as an antispasmodic in whooping-cough, we can speak very differently. It is one of the best, if not the very best, remedy we have used in that disease. To a child two years old, two or three grains may be used three times a day. Its value is enhanced by the addition of hydrocyanic acid and stramonium. We are in the practice of using a formula such as this: Take bromid. ammon., 60 grains; hydrocyanic acid, 20 minims; tinc. stramonium, 20 minims; water and syrup, 4 ounces. A teaspoonful of this mixture three times a day to a child of two years, will seldom fail to produce a marked impression within twenty-four hours. In the first or inflammatory stage, ipecacuanha or some other expectorant should also be exhibited. In regard to the bromide of potassium, its advocates employ large doses, not less than 20 grains three times a day to an adult, often continuing its use for several weeks in larger quantities. It is a calmative and not a narcotic, and is recommended in wakefulness and nervous excitement during convalescence after surgical operations; in the distressing nervousness from an overworked brain; in epilepsy, acute mania and delirium tremens; in certain cases of vomiting; in spasmodic asthma. A gargle composed of one ounce to a pint of water, has been used with great benefit for "irritable sore throat." While some writers have no fear of injury from large quantities, others caution against its continued use, as productive of debility and nervous exhaustion. — *Pacific Medical Journal.*

DISINFECTANTS.—Mr. Crookes, says the *Medical Times*, has shown that the favorite disinfectant, chloride of lime, is about the least efficient of any of those substances reputed to possess disinfectant qualities. Chlorine itself, is very little better, for if used in large enough quantities, it will in time destroy the virus; but, as it acts by way of oxidation, and as living virus resists this longer than dead oxidizable matter, before the gas can attack a virus, everything else that it can oxidize will be oxidized first. And if, when pure, chlorine is so slow of acting, when adulterated with eighty per cent of lime, its value is proportionately less. In sulphurous and carbolic acid, on the other hand, there are substances absolutely destructive of every living thing of low organization, such as cattle-plague virus is supposed to be. These substances, besides destroying the virus, attack it at once, and arrest all putrefying tendency.

EXPERIMENTS WITH BROMIDE OF POTASSIUM.—Messrs. Eulenburg and Gutmann have stated, before the Academy of Medicine of Paris, that doses of from thirty to sixty grains, either by the stomach, or injected under the skin, kill a rabbit in from ten to forty minutes. Smaller doses momentarily disturb the action of the heart, and paralyze the power of moving and feeling, causing a few antecedent shivers. On a post-mortem examination of the animals, no change, but some congestion of internal organs is found. With frogs, a subcutaneous injection of one grain to two, causes, after ten or fifteen minutes, loss of movement, reflex action and feeling, with arrest of respiration, weakening and infrequency of cardiac ventricular action, retardation of peripheral circulation, and lastly, complete diastolic arrest of the heart's action. These effects are attributed by Messrs. Eulenburg and Gutmann, not to the bromine, but to the potassium.—*Lancet.*

PEPSIN IN THE VOMITING OF PREGNANCY.—A number of French physicians declare the efficacy of pepsin in the vomiting of pregnancy. It should be given in the dose of 8 or 10 grains, before eating. Hydrochloric acid is also recommended as equally efficient—30 to 60 drops to be taken daily, properly diluted. Strychnia, we think, is not inferior to either—the 20th to the 12th of a grain, three times a day.

The Elixir of Bark and Iron is found to be the best restorative, or recuperative remedy, after fevers, or any wasting disease.

Gleanings

FROM FOREIGN AND DOMESTIC JOURNALS.

THE BODY MADE TRANSPARENT.—At the International Medical Congress at Paris, M. Milliot, of Russia, made some experiments upon a dog and a cat with an instrument which he calls the somatoscope. This is composed of glass tubes introduced into the rectum or the stomach, and so powerfully illuminated by the platinum wire ignited by electricity as to light up nearly all the viscera. M. Milliot thinks that, with improvements which can be made in the apparatus, the diagnosis of abdominal tumors and dropsies may be made easy, and that even the head may be rendered transparent in cases of hydrocephalic children. The somatoscope, the ophthalmoscope, the stomatoscope, the laryngoscope, the endoscope, etc., etc., are fast robbing nature of her secrets.

The statistics of Scotland show that married life is conducive to longevity.

OINTMENT FOR MOIST ITCHING ERUPTIONS, ACNE, ETC.

℞ Subnitrate of bismuth . . . . ʒi.
Cold cream . . . . ℥i.

M. Use morning and night.—*l'Union Medicale.*

NEW METHOD OF EMBALMING.—M. Brunetti has given to the International Medical Congress a description of his new method for preserving anatomical specimens. His preparations have attracted a great deal of attention at the Exposition Universelle, and the explanation was received with great enthusiasm by the medical congress. Several processes are required,—1st, washing of the piece; 2nd, removing of the grease; 3rd, tanning; and 4th, drying. 1st. In order to wash the specimen, a current of water is forced through the blood-vessels and excretory passages, and this is followed by a current of alcohol, enough to drive out the water. 2nd. A column of ether is propelled through the vessels in the same manner. This process lasts several hours; the ether penetrating into all the tissues, and dissolving all the grease. At this stage, the piece can be preserved indefinitely, if kept in ether. 3rd. After having forced out the ether by a current of distilled water, a solution of tannin disolved in boiling water is employed. 4th. In order to dry the specimen, a current of warm dry air is forced through a vessel containing chloride of lime, and then through the blood vessels. Pieces preserved in this manner are supple and light, whilst they preserve their natural volume and relations. Even the microscopic elements remain solid. They can be handled without fear, and keep indefinitely.

TANSY IN EPISTAXIS.—Dr. C. P. Uhle (*Med. Reporter*) highly recommends the *tanacetum vulgare* as a remedy in epistaxis. He suffered frequently from this affection while a student, and upon one occasion accidentally plucked a leaf of tansy and applied it to the part. The hemorrhage ceased immediately, and the remedy has never failed since. Subsequently, numerous experiments were made by Dr. Uhle, with entire and gratifying success. In some instances the simple aroma or odor of the plant was sufficient to quell the most active hemorrhage.

AN INDIA-RUBBER TONGUE.—A Paris coachman having lost his tongue by amputation—considered necessary because of a cancer thereon—a surgeon of the Hotel Dieu replaced it with one made of India-rubber. Although, like old dog Tray, "he cannot speak," he tastes and smokes his pipe with apparent enjoyment. After eating, he takes out his tongue, cleans it, and carefully lays it away in his pocket until it is again called into requisition.

BOTTLES HERMETICALLY SEALED.—Gelatine mixed with glycerine yields a compound, liquid when hot, but becoming solid by cooling, at the same time retaining much elasticity. Bottles may be hermetically sealed by dipping their necks into the liquid mixture, and repeating the operation until the cap attains any thickness required.

In Munich, the authorities for some years past have required that in all cases of children dying in their first year, the parents should declare whether or not the infant had been nursed by the mother. A statistical table of the last two years, shows that out of one hundred deceased infants, eighty-eight were not so brought up.

PHOTOPERIPATETIGRAPH.—This is a contrivance which is bound to bring itself into notice on the strength simply of its name, and independent of any merit it may or may not possess. A Missourian photographer is the originator of this abbreviated cognomen, and the contrivance is a dark closet mounted on wheels and containing all the apparatus required for out-door photograpy.

Formulae

USEFUL IN MEDICINE AND THE ARTS.

EDITOR JOURNAL OF CHEMISTRY: Nothing is more valuable or interesting to a medical practitioner than a new remedy, which has been found more successful than those in general use. Among your many readers of the medical profession, you may obtain some valuable contributions of this kind, which will render your *Journal* still more popular and useful. The following original are at your service:—

FOR DIPHTHERIA.

℞ Iodide of bromine . . . . gtt. xx.
Syrup acacia . . . . ℥viii

M. *Dose:* One teaspoonful every four hours. It may also be used as a gargle, diluted with gum water. It acts more promptly and efficiently than the permanganate of potassa, and arrests the secretion and vitiation of the fluids. Dose in proportion for a child.

FOR CHOLERA-INFANTUM.

℞ Morphia . . . . grs. i.
Chloroform . . . . gtt. x.
Syr. acacia. . . . . ℥ii.

Dose: 15 to 20 drops for an infant one year old.

FOR ASCITIS.

℞ Veratria . . . . grs. x.
Adeps . . . . ℥i.

M. To be rubbed over the abdomen once or twice a day for a fortnight, and if it irritates the skin too much, omit until it subsides, and add more adeps, giving at the same time a strong infusion of the *polytrichium juniperum.* This produced complete absorption, and cured a case after trying all the usual means, and after I had removed 56 gallons of fluid by paracentisis performed nine times. EDWIN WEBB, M. D.

Hempstead, Long Island.

VELPEAU'S BLACK CAUSTIC.—Triturate, in a porcelain mortar, 30 grms. powdered liquorice root, and add sulphuric acid in small quantities, until a mass of suitable consistence is obtained, which must be neither too hard nor too liquid. This preparation forms a well-marked hard black eschar.

COPLAND'S COMPOUND CONFECTION OF CINCHONA.—Powdered Calisaya bark, 30 parts; confection of rose, 15 p.; dilute sulphuric acid, 3.75 p.; ginger syrup, 45 p. Dose in intermitteut fever: four to eight grammes three or four times a day.

TEETHING SYRUP.—Fresh pulp of tamarinds, 3 grammes; infusion of saffron (made of 6 centigrammes), 2 grammes; clarified honey, 10 grammes; tincture of vanilla, 25 centigrammes. Mix. To be rubbed on the gums.

TOOTHACHE DROPS, of Copland.—Opium and camphor, of each, 60 centigrammes; alcohol, q. s. (?) to dissolve; oil of cloves and of cajeput, of each, four grammes. Mix. To be applied with cotton.

APPLICATION FOR NEURALGIA, by Dr. Gray.—Tincture of aconite, chloroform, of each, five parts; lard, twenty parts. Mix. After applying the ointment, the place is covered with cotton.

PLASMA OF OXIDE OF ZINC, (*Glycéré d' Oxyde de Zinc*, Rollet.)—Glycerine, 16 grammes; starch, 8 grms. Heat carefully until a gelatinous mass is formed; then add oxide of zinc, four grms.

ELECTUARY OF SULPHUR IN HABITUAL CONSTIPATION.—Washed sulphur, 30, cream of tarter, 15, white honey, 90 parts. Mix. *Dose:* A coffee-spoonful once or twice a day.

TOOTHACHE DROPS OF RIGHINI.—Alcohol, 8; creosote, 12; tincture of cochineal, 4 grammes; oil of mint, 6 drops. Mix.

POWDER FOR DESTROYING WARTS.—Powdered savine and verdigris, equal parts. Mix.

// BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, DECEMBER 1, 1867. NO. VI.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

A list of premiums is offered to those who obtain subscribers.

Contents.

A CURIOUS CLOCK.—Rev. John Wesley, in his journal, gives the following account of a talking clock:—

"On Monday, April 27, 1762, being at Lurgan, in Ireland, I embraced the opportunity which I had desired, of talking to Mr. Miller, the contriver of that statue which was in Lurgan when I was there before. It was the figure of an old man standing in a case, with a curtain drawn before him, over against a clock, which stood on the opposite side of the room. Every time the clock struck, he opened the door with one hand, drew back the curtain with the other, turned his head as if looking round on the company, and then said, with a clear, loud, articulate voice, past one, or two, or three, and so on. But so many came to see this (the like of which all allowed was not to be seen in Europe), that Mr. Miller was in danger of being ruined, not having time to attend to his own business. So, as none offered to purchase it, or reward him for his pains, he took the whole machine to pieces."

Familiar Chemistry.

CHEMISTRY OF A PINT OF KEROSENE.

BY THE EDITOR.

There is scarcely an article, solid or fluid, which is more generally regarded in this country as one of household necessity, than what is known as Kerosene. It is brought to the cities, from the oil regions, in vast quantities, and from thence is distributed to every town and village throughout the country. Storekeepers arrange it for sale in close proximity with sugars, coffee, tea, and flour; and often, the dark, moist, and odorous casks are seen mounted by the side of calicoes and ribbons.

The tallow candle and oil lamp no longer flicker and shed their dim light in dwelling or workshop. A more intense and diffusive light now flashes through the windows, and penetrates far into the surrounding darkness. The country lad or dame, visiting the city, is no longer dazzled and bewildered by the blaze of gas-lights; the home far away among the hills is illumined by rays equally as brilliant, and the eye has long since become accustomed to the glare. Kerosene must be considered among the wonderful things which have been developed by this progressive age, and its history and nature worthy of examination and study.

The name, "kerosene," is rather a fanciful one. It originated with one of the early manufacturers, and has now come to possess a general significance. It is applied not only to the oil distilled from coals, but to the illuminating liquid which comes from earth-oil, or petroleum. It is needful that this important body should have a name, generally understood and adopted; and perhaps the word "kerosene" is as good as any that could be suggested.

Before the discovery of petroleum, kerosene was manufactured from soft or bituminous coals, by a peculiar process of distillation. The statement seems paradoxical, or contradictory, that there is not a particle of oil, or gas, or naphtha, in a lump of this variety of coal, when it is known that from it the chemist not only produces them in large quantities, but a dozen or more other bodies, of very remarkable and diverse natures. A lump of coal is capable of yielding olefiant or illuminating gas, hydrogen, sulph-hydric acid, sulphurous acid, ammonia, kerosene, kerosolene, benzine, benzoline, naphtha, naphthaline, paraffine, creosote, carbolic acid, tar, pitch, asphaltum, and some other substances; and yet, as isolated bodies, most of these cannot be said to exist at all in the coal. Their production is due to the manipulating processes to which the coal is subjected. Heat is the great disorganizer, which breaks up, or separates, the atoms of carbon, hydrogen, nitrogen, sulphur, etc., and forces them into new combinations. These substances, most of them, are of a very remarkable character, and largely employed in medicine and the arts. The gaseous bodies are used for lighting, heating, bleaching, etc. Ammonia is used for a great variety of purposes, and is almost indispensable in some processes or manufactures. Very nearly all the ammonia consumed, amounting to many thousands of pounds, is manufactured from the waste products of gas-works, or indirectly from coal. Benzine, benzoline, gasoleine, kerosolene, naphtha (all of which may be included in the general term *naphtha*), are extremely light hydrocarbon liquids, of a similar nature, but differing in density and volatility. Kerosolene, or rhigolene, is the lightest and most volatile of all known liquids. It boils violently, when exposed upon a warm day in summer. Its specific gravity is 0.625. Benzine is employed for making the beautiful aniline dyes, now so popular. The gorgeous rainbow tints derivable from coal, may be regarded as the stored-up sunshine of a past geological epoch; and the science and skill of our advanced age has proved adequate for its liberation or isolation. It is a curious fact that the benzole obtained from petroleum cannot be converted into nitro-benzole, and thence into dye colors. The liquid physically resembles that resulting from the distillation of coal; but, chemically, it widely differs. Creosote and carbolic acid possess remarkable antiseptic or preserving properties. Putrefactive change in organized bodies is instantly arrested by the presence of carbolic acid; and hence, this newly discovered agent promises to be of the highest importance to the human family.

Perhaps no one of the results of the chemical manipulation of soft coals is more striking, or awakens greater wonder in the popular mind, than the production of that beautiful, snowy white substance, used so largely in the manufacture of candles,—paraffine. Naphthaline is still more beautiful. It is produced in the form of scales or crystals, and resembles the pearl or opal in color or appearance. How bodies physically so dissimilar can come from black, dirty coals, is a fact almost incomprehensible to those unacquainted with technical chemistry; and, indeed, we cannot wonder it is so. When the farmer is told that the chemist is able to change not only a lump of coal, but the moist, black "peat" from his meadow, into oil or candles adapted to light his dwelling, he is perhaps ready to admit the truthfulness of the statement; but *how* so strange a transmutation is effected, is a problem deeply puzzling.

The changes in coals and carbonaceous substances which result in the production of oily liquids, are effected by a process called destructive distillation. If water is placed in a retort or still, and heat applied, the particles are raised in the form of vapor, and by condensation are resolved back again into water. There is no change effected in the liquid. But, if we place soft coals in an iron retort, and apply heat, they are disorganized or destroyed. No coal can be found in the retort, or in any vessel containing the volatilized products, after the operation is completed. The *degree* of heat applied will determine whether it be resolved into gaseous bodies, or into liquids and semi-solids. If a cherry-red heat be kept

up during the distillation, we have, as a chief product from the coal, olefiant or illuminating gas; if a lower, or dull red heat, little gas comes over, but copious vapors, which, when condensed, form a thick, black, greasy fluid, of not a very inviting character. This fluid is made up of a great number of substances, the four most important being kerosene oil for burning, oil for lubricating, paraffine, and naphtha. To obtain the pure kerosene oil, the liquid is subjected to several more distillations, in which strong sulphuric acid is employed to aid in the purification, and the acid is afterwards removed by caustic soda. Our limits are too narrow to describe the processes for obtaining the paraffine and other substances, or enter into details regarding the manufacture of kerosene. The brief statement made will serve to convey a general idea of the methods adopted to convert soft coals into kerosene oil.

In manufacturing kerosene from petroleum, the processes are essentially the same. We must regard the crude petroleum as representing the black, tarry liquid obtained from the first distillation of coal.

In the use of petroleum, this first process is saved; the coal having probably been distilled in a far back geological period, on a gigantic scale, by some processes of nature, not well understood. The vast cavities in the rocks in which this crude product is stored, represent, as oil reservoirs, the cisterns in which the manufacturer stored the first products of his coal retorts, before the discovery of petroleum. As soon as this discovery was made, the production of kerosene from coals was promptly suspended, as no one could compete against a natural product existing in immense quantities, which had already passed one important stage of its manufacture.

In the distillation of coal, a substance is left in the retorts, called *coke*, which is very nearly pure carbon. In chemical composition, this corresponds with our hard or anthracite coals. By no possible manipulation can a drop of kerosene be obtained from coke, or from anthracite coal; they are both *residuums*, or results of an exhaustive chemical change. The anthracite coal-beds may be regarded as the coke, remaining after the distillatory process, which produced petroleum, was completed. Artificial coke, by pressure and moisture, can be made to resemble anthracite in its physical aspects. A vast number of interesting questions arise at this point, regarding the probable origin of petroleum, its nature and distribution; but we must hasten to consider the chemical changes to which a pint of kerosene is subjected after being placed in a lamp and burned as a source of artificial illumination.

Kerosene is a pure hydro-carbon liquid; that is, a liquid made up of the elements hydrogen and carbon. Both of these are combustible, or possess a strong affinity for oxygen; and associated together, as in kerosene, they afford a luminous flame when burned by uniting with oxygen. The results, or products, of combustion differ in no respect from those which proceed from other organized carbonaceous bodies, being mainly water and carbonic acid.

Estimating carefully the amount of light afforded by a measured quantity of kerosene, and contrasting it, in price, with gas, sperm oil, wax candles, etc., it is found to be far less costly than either; and it is so convenient and cleanly, its discovery must be regarded as a blessing to the race.

So much has been said respecting the *explosive* nature of kerosene, this point demands consideration. A general impression prevails among consumers that kerosene is *explosive*, and its use attended with a considerable amount of danger. Such, however, is not the case; it is no more explosive than water; and the employment of properly-prepared oil is safe under all ordinary conditions. It is important that there should be a clear understanding of the nature of kerosene, the cause of accidents, and the conditions under which they occur.

As has been stated, kerosene is not explosive. A lighted taper may be thrust into it, or flame applied in any way, and it does not explode. On the contrary, it extinguishes flame, if experimented with at the usual temperatures of our rooms. Kerosene accidents occur from two causes: first, imperfect manufacture of the article; second, adulterations. An imperfectly manufactured oil is that which results when the distillation has been carried on at too low temperature, and a portion of the naphtha remains in it. Adulterations are largely made by unprincipled dealers, who add 20 or 30 per cent of naphtha after it leaves the manufacturer's hands. The light naphthas which have been spoken of, as known in commerce under the names of benzine, benzoline, gasoleine, etc., are very volatile, inflammable, and dangerous. They, however, in themselves, are not explosive; neither are they capable of furnishing any *gas*, when placed in lamps, which is explosive. Accidents of this nature are due entirely to the facility with which *vapor* is produced from them at low temperatures. But, the vapor by itself is inexplosive; to render it so, *it must be mixed with air.* A lamp may be filled with bad kerosene, or with the vapor even, and in no possible way can it detonate, or explode, unless atmospheric air has somehow got mixed with the vapor. A lamp, therefore, full, or nearly full, of the liquid is safe; and also, one full of pure warm vapor is safe. Explosions generally occur when the lamp is first lighted without being filled, and also late in the evening, when the fluid is nearly exhausted. The reason of this will readily be seen. In using imperfect or adulterated kerosene, the space above the line of oil is always filled with vapor; and so long as it is warm, and rising freely, no air can reach it, and it is safe. At bedtime, when the family retire, the light is extinguished; the lamp cools, a portion of the vapor is condensed; this creates a partial vacuum in the space which is instantly filled with air. The mixture is now more or less explosive; and when, upon the next evening, the lamp is lighted without replenishing with oil, as is often done, an explosion is liable to take place. Late in the evening, when the oil is nearly consumed, and the space above filled with vapor, the lamp cannot explode so long as it remains at rest upon the table. But take it in hand, agitate it, carry it into a cool room, the vapor is cooled, air passes in, and the vapor becomes explosive. A case of lamp explosion came to the writer's knowledge a few years since, which was occasioned by taking a lamp from the table to answer a ring at the door-bell. The cool outside air, which impinged upon the lamp in the hands of the lady, rapidly condensed the vapor, air passed in, an explosion occurred, which resulted fatally. If the lamp had been full of fluid, this accident could not have occurred. Before carrying it to the door, flame might have been thrust into the lamp with safety; the vapor would have ignited, but no explosion could have taken place.

This brief explanation will serve to show the *cause* of lamp explosions. We hear much said about dangerous *gases* being formed in lamps, but this is an error. In burning the most dangerous kinds of kerosene, no decomposition takes place, resulting in the formation of explosive gases. The whole hazard comes from air-mixed vapor.

But how can we be positively assured of safety in the use of kerosene? How can we know of the quality or character of the article offered us by dealers? These are important questions, which will naturally arise in the mind of the reader. We answer, there is *positive* assurance of safety, if pure well manufactured kerosene is consumed. We do not believe a serious accident ever occurred from kerosene, the inflammable point of which was above 110° F. and this is the legal standard. During the past fifteen years the writer has made a large number of experiments upon burning fluids, and investigated thoroughly the conditions under which accidents occur in their use. Personal investigation has been made of the alleged cases of explosions, many of which have been reported, and therefore opinions are expressed upon the subject, with a confident feeling of their correctness.

Purchases made direct, of long established, reputable manufacturers, afford assurances of safety. But such are not readily accessible, and in most cases a supply is sought from the nearest dealer, without any knowledge being had of the source from whence it comes, or its character or quality. If consumers are willing to be put to a little trouble, a simple experiment will determine the safety of the kerosene they purchase. Fill a pint bowl two thirds full of boiling water, and into it put a common metalic thermometer. The temperature will run up to over 200°. By gradually adding cold water, bring down the temperature of the water to 110°, and then pour into the bowl a spoonful of the kerosene, and apply a lighted match. If it takes fire, the article should be rejected as dangerous; if not, it may be used with a confident feeling of its safety. In this experiment, which is the most simple that can be devised, the fire test is directly applied. Upon practical trials it has been found to afford correct results.

There are severe enactments, both state and national, against the sale of kerosene of a dangerous character; but, as in the case of many other articles subjected to adulterating processes, the fear of the law does not deter from sophistication. Kerosene is largely mixed with the cheap naphthas to reduce the cost, and thus the lives of consumers are jeopardized.

In conclusion, we would caution our readers against another form of fraud and deception. There are many men in all the large towns and cities, engaged in compounding and vending burning fluids under various names, alleged to be safer, or cheaper, or better, than kerosene. Chemical examination of many of these fluids proves them to be either dangerous mixtures of oil and naphtha, or kerosene, with a little coloring matter added. Avoid all "chemical oils," "lunar oils," "oleines," etc.; from the nature of the case they must be fraudulent, as there are no liquid or solid bodies known to science which furnish perfect artificial light so cheaply as kerosene, the product of crude petroleum.

METEORS.

There have been an infinity, almost, of theories to account for these celestial fireworks, — from the poetical myth of the Lithuanians, who believe that the Pascal weave in Heaven for the new-born child its thread of fate, which is attached to its guiding star, and that at death the thread is rent and the star falls, — to the hard, physical, and apparently more obvious view, that they are simply red-hot stones ejected from the Lunar volcanoes. Many of these theories may be right as applied to some of the meteoric appearances, and all of them wrong as applied to others. One great fault of modern scientific process is an attempt at too extensive generalization, or the seeking to bring together too many effects under one cause. All the phenomena of the heavens above cannot be referred to one class, any more than those of the earth beneath, or the waters under the earth. Of the stars in the sky having the same general appearance, we know that some are fixed stars, or suns, the centres of great

systems, while others are planets revolving round the fixed bodies, and others, again, are moons or secondaries attending on the primaries. Some are double stars, revolving round a common centre; some, as comets, travel in such eccentric orbits as to return only after the lapse of ages; while others dart away on the higher curves, and are seen no more forever. The planet Mercury has the density of lead, while the heads of some comets are so rare as to be transparent to the rays of the faintest stars, their tails being thousands of times lighter than hydrogen gas, the lightest substance we know on the earth.

In regard to ærolites, under which term is included everything that falls from the atmosphere, they have at least three distinct origins, — telluric, atmospheric, and cosmical, — the Lunar origin being, as the Scotch juries say, "not proven." The first include the fireballs, red-hot cinders, stones, ashes, etc., projected from volcanos, during a state of eruption, and which sometimes fall several hundred miles from the mountain. A phenomenon precisely similar to shooting stars has been several times observed during volcanic eruptions, and which is supposed to be due to electrical action. To an astronomical origin must be attributed most of those transient meteors at a very low altitude, shooting in all directions that may be seen on every clear night. They are generally considered of the nature of the "Will o' the Wisp," an ignition of gases exhaled from the earth, or forming by new combinations of the elements found in the air. But by far the larger part of those bodies known as fire-balls, meteors, and shooting stars, which appear at regular periods and in large numbers, are of an undoubted cosmical origin; that is, they belong outside of our atmosphere and of the solar system. This is proved by their light not being polarized or reflected, and also by the fact that the analysis of some of them which have been found on the surface of the earth has yielded substances not found on the earth. In regard to the great shower of 1833, of which last night was the anniversary, Prof. Olmstead rendered it certain that they came from outside our orbit by their being independent of the earth's rotation, as the fire-balls all emerged from the same quarter of the heavens, Gamma Leo, and did not deviate from this point, though the star constantly changed its height and azimuth.

The old doctrine that nature abhors a vacuum has been revived by physicians of late years in its fullest import, it being now generally believed that the whole of infinite space is filled with matter of a greater or less degree of density, from the imponderable æther of the interstellar spaces, up through the thin nebulous matter of the Milky Way, that seems slowly rotating into an embryo system; up through the comets, that have been thrown off from their yet undeveloped nebulous parent, and have started on their erratic journey, though yet possessing less density than our lightest air; and so on to the bodies of our system, that vary from the density of cork to that of lead. Out of this universally distributed matter, it is believed that worlds are being developed or created; that in certain zones or rings it is more abundant and condensed; that certain of these rings revolve around the sun, — millions of little planets, instead of one large one, — and that at certain points in the earth's orbit we intersect that ring and the bodies become visible. The 12th of November is one of these points, so that some meteors are always seen at that date. But the ring seems to have in one part of it a dense central mass, which is perhaps forming into a solid planet, and once in thirty-three or thirty-four years we pass through that nucleus, and the display becomes much greater. It has been observed that for several years the November display increases as we approach that point and then decreases as we pass away from it.

It is certain that the laws of attraction will cause this nucleus in the belt to become more and more dense, till the millions of small bodies now composing it coalesce into one. What the consequences might be when this new planet shall have acquired a consistency approximating to that of the earth, or our attempting to bolt through it as usual, our readers can speculate on with perfect safety — at present. — *Newburyport Herald.*

The Packing of Bottles, filled or empty, is now performed more safely, closely, and rapidly, than heretofore, by means of India-rubber rings slipped over them. The rings cost only once, and can remain on the bottle as long as it lasts.

ORIGIN OF LIFE.

Prof. Newberry, President of the American Association for the Advancement of Science, in his address at the Burlington meeting, makes the following interesting remarks upon the origin of life: —

Upon this question of the origin of life so much is being done and said that you will expect a word of reference to it at my hands, yet little more can be reported as the result of all modern research than that the origin of life is as great a mystery as ever. You will all remember how, a few years since, we were startled by the announcement of the discovery of the generation of the *Acarus Crossii*; and, while our original distrust of the accuracy of the observations of Mr. Cross was strengthened by the failure of all subsequent experimenters to reproduce his results, our unbelief is further confirmed by the unanimity of all the more modern and intelligent devotees of spontaneous generation in the assertion that life can only originate in its simplest form, that of a unicellular organism. There is no Darwinist who will concede the possibility of an animal as highly organized as an *Acarus*, with body, head, limbs, digestion, and senses, all more or less complete, being the product of spontaneous generation, and not the result of slow and gradual development.

Still farther: it is known that the animal kingdom rests upon the vegetable as a base. Animals being incapable of assimilating inorganic matter, could not exist without plants. Plants must therefore have preceded animals, and the fruit of spontaneous generation must be a protophyte, and not a protozoan.

As I have said, the materialists have so far utterly failed to co-ordinate the vital force with those which we designate as material. The beautiful and important discoveries which have followed researches into the correlation and conservation of forces by pointing to a unity of all the forces in the material world, have naturally prompted efforts to centralize, with electricity, magnetism, and chemical affinity, that which we know as vital force. But a moment's reflection will show us how far removed is this vital force from all others with which it has been compared.

The nicest manipulations of chemical science will probably fail to detect a difference in composition between the microscopic germs of two cryptogamous plants. Each consists of the same elements, carbon, nitrogen, hydrogen, and oxygen, in nearly or quite the same proportions. Both may be planted in a soil which laborious mixture has rendered homogeneous, and subsequently supplied with the same pabulum, and yet, in virtue of some inscrutable, inherent principle, one develops a humble moss, and the other rises into the beauty, symmetry, and even grandeur of a tree fern. The same may be said of the spermatozoa of the mouse and the elephant. Indeed, all the phenomena which attend the reproduction of species are totally at variance and incompatible with those which mark the action of material laws. Why, in physical circumstances differing *toto cœlo*, does the germ produce a plant or animal so closely copying the parent? and whence this tenacity of purpose in the germ which reproduces, through a long line of posterity, the trivial characteristics of a remote ancestor. Even within our limited observation we have been struck by the re-appearance in the grandchild of the voice, the gesture, the stature, the features, or some other marked peculiarity of his grandsire. Whence comes the force of the axiom that "blood will tell"? — and how incomprehensible that, by the action of only material laws, mental force, or, it may be, moral infirmity is transmitted from generation to generation, in spite of the system of infinitesimal dilution through which it passes!

Strange as it may seem, there are to-day men, respectable by their number and attainments, who are believers in spontaneous generation; but with this proviso, which leaves the mystery as great as ever, that only from *organic* matter can organisms be produced. So that to the original and primary appearance of life upon the earth, modern science has given us not the slightest clue.

And now, even with this hurried and sadly imperfect exposition of the tendency of modern science, the time at our command has been consumed. Before leaving the subject, however, I crave your indulgence for a word to those who, wholly absorbed in the study of the laws which regulate the material universe, are so deeply impressed with their universality and potency, that they forget that law is but another name for an order of sequence, and has in itself no force. These are they who, in their pride in the achievements of the human intellect, fail to realize that the universe furnishes conclusive proof that all our philosophy, all our logic, all our observation are utterly inadequate to solve the problems that are presented to us; inadequate not simply from the limited nature of our powers of observation, but because the human mind, though forced to confess the existence of the infinite, is utterly unable to grasp it; and that while the logic of reason and the logic of numbers suffice for a qualified understanding of the manner in which material forces work, of the origin and nature of these forces we are and must ever remain ignorant, unless gifted with higher powers than we now possess. As has been stated, seen from the stand-point of our modern materialists, and judged by the criteria which they have adopted, spiritual existence and supernatural phenomena, even if as all-pervading as the most devout religionist believes, must, from *a priori* considerations, be utterly ignored. Of those whose regard for the dignity of material laws leads them to reject the idea of a creative and overruling Deity, I would ask, Is not man himself a disturbing element in your universe? Whatever may be said in regard to man's free-agency, and however confidently it may be asserted that his will is but the resultant of the various motives that operate as distinct forces upon it, consciousness lies at the basis of all reasoning; and the conduct of every man proves that he accepts this axiom. As he issues from his door he is conscious, beyond all argument, that it is in his power to turn to the right or to the left; and while he holds himself responsible for his volition, he cannot blame us if we ascribe to him free-agency. Man is therefore an independent power in the universe. He wills and creates. The locomotive is as truly his creation, as himself fashioned from the dust of the earth and vitalized by the breath of the Almighty, is the work of his hands. If, therefore, all the realm of nature is controlled through material laws, by forces that, like attraction, electricity, chemical affinity, etc., act in an invariable and inflexible way, in this universe man is a stupendous anomaly; and unless he can be degraded from his position of pre-eminence in this material world, the boldest and most irreverent of modern philosophers will strive in vain to dethrone the Great Creator from the rule of the universe, or from his place in the hearts and minds of men.

Chemistry Applied to Agriculture.

PRESERVING HAY WITH LIME AND SALT.

The employment of lime and salt having been strongly recommended for preserving partially cured hay in the mow, we were requested a few months ago by the Editor of the *New-England Farmer*, to express views regarding the chemical effects of the mixture. Accordingly, the following communication was furnished for publication in the *Farmer*: —

150 Congress Street,
Boston, Aug. 10, 1867.

Mr. S. Fletcher, — *Dear Sir*: — I have just read in the *Farmer*, your letter to Mr. Brown regarding Mr. Metcalf's method of curing hay by the employment of *lime* and *salt*. I was so very busy when you called at our counting-room, I failed to learn the true import or nature of your inquiries. It is evident considerable interest will be awakened in this subject, and therefore I hasten to present to your readers, a *chemical view* of the matter, which I trust is reliable.

If the quantities of salt and quicklime mentioned by Mr. Metcalf were mixed together, and sprinkled with water, double decomposition would result, and *caustic soda* and *chloride* of *calcium* would be formed. A mutual destruction takes place between the lime and salt, and birth is given to these new bodies. Caustic soda would be very hurtful to animals, even if afforded in small quantities. It is a powerful caustic irritant. Chloride of calcium is a deliquescent salt used in the arts, and in medicine. This also, would undoubtedly be harmful to animals. If no further chemical changes resulted, Mr. Metcalf's lime and salt mixture upon hay, would certainly prove an unhappy discovery. But the two new bodies

tend strongly towards further changes; the caustic soda has a powerful appetite for carbonic acid, which it finds in the air diffused through the hay; a union is formed, and *carbonate of soda* results. But this is not all. Carbonate of soda and chloride of calcium cannot remain separate,—they rush together, exchange ingredients, and lo! we get back to *salt* again; *common salt* and hard, insoluble *carbonate of lime*, remain in Mr. Metcalf's haymow after the play of chemical affinities is fairly over.

It is presumed that lime and salt mixed and strewn upon moist hay, would be influenced chemically in a way similar to that which takes place when they are mixed and sprinkled with water. It is possible, a body of hay being porous, *unequal diffusion* of the carbonate of soda and chloride of calcium occurs from a point where they are formed, so that they do not unite. In this case carbonate of soda and chloride of calcium remain in the hay instead of salt and carbonate of lime. It is not probable, however, that decomposition stops short of the ultimate results,—*salt* and *chalk*.

With this view, no advantages result from mixing lime with salt in curing hay, as the production of chalk (carbonate of lime) in connection with the salt, affords no additional preservative agent. All the gases involved in the changes are used in the new bodies formed, so that no agent of this nature is set free, to act as an antiseptic or destroyer of ferment. Hay treated in this way would be harmless to animals, as salt and chalk are perfectly innocuous. Very truly yours,

JAS. R. NICHOLS.

It will be understood from the above, that lime and salt are incompatible substances, so far as by their chemical changes any special preserving or antiseptic properties are secured. Partially cured hay, treated in the mow with these articles, is practically unaffected by their presence. How then does it happen that green hay is preserved, when it has been applied? In the experiments made, it is probable the hay would have cured equally as well if the mixture had been withheld. Two mows of the same hay, stored under precisely the same conditions, one with the salts, the other without, would undoubtedly be found alike in the spring. We have long entertained the idea that hay is cured too long in the field. If grass is mown in the morning, *after the dew is off*, it may with safety be stored in barns in the afternoon, provided the day is clear and warm. The influence of dew upon grass after it is cut and lying in the swarth, as affecting its preservation in the mow, is imperfectly understood. We intend to refer to this subject again.

Boston Journal of Chemistry.

BOSTON, DECEMBER 1, 1867.

☞ Any one sending us the names of *three* subscribers with advance pay, will be entitled to receive the *Journal* free for one year. For *five* subscribers, we will send the *petite microscope*. For *twenty-five*, we will send, in addition to the microscope, a copy of *Stockhart's Chemistry for Students*, the best elementary treatise yet published. For *one hundred* subscribers, we will send a complete set of chemicals, together with test tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. Downes is general travelling agent for the *Journal*.

☞ The back numbers of the *Journal* are so far exhausted, we can no longer supply them to our new subscribers. Those who subscribe before the commencement of the new year, will receive the November and December numbers free, their subscriptions dating from January 1, 1868.

THE BROMIDES.—Among the most important of the recent additions to *materia medica*, are the bromides of potassium and ammonium. The potassium salt is much the more largely employed. We publish, in another column of the *Journal*, an interesting communication from Dr. Sabin, in which the results of some experiments with the bromide of ammonium are presented. We have carefully observed the peculiar therapeutic influence of the potassium salt in experiments upon ourselves and others, and are led to believe that much larger doses are borne with safety, and often required, than those given by some practitioners. In some cases of insomnia, where hypnotic effects are desired, small doses of five, ten, or even twenty grains, make no perceptible impression; by increasing to forty, or sixty, the desired effects are produced. We have not yet learned what a dangerous dose of either of these salts may be. They cannot be regarded as very hazardous, or deleterious, as, having been often used heroically, no record of injury has been made; at least, none has fallen under our notice.

Bromine is an element of very poisonous and disagreeable nature; but the mysterious modifying influence of the potassium in chemical combination is here observed, as also in the union of other elementary and compound bodies.

One of the most singular and striking facts is the wide dissimilarity existing between the iodide and the bromide of the metal. Iodine and bromine are found associated together in nature, and they resemble each other in many physical characteristics. In the preparation of the salts, the methods of manipulation are the same; they obey the same laws of crystallization; they are alike in color and solubility; but in taste and therapeutic influence, they have nothing in common. It is important that the one should not be mistaken for the other in prescriptions.

THE DANGERS OF BENZINE.—Our lady readers should be informed that the liquid called benzine, which they use so freely for removing grease and stains from clothing, is a very dangerous article. It is one of the substances distilled from petroleum, and is highly volatile, inflammable, and, when the vapor is mixed with air, explosive. We have frequently been much alarmed, upon visiting neighbors and friends in the evening, to observe a phial of this fluid standing in close proximity with a lamp, or gas flame, and the odor pervading the room. A very small quantity is capable of doing irreparable mischief. The contents of a four-ounce phial, if overturned and vaporized, would render the air of a moderate-sized room explosive; or, if ignited, a whole family might be seriously burned, or lose their lives from it. It should never be used in the vicinity of flame; and it is important to remember, that through the medium of the escaping vapor, when the phial is uncorked, flame will leap to it through a space of several feet. Benzine is often sold under various fanciful names; and therefore any article procured from druggists for removing oil or grease from fabrics, should be handled with the utmost care.

☞ A terrible accident from *benzine* occurred in this city a few weeks since. Two women, at 106 Boylston Street, Miss Caroline Ware and Miss Eunice Weltz, were employed in cleaning furniture, using benzine for the purpose. An explosion occurred by the ignition of the vapor from a gas jet, which so burned the women as to cause their deaths.

UNSUSPECTED INCENDIARIES.—There is often harbored in dwellings, workshops, stores, etc., incendiaries not possessed of human hands, but which are fully as dangerous as the worst class of those who have them. These incendiaries exist in the form of rags, waste, or sawdust, saturated with oil; ashes in wooden receptacles, charcoal, and matches. It should be distinctly understood by every housekeeper, and all others employed in buildings, that oily rags, and substances of like nature, such as are used for cleaning lamps, are liable to become ignited spontaneously. Two buildings in this city have been set on fire through this agency during the past month. Fresh charcoal is also capable of absorbing so much oxygen from the air, as to spontaneously ignite. Three or four fires in buildings have come under our observation originating from this source. Charcoal should be stored, if possible, in brick, or other fireproof bins. Those housekeepers so careless as to store ashes in barrels, or boxes, almost deserve to meet with the calamity of fire. Wood ashes are far more dangerous than those from mineral coal. A large number of the disastrous fires which occur, could be prevented by the exercise of proper caution in the disposal of combustible substances in buildings.

IS PHTHISIS CONTAGIOUS?

The question whether consumption is a contagious disease is one of much importance. Some observing and careful medical men have very decided opinions that it is contagious. Dr. William Budd, a well-known English physician, in an article published in the *Lancet*, remarks as follows:—

"The following are the principal conclusions to which I have been led regarding phthisis and tubercle: 1. That tubercle is a true zymotic disease of specific nature, in the same sense as typhoid fever, scarlet fever, typhus, syphilis, etc., etc., are. 2. That, like these diseases, tubercle never originates spontaneously, but is perpetuated solely by the law of continuous succession. 3. That the tuberculous matter itself is (or includes) the specific morbific matter of the disease, and constitutes the material by which phthisis is propagated from one person to another, and disseminated through society. 4. That the deposits of this matter are, therefore, of the nature of an eruption, and bear the same relation to the disease, phthisis, as the 'yellow matter' of typhoid fever, for instance, bears to typhoid fever. 5. That, by the destruction of this matter on its issue from the body, by means of proper chemicals, or otherwise, seconded by good sanitary conditions, there is reason to hope that we may, eventually and possibly, at no very distant time, rid ourselves entirely of this fatal scourge."

If consumption is communicable from one person to another, if it is disease of a zymotic character, its spread can certainly be arrested, and its fatality controlled. Earnest investigation in this direction will probably throw much light upon a subject of momentous interest to the human race.

ADULTERATION OF LARD.—The adulteration of lard in this country has reached an extent hardly suspected by dealers and consumers. The adulterating materials are water, terra alba, paraffine, etc.; and there are large establishments in some of the cities where this fraud is carried on. We have recently examined specimens in the hands of dealers, which was adulterated to the extent of 30 per cent. Large quantities of the Western lard offered for sale in the market, holds from 10 to 20 per cent of water. The purchase of lard mixed with water subjects the purchaser to great loss; and the fraud demands the immediate attention of those who consume the article.

EDITORIAL SUMMARY.

☞ Russia has about seven hundred and fifty gold mines, which give employment to sixty thousand men, women, and children, and yield twenty-four tons of the precious metals, annually.

Cryolite, the mineral found in Greenland, and from which soda alkali is manufactured extensively in this country, bids fair to become of great industrial value. Nineteen thousand tons were shipped from the company's wharf in 1866. England, however, as yet, leads in the soda manufacture, having during the past year converted the enormous amount of 280,000 tons of salt into alkali.

The important process of washing is carried on in nature upon a large scale, as well as in families. Rain water, in its descent, first washes the air, then vegetation, then the ground, and the impure water passes into the great ocean basins in huge volumes.

Plants which live in the ground, and seem to know the proper constituents for their well-being, are the best chemists, as far as regards the choice of their elements.

Dyspepsia is a disease which should be studied from a chemical point of view, as the function of digestion is intimately dependent upon strictly chemical changes.

Gas consumers should remember that when the gas is poor and thin, the volume passing the metre is increased, so that a larger sum is paid for an imperfect article than for that which is rich, or of standard quality.

Coal ashes, from stoves where considerable wood is used for kindling, is worth saving for fertilizing purposes.

The English nation express alarm not only at the prospective exhaustion of their coal deposits, but at the exhaustion of guano at the Cinchas Islands. It is apparent that the time is not far distant when the last cargo of the precious bird excrement will leave those islands, and then, alas! for British husbandry. There is comfort in the fact, however, that guano has been found in Patagonia, California, the islands of Baker and Jervis, the Coral Islands, and Bolivia. The quality is not equal to that brought from the Cinchas.

The immense deposits of silver in Nevada were discovered by accident. A man named Talcott was hauling wood from the hillside, and struck upon a vein of metalliferous quartz. The mineral proved to be argentiferous, and formed part of what is now known as the Comstock Ledge. This was in 1862. *One hundred millions* in silver have since been taken from the silver rock exposed by the wheels of Talcott's wood-wagon.

Citrate of Iron and Manganese. — We have succeeded in preparing a double salt of iron and manganese in the form of citrate. It is in beautiful scales of a rich ruby-red color, resembling the citrate of iron. Each one hundred grains contains seventy-five of citrate of iron, and twenty-five of citrate of manganese. A dose of eight grains of the salt would afford six of iron, and two of manganese. It is perfectly and readily soluble in cold water or sirup, forming a rich, clear, red solution, of a pleasant chalybeate taste.

The therapeutical influence of manganese in association with iron, is of a marked character, and we think this elegant form of presenting the remedy will meet with the approval of physicians.

☞ Pure vaccine matter from kine may be obtained of Dr. Cutter, 13 Pemberton Square, this city.

Medicine and Pharmacy.

BROMIDE OF AMMONIUM.

Editor of the Boston Journal of Chemistry: —

In your November number of the *Journal*, I find an article on the Bromides of Ammonia and Potassium, asking for the experience of any who may have used these medicines. I have used them both, and like the ammonia much the best, for the reason it is a stimulant; while that of potassium is a sedative; and in most cases of nervous wakefulness, there is great debility attending it, requiring stimulants and tonics instead of sedatives. Both will, in most cases, cause sleep; but with potassium the sleep will be followed with great prostration and languor; while with ammonia they are strengthened and refreshed.

The following case will illustrate: —

Mrs. W., aged 45, of a nervous lymphatic temperament, after the death of a very promising son of 14 years, sank into a condition of nervous prostration; no sleep, no desire for food; was able to sit up, or lay on the lounge; said she was not sick, but could not eat, or sleep; had no pain. After trying opium, morphine, valerian, hyoscyamus, etc., without any beneficial results, I gave bromide of ammonia in 16-grain doses on going to bed, which made her sleep, feeling the next morning very much refreshed. This was continued several days with the same beneficial result. After she had taken it some days, at the suggestion of a neighboring physician, I gave her the bromide of potassium as follows: —

℞ Bromide of potassium . . . . ℥ i.
Aquæ . . . . ℥ iv.

Dose: Tablespoonful three times a day. This took away all her life and ambition; attended with general languor, and great feeling of prostration, which, I fear, had it been continued, might have proved fatal. I changed back to the ammonia with good results; and had the satisfaction of seeing my patient, in a few days, able to take a journey to the sea-shore.

In a case of delirium tremens in a woman, where she had not slept in several nights, after trying opium with no sleep, I gave the ammonia, which made her sleep, waking refreshed, and soon recovered.

In a severe case of typhoid fever, which, after running 14 days, took a favorable turn, and four weeks after the first attack, she being able to sit up, sitting in a room without a fire, took cold, and had a heavy chill, which brought on a relapse which was much worse than the first attack, attended with great delirium, flightiness, no sleep, and, in fact, raving like a maniac; the pulses some of the time running as high as 160 per minute, and some of the time so feeble we could scarcely count them. I gave her opium, quinine, and brandy, in hopes to quiet and make her sleep; but she got no sleep. The raving grew worse, and it seemed she must soon sink from exhaustion. I then tried the bromide ammonia as follows: —

℞ Bromide of ammonia . . . . ℥ ss.
Aquæ . . . . ℥ iv.

Dose: Tablespoonful every two hours till she sleeps. After taking four doses, she went to sleep, and slept about four hours; was waked during the time, and took a little beef tea; then went to sleep again. After this, I gave her a teaspoonful every four hours, which kept her quiet, and she slept most of the time for two days, waking rational, and taking some nourishment; and from that time commenced to convalesce. In several other cases in which I have used this remedy, have had a good result.

A neighboring physician of mine, of very corpulent proportions — weighing about 300 pounds — was troubled with turns of dizziness, when he would almost fall, and would have to seek some place to lie down when they came on. After taking some alterative and aperients, he took the bromide of potassium. In describing his feelings to me when taking it, he said he had no ambition for anything; did not care for anybody or anything; was perfectly listless and careless of all things around him; or, as the school-boy expression is, "Don't care whether school keeps or not." With this effect from the potassium, while that from the ammonia was so refreshing and stimulating, I have been led to give my preference to the latter.

If you consider these views worth publishing, you are at liberty to do so. Yours truly,

R. H. Sabin, M. D., West Troy, N. Y.

BABIES' FOOD.

There is an unusual interest manifested among physicians and chemists in regard to the best substitutes for mothers' milk in the rearing of infants. Professor Liebig perhaps more than any other, has contributed to awaken this interest. The London *Medical Times and Gazette* published recently an interesting article, from which we make some extracts.

Of milk, we have that of the ass, goat, and cow. Asses' milk is by general consent the best substitute for the woman's for most delicate children; and, dear as it is, it is well worth the money. The goat's is a rich milk with a strong curd, and only adapted for robust children. The milk of the cow is, of course, the staple. And whilst for general purposes it is quite right that milk should be brought from any distant part of the country, it must be confessed that a few cows should be kept in town in hot weather, that their milk may reach the baby part of the population fresh, unshaken, and just as yielded by the animal. But cows' milk is too rich in curd for the human baby, whose muscular movements are almost confined to breathing, crying, and the heart's action. So it must be thinned, and the simplest way is the common one of adding an equal part of water (the water being gradually diminished as the child grows older) and a small quantity of white sugar. It is a refinement to use the sugar of milk, instead of common cane sugar, but whether there is anything gained we never could satisfy ourselves.

The test of any kind of baby's food is found in the fact that the child thrives, that it is satisfied after its meals, not subject to fits of pain in the stomach and flatulence, nor yet to fits of colic in the bowels, and that the residuum, which is generally produced upon a napkin for inspection, does not show undigested food. All these things are self-evident. A child ought regularly to grow, to be plump, and to gain in weight every week; and if it do not, something is wrong. Secondly: the child ought to be satisfied and go to sleep after its food; but here the young practitioner ought to be aware of one physiological fact — when a child is in pain in the abdominal organs, it often displays insatiable hunger, has a tendency to suck greedily, and this though the stomach and bowels may be loaded with undigested food. Ignorant nurses kill many a child by inattention to this point. The child cries after food; therefore they say the food is not good enough, "the milk does not satisfy," etc., and forthwith they give the child some half-solid pap, and dose the mother with over-rich food and alcohol. A purgative dose of oil is the best remedy when a baby is unreasonably hungry after food; castor oil is generally used, but any oil or soft fat will answer the purpose. The old custom of giving a bit of the fat of pig is founded on reason and experience. Lastly: the practical fact remains, that no undigested food ought to be found in a baby's napkin. Any mother may be taught that lumps of curd and masses of undigested starch can give the child no nourishment, but decompose in the bowels, and cause first pain, next diarrhœa. A healthy baby's napkin should not be offensive — of course, it has a faint peculiar odor, but certainly it does not stink, and if it do, either improper food has been given, or proper food has not been digested.

In other cases, in order to diminish the proportion of curd, it is useful to give *cream* diluted with new milk and water; and, to prevent the curd of cows' milk from coalescing into hard lumps in the stomach and passing undigested, the milk may not only be diluted with water, but with effervescing soda-water (this is called artificial asses' milk) or potass-water, or lime-water. Sometimes a very little of the solution of magnesia is added.

But this purpose (*i. e.*, the making the curd softer and more digestible) is generally effected by mixing it with cereal food or the starches. Theoretically speaking, we do not want the nitrogeneous elements of the cereals, because the cow's milk contains enough of them. Hence, arrowroot or sago may suffice, if it be understood that the child is to live upon the milk, and that these starchy elements are superadded to modify the milk, and not to be substitutes for it. Still, general experience is in favor of some cereal. Barley-water made from pearl barley, and mixed with an equal part of milk, is an admirable food for most children. Robinson's patent barley deserves praise. Oatmeal gruel and milk agrees well with the robust. Brown and Polson's preparation of maize, and the maizena, seem favorite preparations. On the

whole, however, wheat tends to displace the other cereals. The flour of wheat is often baked or boiled, and when so cooked is boiled afresh with water and milk. Or it is made into biscuits, of which Robb's, Lemann's, the Norwich knobs, "tops and bottoms," and rusks, are popular samples; or into a farinaceous food — that is, a powder composed of wheat flour or biscuit, with or without admixture of other cereals, and already acted on by heat, so as to require little or no cooking (Hard's, Neave's, etc.).

This is the place to notice "Liebig's soup," a compound of milk, wheaten flour, and malt, with a small quantity of bicarbonate of potass. The object of the malt is to convert the starch of the wheat into sugar, and so to save the stomach the trouble of that process; whilst the cow's milk is enriched with the phosphates of the wheat and the added alkali. The thanks of society at large are due to Liebig, not only for the care and patience with which he has worked this idea out, and the liberality with which he published it, but likewise for the impetus which it has given to the study of the whole subject of infant food in connection with mortality.

The original recipe prescribes ½ ounce of wheaten flour, ½ ounce of ground malt, and 7¼ grains of bicarbonate of potash, to be well mixed with 1 ounce of water; then 5 ounces of cows' milk are added, the whole is heated gently till it thickens; then it is removed from the fire, stirred till the starch is converted into sugar, as indicated by the liquid becoming thin, again boiled and stirred for some minutes, and lastly strained. For use, this requires to be much diluted for young babies, less for older ones.

* * * * * *

As for results. We believe that of any six infants one would refuse to swallow it; one would take it without benefit; but that the remaining two thirds would take it greedily and thrive on it. We have known it put a stop to so many of the miseries arising from undigested or indigestible food, that it has, we think, already earned for itself a permanent place. What form of it will ultimately be the favorite is another question.

The objections to Liebig's food in its common form are, first, the time, trouble and nicety — it cannot be prepared in less than twenty minutes, and not every nursemaid or mother has the intelligence necessary. Secondly, there is the considerable amount of indigestible husk, often very difficult to separate by straining, and consisting of spicula that look very formidable to any tender mucous membrane. Thirdly, as a theoretical objection, we mention its too saccharine nature and the absence of fat.

The first objection has been met by Savory and Moore, who have put together and prepared the ingredients in such a way that they only need the addition of water and milk, and no straining nor boiling Mr. Mellin's preparation, if it can be got, of course avoids all trouble of cooking; and we may say that the malt he uses is most scrupulously cleansed from husk. There is also to be procured at Mr. Van Abbot's a preparation called "Liebig's Food for Infants, concentrated," the invention of Mr. Ed. Lœflund, chemist, of Stuttgart; it is a thick sirup, containing a concentrated solution of the wheat and malt elements. It has, when mixed with milk in due proportion, a sweet, somewhat empyreumatic, bitter taste, and this is the general character of the food, however prepared; but there is a distinct acid treacly re-action in Mr. Lœflund's sirup. Mr. Mellen has made an extract in the form of granular powder, soluble in cold water, very palatable, free from acidity, and much more portable than Lœflund's sirup. Lastly, we must notice the very ingenious malt biscuits made by Spiking, of Dover Street; these contain the malt and wheaten flour in the form of a biscuit; of course they are portable, and keep any time, and require no more cooking than Robb's or any other nursery biscuit. * * * * *

We have now, we trust, set forth a pretty general view of infants' food, and shall add but three or four practical hints: — 1. The advantage of adding cream from time to time, especially if the baby is constipated. Want of fat is the cardinal defect in Liebig's soup. 2. The expediency of adding a small quantity of some aromatic water to all infants' food, such as dill, anise, etc. There is a very popular food in some counties, consisting of equal parts of barley-water and milk, with one teaspoonful of good brandy to the pint. Bad for the babies' livers, some would say; but no harm is found in practice. 3. The expediency of giving delicate children small quantities of pure gravy or beef-tea sweetened, or a few grains of raw meat ground to a pulp. If these agree, a child is almost safe. 4. No one kind of food can agree with all children. It has provoked us to see children dying on a diet which did not suit them, without an effort to shift and combine various elements till the right thing could be found. 5. The importance of teaching the poor that food for babies should be *thin*, and that a thin food may be more nutritious than a thick one.

OPIUM AND ITS ALKALOIDS.

BY JAMES R. NICHOLS, M. D.

Opium must certainly be regarded as the most extraordinary of all vegetable productions. Containing, as it does, a large number of substances which have been examined, studied, and experimented with for centuries, it is indeed surprising that so little is known regarding their separate or combined physiological action. Every physician is presumed to be familiar with opium; and, in active practice, it is relied upon more than any other drug; and yet, in many important particulars, the views of medical men do not harmonize regarding its value in specific diseases.

The recent experiments of M. Bernard, as reported to the College of France, entirely controvert some generally entertained opinions regarding the physiological effects of the alkaloids of opium, and awaken a new interest in one or more which have hitherto received but little attention.

The six principles of opium, *morphine*, *narceine*, *codeine*, *narcotine*, *papaverine*, *thebaine*, contain or embrace the soporific and toxicological powers of the drug, and each exert separate and peculiar effects upon the system. The first three are soporifics, and induce sleep; the three latter have no properties of this nature, and are as distinct in their physiological influence as if belonging to another and quite distinct class of plants. Further: the sleep induced by the three first-named substances is peculiar Morphine, narceine, codeine, each produce a characteristic sleep; and this is one of the most interesting and important points brought out by the researches of M. Bernard.

Briefly stated, *morphine* may be said to produce a very profound sleep; yet there is a certain degree of sensibility in the patient while under its influence. The brain is sensitive to sudden noises; if the extremities are pinched, it is made evident that they are alive to pain; a sudden light introduced before the eyes awakens the patient. Upon awakening, there is often a peculiar haggard appearance, which may last only for a moment. The sleep, at best, is quite unlike the natural, and, although a great relief to the suffering, is far from being satisfactory to physician or patient.

The sleep produced by *codeine* is less profound. Men and animals under its influence are easily aroused. There is a certain tranquillity or calmness produced, but imperfect sleep. The effect of codeine may be said to be an exaggeration of the excitability or half conscious-sleep of morphine. The most remarkable difference between the physiological effects of the two principles is seen upon awakening. The patient awakes from morphine in a kind of fright, with the posterior extremities half paralyzed, and with considerable intellectual disturbance. From codeine, he awakes quite free from these unpleasant symptoms; his mind is comparatively clear; and, in a measure, the patient is free from heavy stupor.

The sleep produced by *narceine* partakes of the nature of that from morphine and that from codeine. M. Bernard asserts that *narceine has greater power of producing sleep than any other element of opium*. Since the publication of his paper, presented to the French Academy, the writer has experimented somewhat extensively with narceine, and the results, carefully observed, do not fully sustain the views of the distinguished author. It is important that alleged extraordinary results, in the use or trial of new agents, should be extensively examined and tested before implicit faith is reposed in them. The writer has experimented upon himself and others, under circumstances of health and disease, with narceine; and, while results do not fully sustain M. Bernard's estimate of the alkaloid, it is certain that the views hitherto entertained regarding it are erroneous. The pure alkaloid, in doses of one quarter and one half grain, produced no appreciable effect; increased to a full grain, its soporific influence was felt; and in large doses, a calm sleep induced. The sleep is so like the natural, that it is difficult to decide, upon awakening, whether, after all, it was not due to natural causes, rather than to the drug. Patients in a wakeful condition, who have slept, after having had administered, either by sub-cutaneous injection or the stomach, from one half to one and a half grains of narceine, are inclined to doubt the efficacy of the remedy. All the functions are found in a condition perfectly normal, and, consequently, the sleep is attributed to accidental rather than induced causes.

The statement, in text-books and works upon *materia medica*, that narceine is practically an inert substance, is erroneous; and also the assertion of M. Bernard, that, in equal doses, animals are made to sleep more profoundly by narceine than by the other alkaloids of opium, it is believed, will be found not strictly correct. It must be conceded that narceine, as a component of opium, plays an important part in the aggregate influence it exerts upon the system. Although present in only minute quantity, it probably modifies the action of both morphine and codeine, so far as their soporific influence extends; and also it may in some degree hold in check or mitigate the influence of the more deleterious bodies, narcotine, papaverine, thebaine.

As an isolated body, it can never (however valuable it may be) have a very wide field of usefulness, owing to the small percentage found in opium and the difficulties of its isolation. The cost of production will prevent its general employment.

The study of the different properties of the different active agents found in opium, leads to the conclusion that the combination, as elaborated by nature, has many advantages over any one separated from other of its associates.

By this, we are not to understand that morphine, or narceine, are not of great value by themselves, but that the modifying influence of each upon the other renders the drug, when purified from its useless or poisonous constituents, a compound remedy of superlative excellence in a vast number of diseases.

Leaving out of view all other therapeutical uses of opium, its power of inducing sleep, allaying nervous irritation, tranquillizing the excited brain, — these are its great and important qualities; and to best meet the numerous cases which come under the care of the physician, ought not the three great soporific agents, morphine, codeine, narceine, be retained, that they may act conjointly? The first is capable of striking a blow, perhaps, necessarily harsh, which is modified by the milder and more genial influence of codeine and narceine.

Some empirical solutions of opium have long been used by many physicians. They differ from the standard officinal preparations only in mode of manufacture, by which is removed some of the extraneous properties and interfering constituents found in the drug.

It has been supposed, by those who have carefully studied the physiological effects of opium, that, associating with the ethereal and aqueous extract, other nervines or anodynes increased its soporific or tranquillizing power. With this view, compound spirits of ether, valerian, etc., have been combined and used with alleged success in hospitals and private practice.

The unpleasant taste of both these substances, together with the fact that they affect unfavorably large numbers of nervous patients, must preclude the general use of any such combinations.

The revised edition of the U. S. Pharmacopœia fortunately contains a formula for a preparation of opium, which fully meets all the desirable ends contemplated in this communication. It is called *Tinctura Opii Deodorata;* and in its preparation an aqueous solution is first obtained which holds all the normal soporific constituents, morphine, codeine, narceine, without the resin, lignin, earthy matter, etc.; and then, with the use of ether and alcohol, most of the narcotine, papaverine, thebaine, gum, bassoren, and albumen are removed.

It is to be regretted that the name *Infusum Opii Deodaratum* was not adopted instead of that given it, inasmuch as it is effectively a watery solution, and not a *tincture*.

In order to have this most excellent preparation fulfil perfectly all those desirable ends of which it is capable, the opium used should be accurately assayed, in order that perfect uniformity be maintained in the preparation. Opium, as found in the market, differs so largely in the amount of morphine salts contained, that no preparation can be reliable which is not made from that of ascertained strength. The great danger arising from the use of

ether, and the want of suitable apparatus and experience, causes this officinal, in its manufacture, to rest under the disadvantage of not being adapted to the shop of the ordinary apothecary. It should only be made by those having competent knowledge and suitable laboratory appliances to render it accurate and reliable.

The ordinary sedative dose of this is twenty-five drops, equal to about one sixth of a grain of the opium alkaloids.

If much pain or irritation is to be combated, ten, fifteen, or twenty-five drops more may be required. A pleasant tranquillity and calmness is usually produced by the minimum dose; but in some cases, to complete the effect and produce quiet sleep, a repetition of the dose is required.

The advantages of this preparation are, that the cerebral disturbance, constipation, and other unpleasant consequences resulting from the use of opium, in the usual forms, are entirely, or in a great measure, avoided.

This form of the drug may be resorted to to produce soporific and anodyne effects, when others could not be administered with safety; and, therefore, it is calculated to meet a want long felt by every physician in active practice.

Moisture and Mortality. — Rain, on the whole, would seem to exert a kindly and healthy influence. There is nothing very deadly in it. It may occasion catarrhs and rheumatic complaints, but these are curable with a little management and medicine. And we are apt to put to its credit the washing away of many of the most injurious causes of disease by a good flushing of the sewers. Summer diarrhœa, cholera, and typhoid fever, would be likely to be greatly lessened by a copious rain fall. So says the London *Lancet;* and an examination of a metereological and mortality chart for last year shows that in this city the deaths from all diseases were fewest in numbers during times when the number of inches of rain was the greatest. Dr. Trench, the medical officer of health for Liverpool, has satisfied himself by a series of careful observations, extending over a number of years, that there is an inverse ratio between the amount of rain and the amount of mortality from infantile summer diarrhœa. To the same effect are the tables given by Mr. McPherson, illustrating the relations of moisture to the mortality of cholera in Calcutta. According to these tables, the least mortality from cholera in Calcutta occurs in the months of July, August, and September, which are emphatically the wet months.

At the regular annual meeting of the St. Louis College of Pharmacy, held Oct. 14, 1867, the following persons were elected officers for the ensuing year: — F. Semewald, President; Theodore Kall, 1st Vice-President; M. W. Alexander, 2d Vice-President; E. P. Walsh, Recording Secretary; Nahest Perrium, Corresponding Secretary; Charles L. Lips, M. D., Treasurer.

Gleanings

FROM FOREIGN AND DOMESTIC JOURNALS.

Non-Contagion of Cholera. — Dr. Shrimpton, of London, has offered himself to the International Medical Congress as a subject for any experiments to prove the non-contagion of cholera. He volunteers to sleep with a patient in the algid stage, to inspire the breath of the patient, and to inoculate himself with any of the excretions of the patient. Hares and mice inoculated with the excreta of cholera patients, are said to have died with the disease; and Dr. Shrimpton must have strong faith in his theory, to submit himself to such proofs.

REVULSIVE AND SOOTHING LINIMENT. — LABORDE.

Essence of turpentine, or gin . . . . ʒ viii.
Chloroform and laudanum, each . . . ʒ ii.

Mix and shake.

An excellent application in neuralgic and localized muscular pains; in "stitches in the side;" sciatica, lumbago, etc. Rub the painful spot three or four times a day with a flannel soaked in the liniment. Sometimes it may be neceesary to leave the flannel on the seat of pain; or, in some cases, to replace it by a flaxseed meal poultice. — *L'Union Medicale.*

Intermarriages. — The discussion of a pamphlet upon the results of intermarriages, at the Société de Medecine, of Paris, elicited some remarks from M. Peter, interesting and valuable as containing the opinion of Trousseau. If a robust and handsome young man marry his own cousin, equally healthy, young, and handsome, their children will have the best of chances for inheriting the characteristics of their parents. If, however, an uncle marry his niece, although there are no hereditary defects in the family, disproportion of the ages is injurious to the off-spring. But if a feeble and delicate young man marry a cousin equally feeble and delicate, it is evident that the prospects of the offspring are poor indeed. Thus, if consanguineous marriages are injurious, it is because the hereditary imperfections, like factors, when multiplied into themselves, produce their squares. There is a family of Jews at Amsterdam who have intermarried for centuries, yet their physique is superb. Statistics bearing upon this question are valueless, as they can give no idea of the hereditary antecedents or physical condition of the parties.

Earth, instead of Water Closets. — The comparative merits of different kinds of water-closets are being discussed in England, and many sanitarians express a strong preference for the earth-closet. These have been in use six months on Baron Rothschild's estate, at Halton, and have served 800 people. Cesspools of brick, to be cleared out once in three months, or at longer intervals, have been adopted. Mr. Moules' self-acting closets are used; and by these a pound and a half of dried earth is thrown in at the moment a person rises from the seat. The soil, when removed, is taken to the earth-shed and redried, to be again passed through the closet; it is said, that this operation may be repeated six or eight times, with cumulative power of fertilization and obvious economy of earth and transport. A small kiln is necessary for winter drying. It is said, that no part of the operation is disagreeable; and that the villagers are grateful for such an addition to their health and comfort.

The discovery of the law of gravitation is now claimed for Pascal, who died in 1662; whereas, Sir Isaac Newton's discovery dates from 1665. The authenticity of the letters proving this is to be determined by chemical tests, etc.

Sore Nipples. — Dr. Blacqiueres says, in the *Journal des Connaissances Medicales,* that three or four applications of the following compound cure this complaint: Cocoa butter, 150 grains; extract of rhatany, 10 grains.

Itch in Delicate Skins. — Hebra, of Vienna, uses the following application: Petroleum and spirit, each ʒ i; balsam of Peru, ʒ i; oil of rosemary and lavender, each ♏xv.

Formulae

USEFUL IN MEDICINE AND THE ARTS.

Editor Journal of Chemistry. — Since the medical profession is invited to contribute favorite formulæ for your valuable little paper, I subjoin the following as my first contribution. I am in the habit of using these combinations in my practice with excellent results where they are indicated: —

OINTMENT FOR ITCHING AND SCALY CUTANEOUS ERUPTIONS.

℞ Catechu . . . . ʒ ii.
Sulphate copper . . . . ʒ ii.
Alum . . . . ʒ iv. ss.
Resin . . . . ʒ ii.

Reduce to a very fine powder, and mix with olive oil to the consistence of a thin paste. It is singularly efficacious in allaying the itching and healing the eruption.

FOR SPASMODIC ASTHMA.

℞ Diluted hydrocyanic acid . . . . ʒ ss.
Tinct. lobelia . . . . ʒ iii.
Syrup Scillæ comp. . . . . ʒ ss.
Spts. lavender comp. . . . . ʒ iii.
Syrup simp. . . . . ʒ i.

M. One teaspoonful to be taken as the attack is comcoming on, and repeated within an hour if not fully relieved.

DIAPHORETIC AND SEDATIVE IN FEVERS.

℞ Spts. nitre dulc. . . . . ℥ ss.
Spts. mindereri . . . . ℥ i. ss.
Fluid ext. gelseminum . . . . ʒ i.

M. Give a teaspoonful every two hours. In pleurisy, from twenty to thirty minims of Tinct. of Aconite root may be substituted for the gelseminum with advantage, carefully watching its effects.

FOR DYSENTERY.

℞ Opii pulv., Gum camphor, Rhei, carb.,
Ammonia, aa . . . . grs. xii.
Creta prep. . . . . grs. xxiv.

Mix and divide into twelve powders. One to be given every three or four hours. Ira D. Brown, M. D.
Weedsport, N. Y., Nov. 7, 1867.

Sand Soap. — This soap is of a grayish color, heavy, flinty, rough to the touch, feeling like sandstone when the hand is passed over it, and, when rubbed between the fingers, abandons its sandy constituents, the granules becoming apparent to the sight. It is made by melting any of the white soaps, and, while in paste, thoroughly incorporating therewith seven or eight per cent of finely sifted white sand. As soon as it is quite cold, it is taken from the frame and cut into tablets, or moulded into balls. Porcelain clay, sulphate of baryta, pounded pumice stone, etc., may be substituted for the sand.

To Cider Drinkers. — After your cider has become "hard," or sour in the spring, or summer, you may convert it into a delicious beverage by adding two pounds of strained honey per gallon; after it is dissolved, let it stand in a moderately warm place until minute bubbles rise around the sides of the vessel, when it should be tightly bottled, and left in a cool cellar for several weeks. It is then more delicate to the palate and more wholesome to the stomach, than much of the falsely-called champagne of the American market.

The Air Treatment. — M. Boisson has introduced a method of treating superficial wounds by a jet of air from the common bellows, immediately forming a dried film over the exposed flesh, beneath which healing is greatly facilitated and other obvious advantages secured. Burns which have removed the skin may be treated advantageously in this way.

Grease Stains in Silk. — A sure and safe way to remove grease stains from silks is to rub the spot quickly with brown paper; the friction will soon draw out the grease; or, lay the silk upon a table with an ironing-blanket under it, the right side of the silk downwards; put a piece of brown paper on the top, and apply a flat-iron just hot enough to scorch the paper. We have found this receipt more efficacious than any scouring-drops ever compounded.

Charcoal has been tried in fattening fowls, with marked advantage; the difference in weight produced amounting to fifteen or twenty per cent, besides a decided advantage in tenderness and flavor. The charcoal was pulverized and mixed with the food, about a gill daily to one turkey, and also left free on the ground.

If one four-hundredth part of iodine is added to sulphur heated to about 180 deg. cent. (365 deg. Fah.), and the mixture poured on a slab of porcelain, there results a material which retains for some time a remarkable elasticity. It possesses a metallic lustre and takes impressions with great fidelity.

Effects of Alcohol. — Experiments made by Drs. Ringer and Rickards on men and animals, go to show that the temperature of the body falls nearly as fast after the use of alcohol in doses sufficient to produce intoxication, as after death itself. The facility with which drunkards freeze to death, is explained by this fact. Dr. Jolly declares, that an increasing tendency towards mental disease has been generated by the increasing consumption of spirits. Official reports show, that the abuse of alcohol accounts for one fifth of the insanity in France.

Blacking for Leather. — A good blacking for leather, which is much less injurious than that which is made with sulphuric acid, may be prepared as follows:

Take of bone black, or animal charcoal, one oz.; coarse brown sugar, ¾ oz.; olive oil, one teaspoonful; sour ale, one gill. Warm them gently together, stirring constantly during the time. This gives an excellent and fine polish, and is very cheap.

FOR EPILEPTIC FITS.

℞ Potass bromide . . . . ʒvi.
Bromide ammonium . . . . ℈ii.
Bi-Carb. potass. . . . . grs. xv.
Tinct. columbæ . . . . ʒiss.
Aquæ fontin . . . . ʒiii.

M. Dose: One teaspoonful in three teaspoonfuls of water, to be taken during meals.

Advertisements.

SPECIAL INSTRUCTION

IN

MEDICAL SCIENCE.

IN compliance with the desire of the profession, as indicated by the resolutions of the Convention of Teachers at Cincinnati in May last, unanimously indorsed by the American Medical Association at its subsequent meeting, that the Standard of Medical Education in this country should be raised and its limits extended, the undersigned have associated themselves together for the purpose of giving instruction in their respective departments to advanced students and to physicians who may be desirous of fitting themselves for special practice.

It is thought that this action will be appreciated by those intending to visit Europe, who can do so to better advantage after mastering the details of a special department, as well as by those who are unable to go abroad, and are yet anxious to avail themselves of every opportunity of reaching the same plane with their more fortunate neighbors. There seems little reason why much the same instruction cannot be afforded at home that is now sought in Europe, and sought to so little purpose by those unacquainted with foreign languages.

It is thought, also, that there are many general practitioners who will be glad to refresh their memories after years of engrossing labor.

The courses will be delivered during the winter term of the Medical College, at such hours as will not interfere with the collegiate curriculum.

At the summer session it is intended, with the assistance of additional instructors, to cover the whole range of legitimate specialties.

Fee for each course, $25. The classes will be limited, and certificates of attendance will be issued at the close of the term.

HENRY G. CLARK, M. D. (Bowdoin College), Surgeon to the Massachusetts General Hospital. Lecturer on Public Hygiene and Medical Jurisprudence.

HORATIO R. STORER, M. D. (Harvard University), Pupil of Simpson, of Edinburgh, and Professor in Berkshire Medical College. Lecturer on the Diseases of Women.

Prof. STORER'S course, the present winter, will be upon Uterine Diagnosis; and will be exclusive of that upon the Surgical Diseases of Women, to be delivered in December.

GUSTAVUS HAY, M. D. (Harvard University), Pupil of Arlt, of Vienna, and Surgeon to the Eye and Ear Infirmary. Lecturer on Operative Ophthalmology.

B. JOY JEFFRIES, M. D. (Harvard University), Pupil of Hebra, of Vienna; Lecturer in Berkshire Medical College, Surgeon to the Eye and Ear Infirmary, and Physician to the Boston Dispensary. Lecturer on the Diseases of the Skin.

JOSIAH H. STICKNEY, M. D., F. R. C. V. S. (Harvard University), Pupil of Varnell, of London. Lecturer on Veterinary Medicine and Surgery.

THOMAS B. HITCHCOCK, M. D. (Harvard University), Lecturer on Diseases of the Teeth.

FRANCIS C. ROPES, M. D., F. R. C. S. E. (Harvard University), Pupil of Langenbeck, of Berlin; Physician to the Boston Dispensary, and Surgeon to Out Patients at the City Hospital. Lecturer on Surgical Deformities.

SAMUEL W. LANGMAID, M. D. (Harvard University), Pupil of Mackenzie, of London, and Physician to the Boston Dispensary. Lecturer on Diseases of the Throat.

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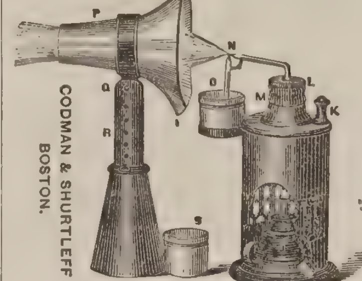

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EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, JANUARY 1, 1868. NO. VII.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

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Contents.

Familiar Chemistry.

HOUSEHOLD WARMTH.

In the cold latitudes of the Northern, Western, and Middle States, artificial warmth in dwellings is required at least during six months in the year; and, therefore, but few topics brought forward for consideration are regarded with more intense interest than those which relate to forms of fuel, or methods and devices for securing household warmth.

It is not our intention, in this discussion, to remark upon different kinds of fuel with reference to their economic values; but rather to make some observations upon the modes or appliances for making heat available, and their management. The question of the best method of warming dwellings, having in view health, comfort, and economy, must be regarded as still an unsettled one. Every year, the attention of housekeepers is called to new forms of stoves and furnaces, recommended by inventors and venders as remarkable for economy in consumption of fuel, or as possessed of points of excellence not found in others. The rapidity or readiness with which housekeepers exchange or throw aside stoves in this country is amusing, and leads almost to the conclusion that there is an extended popular delusion regarding the properties or nature of fuel, and the limits of man's inventive faculty. If there are those who expect a stove to be invented that will cook dinners or warm rooms without making palpable inroads upon the contents of the coal-bin, or the wood-pile, they are certainly to meet with disappointment.

A pound of coal, or a billet of wood, is capable of doing a specific amount of work, when carried through the process of combustion; and, while it is true, there is a difference in the heat-saving qualities of stoves, it is also true, the difference is much less than is generally supposed. It is not a matter of economy for housekeepers to throw aside a cooking or parlor stove that performs its work in a fair or reasonable way, and purchase, at large expenditure, a new-fashioned apparatus, recommended to save "two thirds" of the fuel. An examination of some of these complicated modern devices recalls the story of Mrs. Chauncy's new cooking stove, which required a full half-cord of wood to warm all its intricate, winding flues and cavities, and the old lady declared she never could get it hot enough to bake her Sunday morning pot of beans.

An important point to be regarded in the construction of all stoves, is that of *draught;* and, so long as the products of combustion must pass into flues, there will be a very considerable loss of heat in the outside atmosphere. Much may be done to save fuel by a proper regulation of dampers, and also by the use of moist ashes placed upon a bed of well ignited coals; but, usually, little attention is given to these points.

We hear much said regarding *kinds* of heat radiated from stoves and furnaces, as though there were more than one kind of heat. For example, the heat proceeding from steam pipes is supposed to be unlike that from air furnaces; also, the heat liberated by a soapstone stove is very generally regarded as "different" from that thrown off from iron plates. Heat is a sensation,—an influence, set in motion by chemical changes taking place in bodies. It is not possessed of "kind" or "quality." It differs in degree, or *intensity;* and in this, all "difference" in heat consists. Heat radiated from soapstone, or burnt clay, or any other imperfect conducting substance, is evolved slowly, and the temperature of the radiating surface is usually not above that of boiling water; and, consequently, the surrounding air is not unduly heated. Iron is a good conductor; it heats rapidly, and cools rapidly. The unpleasant or unhealthy effects of iron stoves result from the fitful nature of the warming process. The atmosphere of a room is liable to great fluctuations; the temperature is either too high or too low, and the occupants take cold in consequence. While the radiating surface of pipes heated by low pressure steam and hot water cannot rise much above 212° F., the iron surfaces of stoves often reach a temperature of 400° or 600° F. The air in immediate contact with these surfaces is heated to a corresponding point, and therefore may be of moderate temperature, and healthful, or parched and injurious.

Stoves constructed of soapstone are coming into very general use, and, with care in their management, a healthful and equable temperature can be maintained in households. It must be recollected, however, that the heat from a stove of this kind may become intense, and, therefore, from neglect or mismanagement, be as objectionable as one of metal.

So much has been said by inventors and manufacturers of different devices for warming, respecting the "burning up" of the air, that many regard certain kinds as capable of exerting chemical change upon air, depriving it of its oxygen. In treatises upon warming and ventilating,—those even which are regarded as respectable or scientific,—this vulgar idea is repeated, and the deleterious influence of deoxygenized air descanted upon. In coal-burning furnaces kept even at a red heat, the amount of oxygen that enters into combination with the iron is wholly unimportant. The evils in the use of such do not arise from "burning up the oxygen," but from the excessively heated and dry condition of the air which passes into the room. The radiating surfaces are maintained at too high temperature for health or comfort. In many instances, the heating arrangements in dwellings are disproportionate in size to the building in which they are used. It is poor economy to place a small apparatus in a large house, and, by "driving it," attempt to obtain requisite warmth. Fuel should be burned slowly, and the quantity kept in a state of ignition large enough to supply warmth at a comparatively low temperature. The volume of air entering a dwelling through the furnace

must be generous; and a thermometer placed in the heated current should never rise above 100° F.

There are some families constantly afflicted with colds, chronic catarrhs, headaches, rheumatisms, etc., during the winter months. Such are generally noted for keeping their houses "hot as ovens," and the neighbors can scarcely make a call, without a subsequent attack of illness. The human body is not a very good thermometer under the best of training; by neglect or abuse, it becomes wholly unreliable. We can, by gradually accustoming ourselves to high temperatures, live in a heat equal to that of the tropics, and be entirely unconscious of the fact. With the temperature of our rooms at 80 or 90° F., and the outside atmosphere at zero, it is a severe shock to plunge from the one into the other. The whole chemical and vital equilibrium of the system is disturbed by so sudden and severe a change, and evil results are sure to follow. One of the greatest sources of disease among the laboring classes and the indigent, is the varying temperature of the rooms in which they live. These are often small and crowded, and the stove is kept at a red heat a part of the time, and then suffered to go out altogether. How often physicians are called to attend upon cases of severe illness, when the patient is found in a room at one time oppressively hot, at another, cold as the outside atmosphere!

Why cannot more care and judgment be used among all classes, in regulating the temperature of rooms? The thermometer is an indispensable instrument in dwellings and all other places where artificial warmth is requisite. It is of but little service, however, unless often consulted, and its indications heeded.

DEGENERATION OF THE HUMAN RACE FROM RESIDING IN CROWDED CITIES.

There can be little doubt that, about the great centres of civilization, man is carrying out his sociable tendencies to such an extent as to detract considerably from the enhancement of his personal welfare, looked at in a physiological or medical point of view. He has become so fond of his neighbor, and his neighbor so fond of him, that they are almost inseparable. Their friends are in the same way of thinking, and hence all join company and form compact fraternitation. But the consequence is, that they are in too close contact, and so continuously add to their number that, at length, they scarcely allow themselves room to move. There is no fresh air for them; they are forced to breathe their own and their neighbors' exhalations over and over again. There are so many of them in so small a space that they cannot well get rid of their refuse matters, scarcely of their own excreta. If anything in the shape of an infectious disease attacks one, it spreads like wildfire, of course, amongst the others; and even moral delinquencies are found to be in the same way catching; for if a "black sheep" gets among the flock, it is well known that "evil communications corrupt good manners." If the consequences, then, of this social agglomeration be, on the one hand, increase of political power, of wealth, of commercial and social prosperity, and successful competition with other nations, they are, on the other, an overtaxing of the physical and mental energies at our disposal, and a premature consumption of national life blood. To see all this, we have but to scrutinize the character and results of that which has been called, in recent days, the "great town system." To witness it in perfection, we should observe the effects of this system on the physical condition and modes of life, particularly of the industrial poor of a great city. If we do this, it will certainly be found just as the honorary secretary of the Manchester Sanitary Association and physician to the Salford Hospital assures us is the case. There will be observed, as he states, amongst this class, a singular want of stamina manifesting itself either in the gait, bearing, voice, or frame. The muscular system is rarely fully developed or well strung. Few men are of that calibre from which we might expect either vigorous or healthy offspring, or arduous and sustained labor. Cases of deformity, along with actual distortion, are far from unfrequent; while minor physical defects, many of them denoting no trifling constitutional ailments, are deplorably common. The pulse, telling of the power of the heart, assures us the great central organ of the circulation is weak and flabby. The extremities are often cold in the younger people; the veins prominent and tortuous in the adult; and the elders complain of vertigo. Blanched lips and colorless cheeks are common to men as to women; while hysteria and neuralgia are to be met with under protean and abundant forms. In fine, the blood is proved to be impoverished, and the nervous system devoid of that well-balanced tension on which the easy and harmonious working of the whole system so mainly depends. In the children of this class, again, the teeth are no sooner developed than they begin to decay; enlarged glands protrude from the neck; the skin looks dry and parched; the hair scanty, scrubby, or withered. If we extend our inquiries, we shall find, too, that of the number of military recruits derived from the population of our great towns, nearly four out of five fail to come up to that standard of bodily fitness which the army medical referees are instructed to insist on.—*Lancet.*

Chemistry Applied to the Arts.

INDIA-RUBBER VARNISH.

That india rubber, dissolved in various liquids, yields a good varnish, is well known; but in general they are too viscid for delicate purposes, and are only good for making stuffs waterproof. India rubber liquefied by heat, dissolved in oil of coal-tar, or drying linseed oil, does not give a varnish of sufficient fluency, or free from smell. Moreover, a considerable quantity of india-rubber remains undissolved in a gelatinous state, suspended in the liquid, so that the solution is never clear. Dr. Bolley has recently published some remarks on this subject which may be useful. If india-rubber be cut into small pieces and digested in sulphuret of carbon, a jelly will be formed; this must be treated with benzine, and thus a much greater proportion of caoutchouc will be dissolved than would be done by any other method. The liquid must be strained through a woollen cloth, and the sulphuret of carbon be drawn off by evaporation in a water bath; after which the remaining liquid may be diluted at will with benzine, by which means a transparent, but still yellowish liquid, will be obtained. A more colorless solution may be prepared by digesting india-rubber cut into small pieces for many days in benzine, and frequently shaking the bottle which contains it. The jelly thus formed will partly dissolve, yielding a liquid which is thicker than benzine, and may be obtained very clear by filtration and rest. The residue may be separated by straining, and will furnish an excellent waterproof composition. As for the liquid itself, it incorporates easily with all fixed or volatile oils. It dries very fast, and does not shine, unless mixed with resinous varnishes. It is extremely flexible; may be spread in very thin layers, and remain unaltered under the influence of air and light. It may be employed to varnish geographical maps or prints, because it does not affect the whiteness of the paper; does not reflect light disagreeably, as resinous varnishes do; and is not subject to crack or come off in scales. It may be used to fix black-chalk or pencil drawings; and unsized paper, when covered with this varnish, may be written on with ink.

MODIFIED COLLODIO-CHLORIDE PROCESS.

It is often a matter of considerable value in photography to take up an old process, or an old idea, and view it in the light which the experience of years is capable of shedding around it. Much good might result to photography if all working at the art would occasionally look back on the days gone by, and seek out the good and useful of the past, for the purpose of moulding it to the requirements of the present or the prospects of the future. An old idea revived, but clad in a new dress, now and then makes its appearance, often at an opportune moment. This remark is specially illustrated by some photographs lying beside us as we write, and which, for delicacy and beauty, could scarcely be surpassed. The mode in which these were produced, we shall now briefly describe:—

A good sample of collodion is obtained—one which will yield a rather tough, but not too contractile film, answers better than any other—and to the sample a soluble chloride, such as chloride of calcium, is added, in the proportion of four grains or five to each ounce. Of course, the salt should not be added directly to the collodion, but a solution made as follows:—Chloride of calcium, 16 grains; alcohol, 1 ounce. Two fluiddrachms of this solution are added to six drachms of the collodion, and the proper strength thus insured.

A thin specimen of enamelled paper is now selected and coated with the collodion, just as an ordinary plate is covered with the film. The paper now resembles ordinary albumenized paper, and is submitted to similar treatment in the successive steps of the process. It is floated on the ordinary nitrate of silver solution, and, when dry, exposed under a negative. The printing is quickly effected, and, on removal from the frame, the proof is washed in water and toned. In the case of the prints before us, the ordinary alkaline gold toning bath was used with excellent effect. The fixation and washing are conducted in the usual way.

The process is very simple and useful for many subjects requiring the rendering of the most minute detail; as the *cartes* before us will bear close examination with a powerful magnifier, and when thus scrutinized, not only bear ample testimony to the capabilities of the process, but also to the quality of the negatives from which the proofs were obtained. There is another element of some importance in these prints, which is not to be neglected, now that we have had such good reason to discuss the probabilities of the permanence or otherwise of our prints. We refer to the fact that, as the increased delicacy in the rendering of detail is insured by keeping the sensitive material on the surface of the paper, so is the integrity of the particles of metal constituting the finished print insured by their envelopment in so indifferent a body as collodion is generally believed to be.—*British Journal of Photography.*

IMPROVED SPECTROSCOPE.

Prof. Osborn, of Lafayette College, Easton, Pa., has made improvements in the spectroscope, by which it may be readily applied to a variety of practical purposes, especially in metallurgical operations. In a recent letter to us, he says:—

"The instrument complete is so arranged that the observer reads the degree on the scale by the actual light which he is analyzing. The very light which comprises in its flame the vaporized metal, as lime, iron, chromium, titanium, sodium, etc., discloses to the observer in the spectral form its own nature not only, but often, to a great degree, the approximate quantities found in the original ore, or even in the coal used, or from the wasting brick of the furnace. Nothing can exceed the beauty of the spectral forms which suddenly appear and disappear in the otherwise darkened tube, as the observer stands at the 'tunnel head' of the furnace watching, as it were, the spectral secrets of that terrible flame which pours forth from the stack, especially when, after the 'cast' and consequent cessation of the blast, that blast is again turned on.

"The bright yellow bar of sodium is almost always present during examination of all flames resulting from the use of any and all forms of anthracite in the furnace and forge, or from decomposing soda feldspars.

"But one of the most striking facts in my examinations occurred at our last analysis of a flame from a reheating furnace on the Lehigh, at the wire works of Stuart & Co. The workmen held partly out a bar of intensely heated iron on the hearth of the furnace, when, at rapid intervals, the dark lines which are seen in the solar spectrum appeared faintly, but certainly, flitting over the spectrum of the fierce flame by which the intensely heated iron was enveloped.

"An instrument, of a circular form, is in course of construction, under my direction, for the easy examination of these flames, and which may be used at any time and at considerable distances; and I am hoping that such shall be its sensitiveness, that the furnace-master may sit in his room and know much of the efficiency and value of the operations proceeding at the furnace by its use. I am situated on a hill; and by means of my instrument, placed upon my dinner-table, I can get a beautiful spec-

trum from a reheating furnace situated not much less than a half mile from my instrument, and am able to detect the sodium in the coal, or from the decomposed fire brick; and also any lime, potash, etc., which proceeds from the furnace mouth. I have no doubt that some exceedingly important uses may be made of this discovery of the spectroscope in the line of metallurgical operations." — *Scientific American.*

PIG-IRON which contains copper cannot be puddled so as to make wrought iron. In Germany, when one puddler wishes to annoy another, he stealthily throws a small piece of copper into his furnace, and this prevents his iron from boiling and becoming purified.

The condensed air of a crowded room gives a deposit which, if allowed to remain a few days, forms a solid, thick, glutinous mass, having a strong odor of animal matter. If examined by a microscope, it is seen to undergo a remarkable change. First of all, it is converted into a vegetable growth, and this is followed by the production of multitudes of animalcula; a decisive proof that it must contain organic matter, otherwise it could not nourish organic beings.

SOAP AND CIVILIZATION. — According to Liebig, the quantity of soap consumed by a nation would be no inaccurate measure whereby to estimate its wealth and civilization. Political economists, indeed, will not give it this rank; but, whether we regard it as joke or earnest, it is not the less true that, of two countries, with an equal amount of population, we may declare, with positive certainty, that the wealthiest and most highly civilized is that which consumes the greatest weight of soap. This consumption does not subserve sensual gratification, nor depend upon fashion, but upon the feeling of the beauty, comfort, and welfare, attendant upon cleanliness; and a regard to this feeling is coincident with wealth and civilization. The rich, in the middle ages, who concealed a want of cleanliness in their clothes and persons under a profusion of costly scents and essences, were more luxurious than we are in eating and drinking, in apparel and horses. But how great is the difference between their great days and our own, when a want of cleanliness is equivalent to insupportable misery and misfortune!

A CURIOUS circumstance connected with the construction of the great wall of China is narrated by Capt. Parish, who accompanied Lord Macartney to China. It seems to show that, 2,000 years ago, the Chinese used wall guns, or some fire-arms of that kind. Speaking of embrasures in the great wall, which was built about 221 B. C., he observes: — The soles of the embrasures were pierced with small holes, similar to those used in Europe for the reception of swivels of wall pieces. The holes appear to be part of the original construction of the wall, and it seems difficult to assign to them any other purpose.

SHEEP-WASHING. — Great pains are taken in cleansing wool before shearing in Germany. In Hungary, the sheep are first soaked and rubbed in vats of very warm water with potash. After cooling, they are showered as forcibly as possible with cold water, until the wool is white, and are then kept in a clean and warm shelter until dry for shearing.

IF the current of sparks of an induction coil be passed through the luminous flame of gas or of a candle, no alteration is seen in the flame, excepting that, in the path of the sparks, the flame is intensely luminous. If, however, the flame be examined by means of the rotating mirror, it is found that the flame is always extinguished above during the passage of an individual spark. The part below the spark is constant and steady.

THE quantity of atmospheric electricity at noon is much greater in winter than in summer, the relation being about ten to one. This augmentation of electric force proceeds in a manner almost parallel with the number of days of frost or fog, and inversely as the number of days of thunder, elevation of temperature, and actinic power.

M. QUETELET says that careful observations have convinced him that a plant develops much more rapidly during a mean temperature, when this temperature varies, than when it is uniform, provided that it does not fall below freezing point. He is also of opinion that the effect produced is equal to the square of the temperature.

Chemistry Applied to Agriculture.

SALT AND ITS OFFICES.

Some modern agricultural writers have doubted the necessity of giving animals salt. The following remarks as to the effect of salt upon health, by Prof. Johnston, may be relished by those who still put salt in their own puddings, and allow their cattle a little now and then: —

The wild buffalo frequents the salt licks of Northwestern America; the wild animals in the central parts of South Africa are a sure prey to the hunter who conceals himself behind a salt spring; and our domestic cattle run peacefully to the hand that offers them a taste of this delicious luxury. From time immemorial, it has been known that, without salt, man would miserably perish; and among horrible punishments, entailing certain death, that of feeding culprits on saltless food is said to have prevailed in barbarous times. Maggots and corruption are spoken of by ancient writers as the distressing symptoms which saltless food engenders; but no ancient or unchemical modern could explain how such sufferings arose. Now we know why the animal craves salt; why it suffers discomfort; and why it ultimately falls into disease if salt is for a time withheld. Upward of half the saline matter of the blood (57 per cent.) consists of common salt; and as this is partially discharged every day through the skin and the kidneys, the necessity of continued supplies of it to the healthy body becomes sufficiently obvious. The bile also contains soda as a special and indispensable constituent; and so do all the cartilages of the body. Stint the supply of salt, therefore, and neither will the bile be able properly to assist the digestion, nor allow the cartilages to be built up again as fast as they naturally waste.

COST OF FEEDING COWS.

The cost of feeding a cow on hay through the winter must form a large item in the expense of keeping a dairy, and yet it is strange that nearly all our writers on dairying say little on this point. They give us very minute directions as to feeding the cows in the spring, after they come in, but say nothing in regard to feeding them during the winter. And yet it seems to me the latter is, if anything, the more important point. The cow needs to accumulate strength during the winter to enable her to stand the great strain on her constitution during calving, as well as through the long period of milking.

A cow will eat 3 pounds of hay a day to each 100 pounds of her live weight. If she weighs 800 pounds, she will eat 24 pounds of hay, or 168 pounds a week. If fed on hay alone from December 1st to May 1st (22 weeks) she would consume 3,696 pounds. A cow weighing 1000 pounds would eat, in the same time, 4,620 pounds, or a little over $2\frac{1}{4}$ tons. Horsfall, the best authority we have on feeding dairy cows, says it requires 20 pounds of hay a day for the maintenance of a store cow. In other words, it takes this amount merely to support the vital functions; the cow will give no milk, nor increase in weight. She will merely live. According to this, it requires a little over a ton and a half of hay to keep a cow from December to May, without getting anything in return. When cows are fed three per cent. of their live weight of good hay per day, we may reasonably expect more or less milk, or an increase in flesh or fat.

If it takes 20 pounds of hay a day to keep a cow alive, we should never forget that *all* our profit comes from the food the cow consumes over and above this amount. Mr. Horsfall had a cow that, for the sake of the experiment, he fed on hay alone. She was a rather small cow, but noted for her usefulness as a good milker. At the time of calving her third calf, November 12th, she was in rather high condition, and gave 17 quarts of milk a day. On the 1st of January, at the commencement of the experiment, she weighed 980 pounds, and was giving $15\frac{1}{2}$ quarts of milk a day. She was allowed all the hay she would eat, and consumed, on an average, 28 pounds per day. On March 5th, her yield had fallen off to $9\frac{1}{2}$ quarts per day, and the cow then weighed only 896 pounds — a loss of 84 pounds. On the average, during the experiment of nine weeks, she gave $12\frac{1}{2}$ quarts per day. — *Agriculturist.*

THE quantity of carbonic acid gas locked up in every cubic yard of limestone, has been estimated at 10,000 cubic feet.

LEAVES OF PLANTS. — Autumn leaves by millions rot in heaps unheeded, and yet each one a microscopic wonder of contrivance. And this snow wreath that half envelopes them, made up of myriads of crystals, melting while I look at them — what an utter waste it seems! Wisdom and beauty thrown wholesale into a pit of corruption! Until the day of the resurrection, we shall never comprehend this melancholy mystery. Then shall atoms all be portioned out, and every organized particle of the earth's crust be found to be a part of some soul's tabernacle. Then shall we understand how Cæsar's dust has also lived in the leaf, and his moisture effloresced in the snow, duly to be restored and produced when time and its use are no longer; but meanwhile used everywhere, and nothing lost, mislaid, wasted, or forgotten. — *Dublin University Magazine.*

NUMBER OF USEFUL PLANTS. — A German author states that the number of useful plants has risen to about 12,000, but that others will no doubt be discovered, as the researches yet made have been completed in only portions of the earth. Of these plants there are 1,350 varieties of edible fruits, berries, and seeds; 108 cereals, 37 onions; 460 vegetables and salads; 40 species of palms; 32 varieties of arrowroot, and 31 different kinds of sugars. Various drinks are obtained from 200 plants, and aromatics from 266. There are 50 substitutes for coffee, and 129 for tea. Tannin is present in 140 plants, caoutchouc in 96, gutta-percha in 7, rosin and balsamic gums in 387, wax in 10, and grease and essential oils in 330; 88 plants contain potash, soda, and iodine; 650 contain dyes, 47 soap, 260 weaving fibres; 44 fibres used in paper-making; 48 give roofing materials, and 100 are employed for hurdles and copses. In building 740 plants are used, and there are 615 known poisonous plants. One of the most gratifying developments is, that out of 278 known natural families of plants, there are but 18 species for which no use has yet been discovered.

COAL ASHES. — During a recent visit at the residence of Robert J. Swan, of Geneva, N. Y., he informed us that he had kept his current bushes entirely free of the currant worm by the use of *coal ashes.* He applies them in spring by covering the ground about each bush four or five inches deep or more, and for a distance of two feet on each side. The mechanical sharpness of the ashes prevents the soft larvæ from rising through them. Although the season of fruit had passed when we saw the bushes, they showed great thriftiness, and uninjured leaves.

The same application was used about the quince, with equal success, for excluding the borer — the ashes being in the form of small heaps about the stems. From twelve bushes, he gathered this year sixteen bushels of very fine quinces. — *Country Gent.*

COLD PITS. — Those who have no greenhouse, and yet are desirous of preserving many half-hardy plants through the winter, employ *cold pits.* Choose the dryest situation in the garden, and sink about five feet in depth. It is important that no water can be retained at the bottom. The pit may be of any length required, and about five feet wide, so as to accommodate six feet sash. The inside of the pit may be built up of boards, or, if something more durable and substantial is required, brick or stone. The body of the frame may be built up a few feet above the level of the surrounding soil, and the earth which comes from the pit be employed in banking up to the upper level of the frame. Shelving should be made for the inside so as to extend from the base of the front to nearly the top of the back, on which to place the plants in pots. In the space which will be then under the staging, hard-wooded and deciduous plants, as lemon verbena, fuchsias, etc., may be safely stored, while the more succulent kinds are shelved over head. The plants to be preserved in such a pit should be potted early, and be well established and healthy before being pitted; much of success depends upon this. The less water they can be made to live on without withering through the winter, the better they will keep. Straw mats must be employed to cover the glass when freezing time commences; and, when the thermometer is likely to fall below 20°, straw or litter should be thrown over. Board shutters are also excellent, as it keeps the snow out from the straw and litter, which sometimes makes the mats very awkward to uncover when we would like to give air.

Boston Journal of Chemistry.

BOSTON, JANUARY 1, 1868.

☞ Any one sending us the names of *three* subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For *five* subscribers, we will send the *petite microscope*. For *twenty-five*, we will send, in addition to the microscope, a copy of *Stockhart's Chemistry for Students*, the best elementary treatise yet published. For *one hundred* subscribers, we will send a complete set of chemicals, together with test tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

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☞ We are always pleased to receive communications upon new and interesting points connected with chemistry, medicine, agriculture, and the useful arts. We have not space at present for very long articles; but brief, comprehensive, instructive papers will receive a welcome. If any one has new and important scientific views or truths to make known, it will be difficult to find a medium through which they can be more *widely* diffused than through the columns of this *Journal*.

☞ Subscriptions will be received, and copies of the *Journal* furnished, in New York, by Messrs. Nichols & Hoadley, 56 Pine street.

KEROSENE-LAMP EXPLOSIONS.

The accidents reported as kerosene-lamp explosions have become fearfully frequent of late. No less than nine (several attended with fatal consequences) have fallen under our notice since the last issue of the *Journal*. This is a sad state of things; and when we remember they must all have occurred through the use of fraudulent liquids, we can but regard them as casualties which ought not to have happened, and would not, if the facts contained in our essay upon kerosene, published in the December number of the *Journal*, were known and heeded by consumers. We are determined that no one of our readers or families into which this *Journal* enters, shall suffer from these terrible explosions, if correct information and good advice will serve as safeguards.

Since our last issue, many letters from all parts of the country have come to us, the writers asking a great variety of questions regarding the safety of various burning fluids, suggesting devices to prevent accidents, etc. We regret to find so much misapprehension existing among all classes regarding the character of the illuminating liquids in common use; and further, we are surprised and sorry to learn of the extent to which dangerous naphthas and naphtha mixtures are used among our patrons. We think it fair to infer, from information given, that nearly one half the liquids used in the country are fraudulent and dangerous. A class of scoundrels are travelling about the country, — and from our correspondence we judge they are quite plentiful in the West, — selling recipes for making *cheap*, *inexplosive* burning oils. They are called "Eureka," "Carbon," or "Crystal" oils; and the recipes are peddled from door to door, or sold to grocers and druggists, and large sums realized thereby. Here are the directions for making one of these oils, taken from a *private* circular sent to us from Illinois:

"Take one pound of camphor, two and one half ounces oil of spruce, one half ounce alkanet root; dissolve, and mix all together in one gallon of *benzine*, stirring well for ten minutes; then pour it into a barrel (forty gallons) of benzine; stir till well incorporated, and it is fit for use."

For a family *right* to use this mixture, *one dollar* is charged; and consumers are informed they "need have no fear of explosions, as it is perfectly safe, and may be burned in old-fashioned lamps or in those used for kerosene." Our correspondent, sending the copy of this document, wishes to know what we "think of it, etc." First, we wish to state what "we think" of the man engaged in making and vending such liquids. He is a dangerous imposter; and wherever he appears, or any one else, selling *cheap* oils, or recipes for making them, have the parties arrested at once. A person offering for sale mixtures of naphtha or benzine inflammable at less temperature than 110° F., can be, under United States revenue law, punished by fine and imprisonment. A special act was passed by Congress March 2d, 1867, to punish just such offenders.

The mixture as described above, is essentially the same as has been sold under various names for several years. Camphor is a combustible body, and burns with a clear white light. Its solution in benzine or naphtha confers no desirable qualities; as the flame of benzine, when burned with free access of air, is white and brilliant enough without it. It neither increases or diminishes the dangerous nature of benzine. The oil of spruce is added to cover, or change, the *odor* of the liquid; the alkanet root to *color* it. Here we have a full exposure of the fraud. Is it not detestable? Any family using this or liquids of a kindred nature, are jeoparding their lives constantly. The risk is a fearful one.

We cannot reply to our kerosene correspondents individually. We are only able to do so in a general way 1. Let it be understood that there is no substance, or number of substances, known to chemists which can be added to benzine, gasolene, or naphtha, capable of rendering them safe, without destroying their combustibility or illuminating properties. 2. All illuminating oils offered for sale at less than a fair market price for standard kerosene, should be looked upon with suspicion, and before using, test them after directions given in the last number of the *Journal*. 3. Do not be deceived by the experiments of charlatans who, to prove the safe character of their oils, thrust lighted tapers or matches into lamps or into the vapor. This is wholly empirical. No oil or vapor, neither naphtha, benzine, or gasolene, are in themselves explosive; the *vapor* of these liquids *must be mixed with atmospheric air in order to explode.*

It is a somewhat difficult matter in experimenting with hydro-carbon vapors to secure right conditions for explosive action. With all the skill which experience brings, we have often repeated an experiment a dozen times before we could secure the right mixture. It is fortunate, that even with light naphtha mixtures it is so difficult to place a lamp in a condition to explode; if it were otherwise, a thousand accidents would occur where there is now but one.

Many of the "explosions" reported we have found, upon investigation, not to be accidents of that nature. The injury inflicted was caused by the inflammable nature of the liquid, which, through breakage of the lamp or spilling, had fallen upon clothing or furniture, and in an ignited condition. There is as much, perhaps more, to fear from the easily inflammable character of light oils, than from the explosion of their air-mixed vapors. They are dangerous, however, in every aspect, and should not be harbored in families for a single instant.

On Wednesday night, the 27th of November, a kerosene lamp exploded in a mail car in Jersey city, near New York, setting fire to the mail bags, of which there were about thirty, all containing newspapers. As our November issue was mailed on the 26th instant, we feared that several thousand copies of those sent to the West and Southwest were destroyed. As no complaint has reached us from our subscribers, we conclude the edition was delivered safely.

The *Scientific American*, in noticing this casualty, inquires "who will invent an inexplosive kerosene lamp?" Is a lamp of that character really needed? Kerosene proper — that is, oil of the legal standard — may be burned with perfect safety in any lamp; therefore we hardly need any new device. The liquid that caused this destruction of property was of a kind that ought not to be used in any form of lamp. There is certainly no need at present, with the low prices of safe kerosene oil, to tax the ingenuity for devices to burn unsafe liquids. Would it not be better to devote all our energies to the suppression of the manufacture and sale of the dangerous fluids?

ATOMECHANICS.

Professor Hinricks, of the Iowa State University, has recently published in German, a work entitled, *A Programme of Atomechanics, or, Chemistry as a Mechanics of the Panatoms.* We suppose most of our readers will inquire what is the meaning of all this. What is a "programme of atomechanics"? and what are "panatoms"? Well, we can reply in brief, that the work is intended to set forth some new views regarding chemical philosophy, or new theories of physical science. The general theory is, that inasmuch as astronomy is but a mechanics of the heavenly bodies; and these bodies differ only in the amount or quantity of matter they contain; so chemistry, in regard to atoms, must be considered from the same stand-point. All worlds are constituted precisely alike; that is, they are made up of the same earthy materials; but the laws by which they are governed, act only mechanically; different quantities being subjected to a different influence; *mass* being the sole cause of diverse action.

The atoms of the different chemical elements only differ in regard to *quantity*; that is, in regard to the number and relative *position* of the atoms of some *one* primary matter. Every thing is thus composed of this one primary matter, which is called *pantogen*, and the atoms of which it is constituted, *panatoms*. It is believed that the hypothesis of pantogen, explains the numerical relations of the atomic weights, that the chemical, physical, and morphological, or crystallographic properties of the elements, *may be calculated*, just as the orbit of a planet may be calculated.

Professor H. believes that one day the chemical elements will be decomposed, that they are all alike; that the difference between them is simply *quantitative.* For example, an atom of hydrogen only differs from the oxygen atom, in possessing one eighth the quantity of ponderable matter; if an atom of gold and silver were precisely alike in quantity, they would be precisely alike in nature. There is no single property of any kind of matter which is not in some degree common to all

elements. The elements are, therefore, simply quantitative modifications of *one* substance, — pantogen.

This, in brief, is as clear a view as we can give, of these new notions in chemical philosophy. Prof. H. is a highly respectable scholar and chemist; and his singular hypothesis will undoubtedly receive some attention. There is at the present time, a decided inclination among chemists, to effect a revolution in chemical theory; a revolution nearly as sweeping as that which destroyed the old phlogiston theory of the early chemists. We are ready to adopt any new views which rest upon the safe basis of demonstrable fact, or which come through a course of inductive reasoning, like that which establishes the law of gravitation. We are not ready at present, to believe in the existence of "Pantogen;" but, perhaps, we shall be, before weight of years compels us to throw aside balances and crucibles.

BROMIDE OF POTASSIUM.

A medical friend, in a neighboring city, whose opinions are worthy of the highest regard, makes the following remarks in a private note, concerning the bromide of potassium, —

"I have been intending for some time to send you a few words for the *Journal*, on the Bromide of Potassium. My experience in its use differs from yours, as expressed in the December number. I do not, however, mean to say that I can procure sleep by a few large doses. I do not believe that it possesses that power; nor do I believe in giving it in large doses; but when given in small doses, say gr. v. to x., and v. is better than x., frequently repeated, I believe it quiets the nerves and whole nervous system better, and less injuriously, than any thing else I know of. In neuralgia, nervous headache, nervous excitability, sleeplessness of old people, etc., etc., it has not once disappointed me. I must say, however, that I have never yet succeeded when I attempted to use it in place of a narcotic. When I can get a little leisure, I will write a short article, expressing my views and experience more fully in the use of the salt."

There are no new therapeutical agents more interesting than the bromides; and we shall be happy to receive and publish the experience of physicians in their use. Their employment has become general, and the consumption enormous. A few years ago the manufacture of a dozen pounds furnished stock for many months. During the past year we have been required to furnish, from our laboratory alone, more than *a ton* of the salts.

In the history of these agents, a curious illustration is afforded of a fact that seems paradoxical; viz., That increased consumption and demand lessens the price of a commodity. This is generally true of all rare or little used substances. The price of the element bromine has fallen sixty per cent. since 1865; and the salts have fallen correspondingly. Formerly, when but little bromine was demanded, there was no stimulus for its production. Germany and England supplied nearly all that was required; now our own salt-works furnish it in great abundance, and foreign chemists have lost our market. We are still dependent upon England and France for iodine. There is not, we believe, a single manufactory of this important substance in the United States.

Syrup Phosphate Iron, Quinine, and Strychnine.—This syrup, made after Dr. Aitkin's formula, does not keep well. The iron is liable to be precipitated, and a peculiar change, the nature of which we have not yet fully investigated, sometimes takes place in the syrup. It is, we think, too heavily loaded with the iron and bitter alkaloids, to be pleasant or free from change. We will refer to this again.

Inquiries and Answers.

O. L. S., *Rockford, Ill.* "What is Propolis?" It is a peculiar substance which bees obtain from buds, principally from the birch and poplar, and which they use in constructing the honeycomb. It is odoriferous, glutinous, more extensible than wax, and of an aromatic taste and smell. Dr. Hitchcock, of Illinois, has recently recommended it as a remedy in diarrhœa.

Druggist, *Auburn, N. Y.* *Cryptopia* is a new alkaloidal substance obtained from opium, by an English chemist. It can be of no practical use, and is only important as a new scientific fact.

Mrs. E. B. P., *Davenport, Iowa.* "Would it come within your province, in addition to the very interesting article on Kerosene, in the last *Journal*, to tell us why the oil so persistently finds its way on to the *outside* of glass lamps, in spite of care?"

This we suppose to be a great annoyance to tidy house keepers, and we wish we could suggest a remedy. It is caused by overflow of the oil which ascends the wick by capillary attraction. A larger amount passes up than is consumed, and a small portion trickles over on to the lamp; also, when the lamp is not in use, the oil is inclined to ascend the wick, and if the tube and cap permit, it flows over.

J. S. K. *Silliman's Journal*, published at New Haven, will meet your wants.

A Subscriber. "Will you please inform your readers how grass stains can be removed from cloth?"

A moist paste made of chloride of lime, and laid for a few hours upon the stains, will probably remove them. Chlorine possesses the solvent power of destroying vegetable colors.

T. B. Mc——, *Worcester, Mass.* "I have used sulphite of lime four years, with success, in preserving cider. Will you inform me, through the *Journal*, what the chemistry of its action is?"

The sulphite of lime is a combination of sulphurous acid and lime; while sulphuric acid and lime combine to form the sulphate of lime. Sulphurous acid is a combination of one equivalent of sulphur with two of oxygen ($S\,O^2$), and it has an intense affinity for oxygen, readily combining with one more equivalent to form sulphuric acid ($S\,O^3$). The fermentation of cider is the process of combination by the atoms of cider with oxygen; but as oxygen prefers sulphurous acid to cider, when sulphurous acid is present in the cask, the oxygen combines with it instead of with the cider, and thus the fermentation is arrested.

A. A. L., M.D., *De Ruyter, N. Y.* "What is 'Extract Blodgetti'? I desire to know where I can procure the article. It is named in a prescription which I inclose."

It really seems as if the wicked trick connected with this recipe would never be generally known to druggists, physicians, and invalids. No such article as Extract of Blodgetti is known in medicine, and the quack who advertises the formula was perfectly well aware, when he devised it, that no druggist could supply it. He did not intend they should; and the trick consists in advertising an article which would force invalids to apply to him. He pretends to furnish it, in the shape of some nostrum which is only distinguished by being cheap and worthless.

☞ We can now furnish the *citrate of iron, quinine, and strychnine*, in beautiful garnet-colored scales, soluble in water, wine, or syrup. It supplies a remedy exceedingly pleasant, permanent, and of the highest efficacy.

Medicine and Pharmacy.

(Communicated to the Boston Journal of Chemistry.)

ON THE ATTACHMENT OF SPONGE TO METALLIC BOUGIES.

BY EPHRAIM CUTTER, M. D., BOSTON, MASS.

To those who employ sponge as a vehicle for the topical application of medicinal agents to organs or parts of organs which are seated within the canals of the body, as the meatus externus of the ear, the eustachian tubes, the nasal passages, the pharynx, larynx, œsophagus, trachea; the urethra, the rectum, the vagina, the womb, fistula, sinuses, abscesses, punctuations, wounds, etc., it has long been a desideratum to attach the sponge to the metallic bougie in such a manner as that it shall be secure; and at the same time the fastening shall not weaken the bougie or increase the bulk unduly. It is also a desideratum to have the quantity of attached sponge so small as to be sufficient to carry the medicine, but not to obscure the vision when introduced within the specula of one quarter of an inch in diameter. Still another desideratum is, in reducing the quantity of attaching material to the least possible quantity.

For some time past, the writer has employed sponge in conveying medicinal agents to parts within the ear, nose, pharynx, larynx, and urethra, with satisfaction; and this sponge has been so attached to wires, as to combine the desideratum above mentioned. The material is simple, the process facile, and the result satisfactory, if the steps of the operation are closely adhered to. When sponge is attached by thread passing through a foramen in the bougie, if the bougie is very small, it is very much weakened by the perforation of its substance, and is liable to break off by use.

The principle of the process depends upon a well-known fact in the art of soldering, that the substance soldered must be heated up to the melting point of the solder, hence the bulky copper soldering-iron. Now if the solder, in a melted state, is dropped on to a metallic substance, when temperature is below the soldering point, it is chilled, and the surface sort of crystallizes suddenly, leaving no minute arms or processes to fill up the crevices of the metallic surface, and thereby having no hold. It is so with sealing wax. If it is melted and dropped on to a cool metallic surface, the portion that comes in contact is chilled quickly, crystallizes smooth, and has but little hold if any. But heat the metallic substance up to the melting point, and then put on the sealing wax, melt it, and allow it to cool gradually, and it will be very difficult to detach it. It will sooner suffer rupture of its substance. The process, then, is as follows: —

Take some sealing wax, a metallic wire or bougie, a piece of sponge, and the flame of a candle, lamp, or gas-light, — four articles.

First. Heat the end of the wire in the flame till it will melt the sealing-wax.

Second. Apply it to the sealing-wax, turning it about till it is well covered over with a film of the wax. Keep it turning until cool enough to retain some plasticity, and then,

Third. Sink it into the sponge, and hold it there until it becomes cool. The sponge will then be found to be firmly attached, and will suffer a rupture of its parenchyma before it will come off of the wire. It should then be trimmed with scissors to the desired shape, moistened with water, dried, and it is ready for use.

On communicating this process to my friend, L. Elsbury, the eminent laryngoscopist of New York city, I

found that Tobold had published an account of the same process, thus depriving me of the honor of priority of invention, and, at the same time stamping it with the approbation of his great talents and genius.

Dr. Elsbury suggests a modification in the process, which is an improvement. His first and second steps are the same as mine. He then allows the bougie to cool, rotating it so that the sealing-wax forms a button over the end of the wire. He then re-heats it carefully, so as to give it only plasticity enough to adhere to the sponge, and then plunges it into the areola of the sponge. When cool and trimmed, it is ready for employment.

It is easy to see that, by this process, a very small quantity of sponge can be attached to metallic surfaces —smaller than by any fastening of thread. It may be thus fastened to the end, sides, or surfaces, of metallic or vitrous bodies, as desired by the practitioner. I have attached sponge to whalebone in this manner.

The various practical applications of this simple process are clear to every practitioner who employs sponge It is sufficient excuse for the writer, in bringing this forward, that it has given him a deal of comfort in making topical applications, by its efficacy, facility, and simplicity.

CONTAGIOUSNESS OF PHTHISIS.

The following note, respecting the contagiousness of phthisis, is from a medical gentleman of high distinction, and awakens inquiry upon an important point: —

NEWBURYPORT, Dec. 11, 1867.

DR. NICHOLS, — *My Dear Sir:* — The perusal of a paragraph in the *Journal of Chemistry*, entitled "Is Phthisis Contagious?" has induced me to send you the following record of a patient of mine:

Mr. W——r, of robust frame, and apparently in excellent health, was married in August, 1862, to a lady known by him and others to have a cavity in her left lung, from softened tubercles. A few weeks after his marriage, he had typhoid fever, from which, however, to all appearance, he entirely recovered. Fifteen months after his marriage, his wife died. About twenty months after her decease, Mr. W—— bled from the lungs, after a slight but unusual effort at reaching upward. He never bled but this once, but gradually declined in health with the ordinary symptoms of phthisis, and passed away fifteen months after his attack of hæmoptysis, at the age of thirty-three years.

He left seven brothers and sisters, all unusually vigorous and healthy. His parents are (or were but a short time since) alive, and in perfect health, and over sixty years of age. Three of his grandparents lived to be over eighty years old; and the only one of his ancestors known to have died of consumption was the remaining grandmother. This certainly does not seem to have been a case of hereditary phthisis. Was the disease contracted from his wife?

Very respectfully and truly yours,

H. C. P.

PRESENCE OF INFUSORIA IN THE EXPIRED AIR IN WHOOPING COUGH. — M. Poulet, in a note to the *Academie des Sciences* (*Gazette Hebdomadaire,*) writes as follows: A small epidemic of whooping cough having occurred in the locality where I live, I was induced to examine the vapor expired by several children affected with this malady, reputed contagious by the majority of observers. These vapors arising from the respiration of the little patients, presented a veritable world of infusoria, identical in all cases. The more numerous, which were also the most slender, may be classed with the species described by some under the name of *Monas Termo;* by others, under that of *Bacterium Termo.* Others in less number moved to and fro in the field of the instrument. They had a form resembling a *bacillus,* slightly spindle-shaped; their length was from two to three hundredths of a millimetre; their breadth, about a fifth as much. This is the species which Muller named *Monas punctum*, Ehrenberg, *Bodo punctum*, and which micrographers habitually class among the Bacteries—*Bacterium bacillus.* Thus, whooping cough, because of these alterations in the expired air, belongs to the class of infectious maladies, of which I have already studied, from the same point of view, variola, scarlatina, and typhoid fever; and a truth, which the simple observation of facts had already rendered evident, receives from microscopic study complete confirmation.

GEUM VIRGINIANUM.

BY W. A. GIBSON, M.D., ST. LOUIS, MO.

I wish briefly to call attention to the medical virtues of this plant in dysentery. It belongs to the natural order, *Rosaceo* (Linnæus). It is a perennial plant, and grows abundantly in the United States; as well in the rich soils of the uplands as in the alluvials of our river bottoms. In the uplands it is to be found where the soil is loose and rich, especially on little mounds covered with hazel, as also in the corners of fences. In the rich soils of the bottom lands it grows abundantly, and much more luxuriantly than in the uplands.

The root is astringent, and slightly bitter, very much resembling in taste the blackberry root. I have been using a decoction of the root and plant in dysentery for more than ten years, and I think it worthy of a place in our Dispensatory. I require my patients to drink freely of the tea thus made, using it in lieu of water, which I always forbid, if cold. I never, in my experience (which has been large in this disease), knew a patient with dysentery to take a large draught of cold water who did not desire to go to stool immediately. While practising in the country, my attention was first called to the virtues of this plant by the farmers. Many of the country people, appreciating its value, entirely ignore the idea of calling in a physician in a case of dysentery, but rely entirely on this remedy; and candor compels me to say, that I believe they have oftener gained than lost by this course. I have seen many bad cases of dysentery successfully treated with this remedy alone.

I have, thus briefly, called the attention of the profession to the *Geum Virginianum*, with a hope that it will receive a fair trial; and if found worthy, let it take its place in the list of therapeutic agents. — *Communicated to the Medical Reporter, St. Louis.*

PERMANGANATE OF POTASH IN ACUTE RHEUMATISM.

By C. M. FENN, M.D., of San Francisco.

An extract from a clinical lecture delivered by Dr. Jas. F. Duncan, at the Adelaide Hospital, some time since directed my attention to the use, among other remedies, of permanganate of potash in the treatment of rheumatism. I promised myself to make trial of the remedy at the first opportunity. Regarding the so-called chemical theory of the etiology and pathology of rheumatism as, at least, the most plausible; and believing the efficacy of the other salts of potash in that disease to be largely due to the measure of oxygen which they contain, it seemed to me that in this salt we possessed a remedy admirably adapted to meet all the indications; and that, from the fact of its containing so large a proportion of oxygen ($KO, Mn^2 O^7$), and holding the same in such loose affinity, we should be enabled most speedily to promote the transformation of lactic into carbonic acid. In apparent corroboration of this view, I append the record of three cases.

Case 1. — Mr. S——, salesman, Æt. 30, after some unusual exposure, was prostrated by a severe attack of rheumatism. Upon an examination of his case, the new remedy recurred to my mind. But the urgency of his symptoms was such, that it seemed preferable to make use of the medicines we had some confidence in, rather than fly to others we knew not of. He was, therefore, ordered a preparation of potass. iodid.; vin. colch. sem., etc., and submitted to a hypodermic injection of morph. acetas, one fourth of a grain. To modify the exhausting and troublesome perspiration, he used, on the third day, a vinegar vapor bath, with no appreciable relief. On the fourth day, discovering no change in his condition, other than might be ascribed to the daily hypodermic injections, I requested him to suspend the mixture, and have half a grain of the permanganate, three times a day. At my next visit, on the following evening, I was surprised at the marked abatement of all the symptoms. The tongue was quite clean, the perspiration no longer excessive nor disagreeable, and the pains were so far relieved, as almost to preclude the continuance of an anodyne. His convalescence was now constant and rapid, and on the tenth day from the commencement of the attack, he was again at his post.

Case 2. — Mrs. G——, Æt. 35, of full habit and previously healthy, was attacked during the passage from New York. There had been a considerable amelioration of the more violent symptoms at the time of her arrival here; but some of the larger joints were still tumid and painful. The permanganate of potash was resorted to, and in a few days she was able to attend to her household duties.

The third case I regarded as, in some sense, a crucial test of the remedy. The patient, a man in middle life, had long been a victim to chronic rheumatism; some of the joints had become permanently distorted with tophaceous deposits, and the malady was so far incurable. This was varied, however, at intervals of two or three months, with acute attacks which apparently resisted all the usual remedies, and expended their force in from two to three weeks. I had previously attended him in several of these attacks, and found the common remedies, colchicum, acetate of potash in large doses, etc., of but little avail. I now put him on the permanganate, and had the pleasure of seeing him on the street in seven days.

I find the raspberry syrup to be the best menstruum, as it disguises the somewhat nauseous taste of the medicine completely. — *Pacific Med. and Surg. Journal.*

GALVANIC ELECTRICITY UPON THE MUSCULAR AND NERVOUS SYSTEM.

The effects of the galvanic current on the nerves and muscles of animals, is essentially the same as that produced by frictional electricity, modified, however, in some degree, by the continuous action of it. They are also characterized by the presence of some chemical influence, which excites the organs of taste and sight in a remarkable manner. Very small batteries are adequate to excite the organs of taste and sight, but a large apparatus is needed to produce any perceptible influence on the sense of touch, so as to cause the muscles of the human body to contract, when it forms part of the circuit. Galvani, in his fundamental experiment, touched the nerves of a dead frog's spine and the muscles of one of his thighs with two different metals, and then forming a circuit by a wire between them, the leg became violently contracted. When the nerves of vision are made to form part of the voltaic connection, peculiar luminous flashes will appear before the eyes. The excitement of the organ of hearing under similar circumstances is not less interesting, a roaring sound being heard as long as the wires are kept in place. On closely observing the effect of galvanic electricity upon the muscular and nervous system, three distinct stages in the process are readily seen. First, when the circuit is completed, an electric shock is experienced; next, the continued action of the current causes a series of contractions rapidly succeeding each other; and lastly, when the connection is broken, a less violent shock than before is felt. The shock of the voltaic battery differs from that of common electricity, as the latter is felt far less deeply, affecting only the outer part of our organs, and being exhausted in a moment. The voltaic shock, on the contrary, penetrates further into the system, passing along the entire course of the nerves. The influence of the galvanic current on the nervous system, has been successfully applied to the restoration of persons in whom animation was suspended. By means of it Aldini set in motion the feet of a corpse, caused the eyes to open and shut, and distorted the mouth, cheeks, and the whole countenance. Ure, by completing the circuit through the body of a man recently hung, caused the muscles of the face to acquire a frightful activity, so that rage, despair, and anguish, with horrid smiles, were successively depicted on the countenance. — *Telegraphic Journal.*

CROUP TREATED BY SULPHUR. — M. Lagauterie (*Half-Yearly Abstract*) gives in croup, teaspoonful doses, every hour, of a mixture of sulphur and water (a teaspoonful to a glass of water), with effects which he describes as wonderful. The cure, in seven very severe cases, was accomplished in two days, the only symptom remaining being a slight cough. An observation of the effect of sulphur on the oidium of vines, led to its use in croup.

HYPO-SULPHITE AND SULPHITE OF SODA IN MALARIAL FEVERS.

By Will E. Turner, M. D., Leavenworth.

The last number of the *Herald* contains a request for the communication of the experience of its readers in the use of the sulphites of lime, soda, and magnesia. I will briefly state the results of my own observation in the use of hypo-sulphite and sulphite of soda during the summer and fall of 1866, while Dr. John D. Cope and myself were associated together in practice in Southern Illinois. My attention was called to these articles by a writer in the *Chicago Medical Examiner*, who claimed he had given them in intermittent and remittent fevers with the greatest success.

My first trial of the hypo-sulphite was made upon some chronic cases of intermittent fever with such apparent good results, that myself and partner procured some two pounds for purposes of experiment. In the section of the State where we practised, it was nothing unusual for three, four, and even five, in a large family to be sick with some one of the forms of periodical fever at once. In prescribing the remedy, we made an express stipulation that the result should be faithfully reported to us. We used this article in from one hundred and twenty-five to one hundred and fifty cases of intermittent and remittent fevers with almost unvarying success, and with better after results than with quinine or any of the alkaloids of the Peruvian bark. Where the directions were honestly and persistently carried out, the fewest number of cases resisted its influence.

After these favorable results with the hypo-sulphite, I was induced to try the sulphite; and in a large number of cases, treated both then and since my removal to this city, I verified its powers to be equal to the former in those varieties of malarial disease.

The trifling cost of both these articles makes their use of no little consideration, to the poor at least. I have given quinine but three times for intermittent fever in seven months, and then not because of failure of either of the former remedies. I have noticed, however, that the sulphites are not, at all times, so prompt in their action or relief; but that when relief was afforded, there was less tendency to a periodical return of the disease.

The usual dose of either of these salts with me has been from fifteen to twenty grains every two hours for an adult.

I think the successful treatment of intermittent and remittent fevers by these alkalies is a strong proof of their palmellar origin, as claimed by Prof. Salisbury.— *Leavenworth Medical Herald.*

Sulphite of Soda in the Treatment of Erysipelas.— Dr. Addinell Hewson says he has obtained results from the use of sulphite of soda in the local treatment of erysipelas which have been to him both interesting and surprising. In extensive trial of the remedy, both in hospital and private practice, he has never seen it fail when thoroughly applied before the deep planes of cellular tissue had been invaded by the disease. Before such parts had become affected, a solution of ten grains of this salt to the ounce of water, when thoroughly applied on lint all over the surface affected, and to a considerable distance beyond it, and covered with oiled silk to prevent the evaporation of the solution, had not only produced a decided bleaching effect on the discolored surface in every such instance in the first twenty-four hours of its use, but had invariably destroyed all traces of the disease in forty-eight hours from its first application. The effect was the same, whether the application was made in the traumatic or idiopathic form of the disease. He has thus cured twenty-seven cases, seven of which were of idiopathic erysipelas. Even in the cases where the deep planes of cellular tissue were involved, as well as the surface, the disease on the surface was always apparently affected by the application. It was most positively bleached in all instances, and in many was evidently destroyed, within the period above stated, even while that in the deeper part proceeded to suppuration.— *Trans. Col. Phys., Philadelphia.*

Glycerine, as an article of food, as a nutrient, is well worthy of being brought into public notice. Sweet oil, in Palestine and other old countries, has, for ages, been used as an article of daily food; and glycerine may be considered as the essence of pure "sweet," that is "olive oil," they being one and the same. It is a perfectly neutral and bland fluid, and the most penetrating perhaps in all nature. Oil itself will permeate where water will not; and glycerine, which may be considered the ethereal part of oil, has this property to a most remarkable degree. It penetrates the solid bone. If poured into a mixture of blood and matter, such as is expectorated from consumptive lungs, it will get in between the globules of each, and show them with great distinctness; being thus penetrating, it is the very best application for all feverish sores, for inflamed or dry surfaces, simply from its quality of penetration and want of evaporatability. The first and highest value of any poultice is its capability of keeping moist for the longest time; no one ever thinks of a dry poultice. Glycerine keeps a part moist longer than any substance known, hence its value as above, mixed with an innoxious dry powder called sub-nitrate of bismuth, so as to make a thin paste or poultice. It is one of the very best applications known for burns, whether in children or adults, giving an almost instantaneous relief from suffering by its entire exclusion of air and by its moistening; hence cooling, soothing effects promote a speedy healing process, always safe, simple, and efficient.— *Hall's Journal.*

Gleanings

FROM FOREIGN AND DOMESTIC JOURNALS.

Cutaneous Absorption by the Hands.— Dr. Dufay, of Blois, having turned a solution of acetic acid upon his fingers, experienced a taste of vinegar. This suggested to him a trial of the absorbent power of the hands in a case of neuralgia, where frictions of quinine in the axilla had been without result. For this purpose he had the skin of the hands softened by washing in warm water, and then turned into the palms a spoonful of water containing 15 grains of quinine. But two or three minutes of rubbing the hands together were required for the absorption of this quantity of liquid. One hour after, dizziness and ringing in the ears tormented the patient; but the neuralgia left, and did not return. Two more frictions confirmed the cure. Ten more cases have been treated in the same manner, and in no one has the effect of the quinine failed.— *L'Union Medicale.*

Prof. Vogel's Theory of Diabetes Mellitus.— The theory of Prof. Vogel is, that however the organization of sugar may be explained, the sugar must be accumulated in the blood, and is dissolved in the serum, which, in patients suffering from this disease, is of higher specific gravity (1033 instead of 1029).

This concentrated serum is absorbing, according to the laws of Endosmosis, the water from the substance of the tissues as well as that taken with the food and drink. In consequence of this, the blood-vessels are overcharged; a plethora takes place, which causes a higher degree of pressure in the vascular system, especially in the kidneys, resulting in a large increase in the quantity of the urine. By this theory the thirst, dry skin, and other symptoms of diabetes mellitus are easily explained.

Incompatibility of Iodide of Potassium and Mercury.— *Curious case.*— It is well known that iodide of potassium combined with mercury produces the very powerful biniodide. A case is reported in the *Union Medicale* where an intense conjunctivitis was excited by the introduction of calomel into the eye of a child who was under an internal treatment by iodide of potassium. Enough of iodide was eliminated by the tears to cause this reaction.

Carbolic Acid in Cystitis.— Dr. Bottini (of Novare) has injected the bladder in cases of cystitis with a solution of carbolic acid—1 part to 100 of water—and has obtained most unhoped-for success. The putrefaction of the urine, due to its stagnation in the bladder, is combated, stopped, or prevented; and the myriads of zoöphytes and of pencillium glaucum, very abundant before its use, are no longer to be found in the pus or urine.— *Giorn. della Venetie.*

Parasites in Perspiration.— Dr. Lemaire, of Paris, has been examining the coating of perspiration and dust formed upon the bodies of people who have passed ten or fifteen days without a bath, and finds in it myriads of living parasites.

Sulphurous Acid as Applied to Wounds and Sores. — Dr. Dewar, in the *Medical Times and Gazette*, recommends the application of sulphurous acid for preventing the formation of pus, and for procuring union by first intention. He sponges the wound carefully with the acid, and then dresses it with pledgets of lint saturated with the same. Prof. Syme has obtained the result claimed by the use of sulphurous acid spray.

New Treatment for Tape-worm.— Dr. Lurtel (*Gazette Medicale de Paris*) has tried with success the following method: He gives in one dose two thirds of an ounce of ether, followed two hours afterwards by an ounce of castor oil. The worm is discharged entire, or almost so, and always with the head intact. No pain is caused by this treatment.

How to Prevent Iodine from Staining.— The addition of carbolic acid to the tincture of iodine not only imparts antiseptic properties, but renders the iodine colorless. Dr. Boulton, of London, recommends the following prescription in chronic ozœna, to be applied by the spray producer: Compound tincture of iodine, ℥ i.; solution of carbolic acid (as sold in the shops), gtt. vi.; water, vi. ℥.

Formulae.

USEFUL IN MEDICINE AND THE ARTS.

How to Make a Cement for Stoves.— Take fine salt one part, and two parts of fresh, hard-wood ashes; mix well together, then take cold water, and mix into a mortar. Apply to the crack either warm or cold, and you have a cement which will answer all common purposes, and will be very useful where the stove-pipe joints are not as tight as is desirable.

Still Another.— Take iron filings, and mix to about the consistency of putty for glazing, with white lead and linseed oil. Fill in the joints as securely as possible, while the stove is cold, and let it stand a day or two before using.

A Fine Red Color for Cordials and Confectioneries.— To one ounce of powdered cochineal, add one half ounce of dried alum, with the same quantity each of cream of tartar and the carbonate of potash. Add to the cochineal four ounces of boiling water, then throw in, little by little, the alum, next the cream of tartar, and lastly the carbonate of potash. After boiling five minutes, filter while hot, and add an equal amount by measure of alcohol at 80 per cent. Should the alcohol render it turbid, it should again be filtered. It is not poisonous, like many confectioners' colors.

Lemon Preserves.— An excellent substitute for jam may be made as follows:— One pound of powdered loaf sugar, a quarter of a pound of fresh butter, six eggs, leaving out the whites of two of them; adding the juice and rind of three fine lemons. Put the ingredients into a saucepan, and stir the whole gently over a slow fire, until it becomes as thick as honey. Put into small jars, and keep in a cool, dry place.

Bed-bug Poison.— Alcohol, ½ pt.; spirits of turpentine, ½ pt.; sal-ammoniac, 1 oz.; corrosive sublimate, 1 oz.; camphor, 1 oz. Put the camphor into the alcohol and dissolve it, then pulverize the sal-ammoniac and the corrosive-sublimate and add, after which put in the spirits of turpentine and shake all well together. On washing the beadstead, as well as the clinks and crevices of the room, with this compound, it will end the days and nights too of any bed-bug it touches.

Imitation Musk.— To one drachm pure oil of amber, add by drops four drachms of nitric acid (the "chemically pure" is the best), stirring the mixture with a glass rod. The product will be a yellow resinous substance, having the odor of genuine musk. It should be well washed with water to free it from excess of acid, and then carefully dried.

To Remove Rust Stains.— Stains of iron rust may be removed from linen or cotton thus:— Wash the cloth through one suds, and rinse. When wet, rub ripe tomato juice on the spots. Expose it in the sunshine until nearly dry, and wash in another suds.

Application for Chilblains.— A writer in a late number of the *Lancet*, recommends the Linimentum Aconiti of the pharmacopœia as an application for chilblains and painful corns.

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DIRECTIONS.—The object to be examined is placed upon the end of the little glass lens, which perforates the cork, causing it to adhere by using a little saliva, when the object is not moist enough. With a sharp knife, slice off a thin bit of lean pork, and place it upon the lens; if there are trichinia in it, they will be seen at once. Take a glass of water, put it in a warm place, and throw in it some grass or leaves; let it stand a week or more, and then, with a pin, put a drop on to the lens. The little animalcules will be seen swimming and darting about lively. A little of the fine dust found in the cavities of cheese affords cheese mites in large quantities. A little of this dust put upon the lens affords an interesting spectacle.

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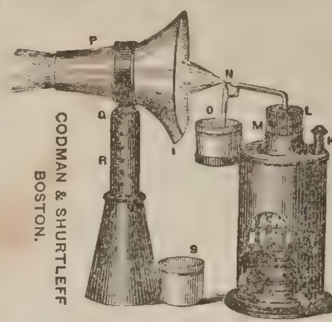

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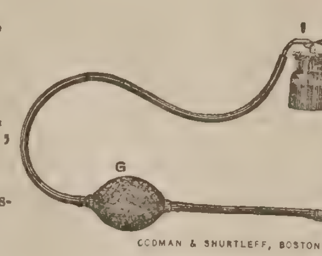

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VOL. II. BOSTON, FEBRUARY 1, 1868. NO. VIII.

THE

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Familiar Chemistry.

RE-BREATHED AIR.

It is a matter of astonishment to those who understand the importance of a proper observance of the chemical and physiological laws connected with our existence, to observe how great abuse of these laws the system is capable of withstanding. Not a third of the race have any knowledge of, or regard for, the important sanitary rules upon which life and health depend. Men, women, and children, in all parts of the world, huddle together in narrow huts, cellars, and garrets, and breathe over and over again the corrupted air; subsisting at the same time upon the most unsubstantial and improper food; yet they manage to live out many weary days, and months, and even years, in these abodes.

The power of resistance to external and internal disturbing and destroying forces possessed by the animal organism is indeed marvellous. Great as is this power, however, and constant as is the warfare kept up by the vital forces against the unnatural and evil influences of bad air and bad food, the conflict is an unequal one. The inroads of disease can not very long be resisted; the great fundamental laws upon which life and health depend, cannot always be violated with impunity.

Among the many detrimental influences to which human beings are subjected, no one is greater than re-breathed air. Whilst there are tens of thousands who suffer through this agency involuntarily, there are other tens of thousands who might, if they would, escape from its baneful influence. There is bad air in churches, lecture-rooms, theatres, school-rooms, parlors, bed-chambers, etc., which ought not to be present; or if, when occupied, the air of these rooms *must* become vitiated, then they ought never to be occupied. Certainly, enough has been written regarding ventilation, to arouse public attention to its importance; but, after all, little heed is given to the matter in buildings, public or private.

Let us reflect a moment upon re-breathed air. What is it? It is, strictly speaking, one of the excrementitious products of the human organism. It is a mixture of gaseous bodies which have entered the system, been subjected to chemical changes, then rejected as a waste product.

Re-breathed air is the only excrementary matter thrown off by men or animals, which is not positively abhorrent to all the senses; which is not cast away and shunned by all classes,—the ignorant and the learned, the cleanly and the uncleanly, the civilized and the savage. A delicate and fastidious lady will spend hours in a crowded theatre, ball-room, or lecture-room, and take into her lungs a gaseous mixture which has already traversed the air passages and impinged upon the lung cells of perhaps hundreds of men and women. If she should learn that her toothbrush at any time had come in contact with the surfaces over which this air passed, it would be speedily cast aside, and a new one purchased.

But it is the chemical change in air which results when respired, that renders it unfit for further use. It is reasonable to suppose—in fact, we know—that re-breathed air is little less than poison to the blood. Consumption and scrofula are found in intimate connection with imperfectly ventilated sleeping apartments, school-rooms, living-rooms, etc. A vigorous constitution may fight bravely and persistently against the influence of the poison; but the crash comes at last. No one can subsist for many years upon re-breathed air.

Animals suffer from it as unmistakably as man, and similar diseases are produced in them. The lions and tigers and bears and hyenas confined in menageries, kept close and warm, die speedily of consumption. True tubercle is produced; weakness, emaciation, death, result. It may be that the carbon is retained unoxidized, and that, by further chemical action, it is forced into new combinations by which bodies are formed of a poisonous nature, or which act the part of a ferment in the blood.

We do not know precisely *how* re-breathed air produces its deleterious influence, nor is it worth while to stop to inquire, in this discussion. It is certain that its effects are fatal to health. It would be absurd to assert that the frightful prevalence of consumption is due entirely to this agency; as all intelligent observers understand that there are many causes operating to produce or develop this disease. It is nevertheless probable that impure or re-breathed air is the greatest agent of evil, in inducing and rendering fatal pulmonary affections. The crowded, badly-ventilated school-room is often the place where, early in life, re-breathed air commences its deadly work. Not one school-room in a hundred in this country is a fit place in which to confine children six or eight hours of the day. The little ones are herded together in a promiscuous crowd: those of tender years and those more advanced, the feeble and the strong, the sickly and the well, are all subjected to the same hours of study, the same school-discipline, and all breathe the same deleterious air. The hardy and the strong may be able to resist the influence of the poison; the weak and tender ones grow pale and haggard, and, struggling on through their school-days, live perhaps to the age of puberty, and then drop into the consumptive's grave. Will parents never awake to the enormity of this evil?

Small, ill-ventilated sleeping rooms, in which re-breathed air is ever present, are nurseries of consumption. These are not found alone in cities and large towns, or among the poor and lowly. Well-to-do farmers' daughters and sons in the country,—those who live among the mountains of the New-England States, where God's pure air is wholly undefiled,—are often victims of consumption. How is this explained? Look into their bedrooms; examine into their daily habits of life; and the cause is made plain. Old-fashioned fire-places are boarded up; rubber window-strips and stoves have found their way into the most retired nooks and corners of the land; and the imprisoned mountain air

in country dwellings is heated to a high point, and breathed over and over during the days and nights of the long winter months. It is certainly true that girls in the country take less exercise in the open air than those residing in cities. They appear to be more *afraid* of pure, cold air than city girls. Consumption is not less rare among females in the country than in cities, in the present age. It was not so formerly. The declarations of grandmothers and old physicians go to show that, fifty years ago, consumption was hardly known in the rural districts. The winds whistled through the dwellings then, and the fire blazed and roared upon the hearth. Half the time, in the cold winters, "the backs of the inmates were freezing, while the front parts of the person were roasting;" and yet there was less rheumatism than now, and no consumption.

Whilst we have made changes in dwellings, workshops, and public buildings, which operate to sadly deteriorate and confine the interior air, the outside atmosphere is just as pure, just as healthful, as in the days of our ancestors. Let us adopt means to secure a full measure of this "pabulum of life," clear, undiluted, uncontaminated, day and night, during the hours of sleep and study. Let us live as much as we possibly can in the *open air*, and the measure of health will be greatly increased, and life prolonged.

THE WONDERS OF ANCIENT ROME.

We have read with profound interest, Dr. John Lord's new book, "*The Old Roman World: the Grandeur and Failure of its Civilization.*" We have long studied Roman history, and visited those old ruined cities, once occupied by the proud rulers of the world; but this book awakens an enthusiasm hardly before experienced. Dr. Lord stands alone in fervid eloquence, when discoursing upon matters of history; and the past, by the aid of his pen, is made to stand before us like a thing of the present. We advise our readers to buy this book; it will be money well expended.

We make some extracts which will illustrate the style of the work. Here is his thrilling description of the wonders of ancient Rome:—

Modern writers, taking London and Paris for their measure of material civilization, seem unwilling to admit that Rome could have reached such a pitch of glory and wealth and power. To him who stands within the narnow limits of the Forum, as it now appears, it seems incredible that it could have been the centre of a much larger city than Europe can now boast of. Grave historians are loth to compromise their dignity and character for truth, by admitting statements which seem, to men of limited views, to be fabulous, and which transcend modern experience. But we should remember that most of the monuments of ancient Rome have entirely disappeared. Nothing remains of the Palace of the Cæsars, which nearly covered the Palatine Hill; little of the fora which, connected together, covered a space twice as large as that inclosed by the palaces of the Louvre and Tuileries, with all their galleries and courts; almost nothing of the glories of the Capitoline Hill; and little, comparatively, of those Thermæ which were a mile in circuit. But what does remain attests an unparalleled grandeur—the broken pillars of the Forum; the lofty columns of Trajan and Marcus Aurelius; the Pantheon, lifting its spacious dome two hundred feet into the air; the mere vestibule of the Baths of Agrippa; the triumphal arches of Titus and Trajan and Constantine; the bridges which span the Tiber; the aqueducts which cross the Campagna; the Cloaca Maxima, which drained the marshes and lakes of the infant city; but, above all, the Colosseum. What glory and shame are associated with that single edifice! That alone, if nothing else remained of Pagan antiquity, would indicate a grandeur and a folly such as cannot now be seen on earth. It reveals a wonderful skill in masonry, and great architectural strength; it shows the wealth and resources of rulers who must have had the treasures of the world at their command; it indicates an enormous population, since it would seat all the male adults of the city of New York; it shows the restless passions of the people for excitement, and the necessity, on the part of government, of yielding to this taste. What leisure and indolence marked a city which could afford to give up so much time to the demoralizing sports! What facilities for transportation were afforded, when so many wild beasts could be brought to the capital from the central parts of Africa, without calling out unusual comment! How imperious a populace that compels the government to provide such expensive pleasures! The games of Titus, on its dedication, last one hundred days; and five thousand wild beasts are slaughtered in the arena. The number of the gladiators who fought surpasses belief. At the triumph of Trajan over the Dacians, ten thousand gladiators were exhibited, and the emperor himself presides under a gilded canopy, surrounded by thousands of his lords. Underneath the arena, strewed with yellow sand and sawdust, is a solid pavement, so closely cemented that it can be turned into an artificial lake on which naval battles are fought. But it is the conflict of gladiators which most deeply stimulates the passions of the people. The benches are crowded with eager spectators, and the voices of one hundred thousand are raised in triumph or rage, as the miserable victims sink exhausted in the bloody sport.

But it is not the gladiatorial sports of the amphitheatre which most strikingly attest the greatness and splendor of the city; nor the palaces, in which as many as four hundred slaves are sometimes maintained as domestic servants, twelve hundred in number, according to the lowest estimate, but probably five times as numerous, since every senator, every knight, and every rich man was proud to possess a residence which would attract attention; nor the temples, which numbered four hundred and twenty-four, most of which were of marble, filled with statues, the contributions of ages, and surrounded with groves; nor the fora and basilicæ, with their porticos, statues, and pictures, covering more space than any cluster of public buildings in Europe, a mile and a half in circuit; nor the baths, nearly as large, still more completely filled with works of art; nor the Circus Maximus, where more people witnessed the chariot races at a time than are nightly assembled in all the places of public amusement in Paris, London, and New York combined—more than could be seated in all the cathedrals of England and France,—it is not these which most impressively make us feel that Rome was the mistress of the world and the centre of all civilization. The triumphal processions of the conquering generals were still more exciting to behold; for these appeal more directly to the imagination, and excite those passions which urged the Romans to a career of conquest from generation to generation. No military review of modern times equalled those gorgeous triumphs; even as no scenic performance compares with the gladiatorial shows. The sun has never shone upon any human assemblage so magnificent and so grand, so imposing and yet so guilty. And we recall the picture of it with solemn awe, as it moves along the Via Sacra and ascends the Capitoline Hill, or passes through the theatres of Pompey and Marcellus, that all the people might witness the brilliant spectacle. Not only were displayed the spoils of conquered kingdoms, and the triumphal cars of generals, but the whole military strength of the capital. An army of one hundred thousand men, flushed with victory, follows the gorgeous procession of nobles and princes. The triumph of Aurelian, on his return from the East, gives us some idea of the grandeur of that ovation to conquerors. "The pomp was opened by twenty elephants, four royal tigers, and two hundred of the most curious animals from every climate, north, south, east, and west. These were followed by one thousand six hundred gladiators, devoted to the cruel amusement of the amphitheatre. Then were displayed the arms and ensigns of conquered nations, the plate and wardrobe of the Syrian queen. Then ambassadors from all parts of the earth, all remarkable in their rich dresses, with their crowns and offerings. Then the captives taken in the various wars,—Goths, Vandals, Samaritans, Alemanni, Franks, Gauls, Syrians, and Egyptians, each marked by their national costume. Then the Queen of the East, the beautiful Zenobia, confined by fetters of gold, and fainting under the weight o jewels, preceding the beautiful chariot in which she had hoped to enter the gates of Rome. Then the chariot of the Persian king. Then the triumphal car of Aurelian himself, drawn by elephants. Finally, the most illustrious of the Senate, the people, and the army, closed the solemn procession, amid the acclamations of the people and the sound of musical instruments. It took from dawn of day until the ninth hour for the procession to pass to the capitol; and the festival was protracted by theatrical representations, the games of the circus, the hunting of wild beasts, combats of gladiators, and naval engagements. Liberal donations were presented to the army, and a portion of the spoils dedicated to the gods. All the temples glittered with the offerings of ostentatious piety, and the Temple of the Sun received fifteen thousand pounds of gold. The soldiers and the citizens were then surfeited with meat and wine. The disbanded soldiery thronged the amphitheatre, and yelled their fiendish applause at the infernal games,—'the gorged robbers of the world, drunk in a festival of hell,'*—a representation of war as terrible as war itself, compensating to the Roman people the massacres which they could not see."

If anything more were wanted to give us an idea of Roman magnificence, we would turn our eyes from public monuments, demoralizing games, and grand processions; we would forget the statues in brass and marble, which outnumbered the living inhabitants, so numerous that one hundred thousand have been recovered and still embellish Italy, and would descend into the lower sphere of material life—to those things which attest luxury and taste—to ornaments, dresses, sumptuous living, and rich furniture. The art of working metals and cutting precious stones surpassed any thing known at the present day. In the decoration of houses, in social entertainments, in cookery, the Romans were remarkable. The mosaics, signet rings, cameos, bracelets, bronzes, chains, vases, couches, banqueting tables, lamps, chariots, colored glass, gildings, mirrors, mattresses, cosmetics, perfumes, hair dyes, silk robes, potteries, all attest great elegance and beauty. The tables of thuga root and Delian bronze were as expensive as the sideboards of Spanish walnut, so much admired in the great exhibition at London. Wood and ivory were carved as exquisitely as in Japan and China. Mirrors were made of polished silver. Glass-cutters could imitate the colors of precious stones so well, that the Portland vase, from the tomb of Alexander Severus, was long considered as a genuine sardonyx. Brass could be hardened so as to cut stone. The palace of Nero glittered with gold and jewels. Perfumes and flowers were showered from ivory ceilings. The halls of Heliogabalus were hung with cloth of gold, enriched with jewels. His beds were silver, and his tables of gold. Tiberius gave a million of sesterces for a picture for his bed-room. A banquet dish of Drusillus weighed five hundred pounds of silver. The cups of Drusus were of gold. Tunics were embroidered with the figures of various animals. Sandals were garnished with precious stones. Paulina wore jewels, when she paid visits, valued at $800,000. Drinking cups were engraved with scenes from the poets. Libraries were adorned with busts, and presses of rare woods. Sofas were inlaid with tortoise-shell, and covered with gorgeous purple. The Roman grandees rode in gilded chariots, bathed in marble baths, dined from golden plate, drank from crystal cups, slept on beds of down, reclined on luxurious couches, wore embroidered robes, and were adorned with precious stones. They ransacked the earth and the seas for rare dishes for their banquets, and ornamented their houses with carpets from Babylon, onyx cups from Bythinia, marbles from Numidia, bronzes from Corinth, statues from Athens,—whatever, in short, was precious or rare or curious in the most distant countries. The luxuries of the bath almost exceed belief; and on the walls were magnificent frescoes and paintings, exhibiting an inexhaustible productiveness in landscape and mythological scenes, executed in lively colors. From the praises of Cicero, Seneca, and Pliny, and other great critics, we have a right to infer that painting was as much prized as statuary, and equalled it in artistic excellence, although so little remains of antiquity from which we can form an enlightened judgment. We certainly infer, from designs on vases, great skill in drawing; and,

*Henry Giles.

from the excavations of Pompeii, the most beautiful colors. The walls of the great hall of the baths of Titus represent flowers, birds, and animals, drawn with wonderful accuracy. In the long corridor of these baths, the ceiling is painted with colors which are still fresh; and Raphael is said to have studied the frescoes with admiration, even as Michael Angelo found in the Pantheon a model for the dome of St. Peter's, and in the statues which were dug up from the ruins of the baths, studies for his own immortal masterpieces.

Thus everything which gilds the material wonders of our day with glory and splendor, also marked the old capitol of the world. That which is most prized by us, distinguished to an eminent degree the Roman grandees. In an architectural point of view, no modern city approaches Rome. It contained more statues than all the Museums of Europe. It had everything which we have, except machinery. It surpassed every modern capitol in population. It was richer than any modern city, since the people were not obliged to toil for their daily bread. The poor were fed by the government, and had time and leisure for the luxuries of the bath and the excitements of the amphitheatre. The citizen nobles owned whole provinces. Even Paula could call a whole city her own. Rich senators, in some cases, were the proprietors of twenty thousand slaves. Their incomes were known to be £1000 sterling a day, when gold and silver were worth four times as much as at the present day. Rome was made up of these citizen kings and their dependents; for most of the senators had been, at some time, governors of provinces, which they rifled and robbed. In Rome were accumulated the choicest treasures of the world. Her hills were covered with the palaces of the proudest nobles that ever walked the earth. Rome was the centre, and the glory, and the pride of all the nations of antiquity. It seemed impossible that such a city could ever be taken by enemies, or fall into decay. "*Quando cadet Roma cadet et mundus*," said the admiring Saxons, three hundred years after the injuries inflicted by Goths and Vandals. Nor has Rome died. Never has she entirely passed into the hands of her enemies. A hundred times on the verge of annihilation, she was never annihilated. She never accepted the stranger's yoke; she never was permanently subjected to the barbarian. She continued to be Roman after the imperial presence had departed. She was Roman when fires, and inundations, and pestilence, and famine, and barbaric soldiers desolated the city. She was Roman when the Pope held Christendom in a base subserviency. She was Roman when Rienzi attempted to revive the virtues of the heroic ages, and when Michael Angelo restored the wonders of Apollodorus. And Roman that city will remain, whether as the home of princes, or the future capitol of the kings of Italy, or the resort of travellers, or the school of artists, or the seat of a spiritual despotism which gains strength as political and temporal power passes away before the ideas of the new races and the new civilization."

Chemistry Applied to the Arts.

MEDICINAL PRODUCTS OF SOUTHERN ITALY.

When at the crater of Vesuvius a number of men were engaged just within the southern edge, gathering sulphur into bags, which, when filled, are strung across a pole and carried by two men to the place of descent on the northern edge; there they are dragged down on the volcanic ashes and, at the base of the cone, are loaded on mules, pannier-fashion, and transported to the coast. On inquiry it proved to be very impure, and used only for the vine disease, *oidium tuckeri*, for which sulphur appears to be the best remedy. The best sulphur used here comes from Sicily. Olive oil is made at Sorrento and other places near, but the greatest production is at Otranto and Bari, to the south-east, and especially near Gallipoli. The annual product of Southern Italy is about 35,000 tuns. It is said that about two thirds of the soil in the previous-named districts is devoted to the olive. It is propagated several ways, but most successfully by slips grafted on the wild olive, requiring ten years to come in bearing, and then, with care, lives centuries. The tree blooms in June, and ripens from October to December. Mr. Kernot gave me a specimen of very good fat manna, produced at Salerno, within fifty miles of Naples, and says that flake manna, small and large, comes from Sicily, but large quantities of inferior grades are produced in Southern Calabria, and probably enters commerce through Messina as Sicilian. The finest is obtained on the mountain side near Corigliano. Oil of oranges and lemons, I was informed, is made in Calabria and Sicily, in three ways: 1st, by scraping off the exterior cellular tissue, and expressing the pulpy mass. 2d, by grating off the rind, pouring on it hot water, which causes the oil to separate and rise. The pulp is then depressed beneath the surface, and the oil, after it collects, is skimmed off. 3d, by distillation. When at Cork, Mr. Frank Jennings informed me, on the authority of Mr. John A. Dix, of New York, that the best Sicily oil is obtained by dexterously wringing the rind of the orange so as to rupture its oil cells, and cause their contents to spirt out, the operator holding the orange within a cask. As the drops accumulate they run down the sides, and gather at the bottom, unmixed with any foreign matters. At Naples this new process was wholly unknown. Liquorice is not grown for commerce near Naples, but eighty miles south, in Calabria. Mr. Kernot says that the brand most esteemed there is *Corigliano*, some of which, of superior quality, he gave me; then *Campagna, Sallugra*, and *Barraco*. These are the family names of the large proprietors. Perhaps the most is grown on the east coast of Calabria, as Coterne Baron Campagna alone is said to make liquorice paste to the value of two millions of ducats annually, whilst the estates of the Barraco family are said to yield $750,000 annually. I have observed the fact in New Jersey, that the horizontal roots of liquorice keep below ordinary garden cultivation, and after the ground is laid out for vegetables, the annual shoots appear at random in the beds. In Calabria the ground is given at the same time to wheat and other grains. The liquorice, being below the plow, is not injured, and, as it requires several years to attain its proper magnitude, the annual shoots are cut off with the grain, or avoided by the reapers, according to the manner of gathering the cereals.

Among the staples of Southern Italy is argols, and is generally the red variety, as the grapes are usually fermented with their skins. Mr. Kernot said that at almost any time one might buy 1000 casks of tartar, of 1200 lbs. each, in the Neopolitan market. Both sweet and bitter almonds are largely produced on the east coast, in the Bari district, whilst saffron (*Crocus sativus*) grows wild in the pasture region of ultra Southern Italy, and is collected to some extent for commerce in districts near Taranto.

We should not leave Naples without saying that we visited the apothecary shop at Pompeii, and stood behind its earthen counter; and, in the *Museo*, saw some of the implements used therein for making pills—a tile and spatula, with a pill-box containing some remains of Pompeian skill—certainly the oldest existing samples of fossil pharmacy out of Egypt.—*Prof. Proctor, in Journal of Pharmacy.*

New System of Cooking.—At the Great Exhibition is a new cooking apparatus of Norwegian origin, which is well spoken of by the *Medical Times and Gazette*, the *London Times*, and several French journals. It consists of a wooden box, about eight inches square, and thickly lined with wadding and black felt, and containing a tin box which holds the article to be cooked. A chicken, with vegetables, for example, is placed in the tin case; cold water enough is added to fill the case, which is placed upon a common fire until the water reaches the boiling point, when it is put into the wooden box and carefully shut up. In two hours the chicken and vegetables are deliciously cooked, preserving the flavor and delicacy lost in the usual process of boiling. Any one can see the host of advantages to be derived from such an apparatus, especially in families of moderate circumstances, as the saving in fuel and trouble is immense. A hot dinner can be served even after seventeen or eighteen hours of isolation, and the virtue of the meats can not be destroyed by poor cooking. A gallon of water shut up at 212° Fahrenheit registers 140° after the lapse of twenty-four hours. One thing must be borne in mind, viz., that meats are very poor conductors of heat, and that their temperature is still quite low when the water has reached the boiling point. For this reason sufficient water should be used to bear the loss of the heat absorbed by the meat after the case is sealed.

Decoloration of the Hair.—In a memoir presented to the Royal Society, Mr. Erasmus Wilson has occupied himself with the decoloration of the hair, especially with the sudden whitening produced by terror; and he has thrown a new light on this singular phenomenon. He has assured himself that the decoloration suffered is due to the accumulation of globules of air in the fibrous tissue of the hair; that there is no lack of pigment; but that the normal color is marked by the globules of air. Under the empire of nervous commotion, the fluids of the hair retire towards the interior, even as the blood flows from the surface of the body; there is a general movement of reflux and contraction. The empty place of the fluids in the hair is now filled at once with atmospheric air, and, unfortunately, in a permanent manner.

The Petrified Forest in Egypt.—The celebrated forest, or, rather, the plain covered with overthrown trees, is distant about an hour's travel from Cairo. The remains of trees are scattered in all directions as far as the eye can reach; the hills and valleys of the desert are covered with them. Here we find the trunks, there the branches or the roots; we see upon them the marks produced by age or the sun. The species are various; but the palms predominate. All these vegetable remains are petrified, and are as hard as the hardest flint-glass. We find similar collections in some other parts of Egypt, but in less quantity. Many theories have been proposed to explain their origin; but they agree only in establishing the fact that, at some time, the trees have been under water. Whether they grew at their present resting-place, or have been brought to it by torrents, is difficult to determine. They measure from 13 to 20 metres (about 42 to 65 feet) in length, and more than a metre (3 feet 3 inches) in diameter. As their rocky substance is susceptible of a beautiful polish, various kinds of ornaments are made from them.

Colorless Varnish with Copal.—To prepare this varnish the copal must be picked; each piece is broken and a drop of rosemary oil poured on it. Those pieces which, on contact with the oil, become soft, are the ones used. The pieces being selected, they are ground and passed through a sieve, being reduced to a fine powder. It is then placed in a glass, and a corresponding volume of rosemary oil poured over it; the mixture is then stirred for a few minutes until it is transformed into a thick liquor. It is then left to rest for two hours, when a few drops of rectified alcohol is added and intimately mixed. Repeat the operation until the varnish is of a sufficient consistency; leave to rest for a few days, and decant the clear. This varnish can be applied to wood and metals.

A Simple Method of Protecting Water from the Action of Lead Pipe.—*Dingler's Polytechnisches Journal* publishes a simple method, brought forward by Dr. Schwarz, of Breslau, for preventing the poisonous influence of lead pipes on water, by forming, on the inside surface of the pipes, an insoluble sulphuret of lead, which has proved so effective that, after simple distillation, no trace of lead can be detected in water which has remained in the pipes for a long time. The operation, which is a very simple one, consists in filling the pipes with a warm and concentrated solution of sulphuret of potassium or sodium; the solution is left in contact with the lead for about fifteen minutes. Commonly, a solution of sulphur in caustic soda will answer the purpose, and produce, practically, the same results. It is known that sulphuret of lead is the most insoluble of all compounds of lead, and nature itself presents an example which justifies the theory of Dr. Schwarz, since water extracted from the mine of Galena does not contain lead, a fact which has often occasioned surprise.

Hermetic Seal.—A mixture of gelatine and glycerine, is liquid while hot, but on cooling it becomes solid, retaining considerable elasticity and toughness. The neck of a bottle dipped into this melted compound is covered with an air-tight cap, which can be made as thick as desired by repeating the operation.

Chemistry Applied to Agriculture.

FERTILIZER RECIPES.

Accurate, scientific agriculture is based upon certain general laws or principles, which are to be studied and understood, rather than specific statements or formulæ. The presentation of recipes for manures is, according to just criticism, empirical, and therefore, perhaps, ought not to be encouraged; and yet, it is specific formulæ which interest farmers, and most readily attract attention. Mr. A states that he has secured unusual crops by employing a certain compound upon his lands. Why is not this compound good for Mr. B? Mr. B tries it, and his crop fails; therefore he concludes that Mr. A's statements are not true, or are greatly exaggerated. Here are errors and wrong reasonings which arise from a misconception of the fundamental principles upon which plant growths depend; a forgetfulness of the fact that specific soils and plants require specific food,—food adapted to their peculiar wants. We must treat soils pretty much as the physician treats cases of disease. It is as necessary for the farmer to understand the *anatomy* and *physiology* of the soil, and the wants and appetites of plants, as it is for the physicians the anatomy and physiology of the human system, and the laws of animal nutrition. It is difficult to frame formulæ which are safe and of general adaptability, for use among farmers or physicians. The quack medicine vender does this; but his wares are utterly repudiated by the educated medical man. Shall we adopt this course in regard to the land nostrums so freely offered for sale. It is the part of wisdom to do so, unless we fully understand the nature and value of the substances and compounds in the market, recommended as soil specifics.

Recently, some of the fertilizer quacks have concluded that the usual forms of their specifics were a little too bulky and inconvenient to manage with facility; consequently, they have *concentrated* and put in *liquid form* their precious plant food. A circular has been placed in our hands, which sets forth the virtues of what purports to be a *French* preparation, put up in "stone jugs holding a *quart*," and sold for the modest sum of $2.50 each! What an insult this is to the common intelligence of horticulturists and farmers! The impudence is surprising; and this is not the only surprising thing connected with it. The names of some well-known and eminent horticulturists and seed-venders are upon the circular, as having the article for sale!

We often have sent to us for examination, manure recipes; and our views are solicited as regards their value. We are pleased to lend all the aid we can to the soil cultivator, and therefore take special pains to answer these inquiries and all others connected with agricultural matters.

The following comes to us from Richmond, Va., and is called Dr. Valentine's recipe for making artificial guano:

No. 1.	Dry Peat,*	20	bushels.
" 2.	Wood Ashes,	3	"
" 3.	Fine Bone Dust,	3	"
" 4.	Calcined Plaster,	3	"
" 5.	Nitrate of Soda,	40	lbs.
" 6.	Sal. Ammoniac,	22	"
" 7.	Carb Ammonia,	11	"
" 8.	Sulph. Sodæ,	20	"
" 9.	" Magnesia,	10	"
" 10.	Common Salt,	10	"

*If peat cannot be obtained, use garden mould or clean virgin soil instead.

DIRECTIONS FOR MIXING.

Mix Nos, 1, 2, 3, together; mix 5, 6, 7, 8, 9, 10, in four or five pails of water, or enough to dissolve the ingredients. When dissolved, add the liquid to the mixture (1, 2, 3), and mix as in making mortar. When thoroughly mixed, add No. 4 (the calcined plaster), which will absorb the liquid, and bring the whole to a dry state. Mix under cover, in a dry place; pack so as to exclude air; observe the proportions in making small or large quantities. The above recipe will make one ton, which will manure seven and a half acres of land.

This is a very good general formula, and embraces in fair proportions nearly all the ingredients of plant food. We should prefer to substitute nitrate of potassa for soda, and also to increase the bone-dust to four or five bushels. This should not be spread over *seven and a half acres* of land. We think very well of the combination, and have no doubt, if used upon our ordinary northern soils, upon one or two acres, it would render highly remunerative returns. The cost of the ingredients, excluding the peat, will be, at present market prices, about $20 the ton.

We present another recipe, which is stated to have been "patented" by some one in Western Massachusetts last August. A farmer might as well patent his jack-knife, or the contents of his pig-pen, as to patent a compound like this:

Pond or meadow muck,	1500 lbs.
Sulphuric acid,	20 "
Potash,	50 "
Salt,	80 "
Nitrate of soda,	100 "
Lime,	150 "
Phosphate of lime (bone dust, we suppose),	100 "

We are not informed by what manipulation this is fitted for the soil. These are all good materials; and the formula in some respects resembles one we have experimented with for some years. We have realized most excellent results from a compost essentially of this nature; but, for general employment, we should rather prefer the Virginia combination. That is easily prepared, and embraces the magnesian element so important in the cereal grains.

RATS AND MICE.—Farmers throughout Eastern Massachusetts have been exceedingly annoyed and injured the present winter by swarms of rats upon their premises. Late in the autumn, they were found in the fields, under corn-shooks and haystacks, and in the stone walls, in large numbers. This was very unusual, and excited much remark. As soon as the winter closed in, they retreated to the barns and dwellings, and upon our own farm premises they held for a while "high carnival." Cats, traps, and poison, did not sensibly diminish their numbers. At last free use was made of *carbolate of lime* about their holes and walks, and this proved effective. They suddenly disappeared, and have not since returned. Carbolate of lime is a most excellent article for farmer's use, as it is a thorough and cheap disinfectant, and no vermin can live in its vicinity.

PRODUCTION OF EGGS.—We have found good, fresh malted barley, to be the best form of food for hens. It stimulates wonderfully the reproductive functions; and obstinate fowls, under its influence, are led to the immediate performance of their duty in the matter of egg-laying. It should be mixed with warm water, half malt and half meal, with a pinch of cayenne thrown into the dish in cold weather.

☞ February is the month for driving snow storms, and young fruit trees, pears, apples, peaches, etc., must be looked after to save them from being broken down by accumulation of snow upon the branches. Many a fine orchard has been greatly injured from this course; and all farmers, gardeners, etc., should use the shovel freely after each storm.

Boston Journal of Chemistry.

BOSTON, JANUARY 1, 1868.

☞ Any one sending us the names of *three* subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For *five* subscribers, we will send the *petite microscope*. For *twenty-five*, we will send, in addition to the microscope, a copy of *Stockhart's Chemistry for Students*, the best elementary treatise yet published. For *one hundred* subscribers, we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring-rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. Downes is general travelling agent for the *Journal*.

☞ The *Journal* is sent only to subscribers who have paid in advance for the first or second volume.

☞ We are receiving many letters containing money and subscribers' names, in which the name of the *state*, or *town*, or *both, are omitted*. We cannot enter cash or names upon our books under such circumstances. We can only hold them until a *scolding* letter comes along, asking "Why we do not send the *Journal?*" The second letter may, perhaps, give the desired information. Will our friends be *careful* about giving the name of the State and town, and their own names *plainly written*.

☞ A few of the little slips, or "reminders," intended for those who had not remitted for the second volume of the *Journal*, were placed into the wrong papers in our last issue, and much annoyed some of our good friends who were "all paid up." Please pardon us for this mistake, and any others which may have occurred. We are doing all we can to systematize and perfect the business department of the *Journal*. It was commenced without any expectation of so large patronage, and in the midst of great and exacting business cares; therefore some errors have unavoidably occurred which would not under other circumstances. The names of subscribers have been transferred *three times* to new and larger books, to accommodate the increasing list; and it is possible some errors in names have occurred which have not yet been detected. If our subscribers do not receive their papers regularly, or if there is any thing wrong in the direction, will they please notify us promptly.

☞ A very large number of remittances for the *Journal* have been received since our last issue, all of which have been placed to the credit of subscribers upon our books. For the kind words of commendation and encouragement which accompanied so many of the remittances we desire to express thanks. We wish we could respond personally to these letters; but we cannot, as it would consume all the time at our command.

SILICATE OF SODA FOR WATER-CISTERNS.—Dr. J. H. Estep, of Canton, Ohio, sends us a list of subscribers, and writes as follows:

"You will remember that you advised, through the *Journal*, the use of liquid silicate of soda, to prevent rain-water from becoming hard after passing into brick cemented cisterns. I was exceedingly troubled in this respect, and was led, from your directions, to procure the liquid silicate of soda, and apply it to the inside of the cistern. The water has since been as soft as it falls from the clouds. This one item of information is worth to me many times the subscription price of the *Journal*."

We are glad to be able to impart useful information to our patrons. It is no unfrequent occurrence to receive, in a single mail, a dozen letters in which the writers remark, that some "one article in the *Journal* was worth more than the subscription price of the paper."

ANÆSTHETICS—NEW AND OLD.

The versatile Dr. B. W. Richardson, of England, has recently created considerable interest throughout the medical world by bringing forward another new anæsthetic agent — the bichloride of methylene. A few months ago he suggested tetrachloride of carbon for the same purpose, and published the results of some experiments in its use, which apparently afforded most satisfactory results. From an understanding of the chemical character of this and analogous compounds, we were led to doubt its safety and usefulness. Although an active demand sprang up for it in this country, we hesitated to engage in its manufacture upon a large scale, feeling assured it would soon fall into disuse. Dr. R. has since found it necessary to put forth a "caution" in its use, and now declares it to be "far more dangerous than chloroform." Bichloride of methylene contains two equivalents less of chlorine, and therefore may be a safer anæsthetic, but we hardly believe it will prove safer or in any respect better than chloroform. It is certainly much more costly. Several years ago we had occasion to investigate the nature of some of the substances formed from that series of homologous compound radicals to which belong methyl, butyl, propyl, etc., and we are certain no more interesting researches can be undertaken by any one. Bichloride of methylene and terchloride of formyle (chloroform), are strikingly alike in chemical composition. The formula of the former, C H² Cl Cl, and the latter, C H Cl² Cl, shows that by the substitution of an atom of chlorine for one of hydrogen in the bichloride of methylene, the two compounds are made precisely similar. With these compounds the law of substitution may be made to play a most remarkable part. What is known as marsh gas (hydride of methyl), C H³ H, is the starting point for chloroform, and the two bodies proposed as anæsthetics by Dr. Richardson. Here we have four atoms of hydrogen in association with one of chlorine. Three of these may be regarded as belonging to the chlorine atom, to form the radical, methyl — the other added, makes hydride of methyl. Now it is possible to expel all these hydrogen atoms, and substitute in their place chlorine. By so doing we form a new series of bodies; first, we have hydride of methyl, C HHHH. Expel one H, and substitute Cl, and we have C HHH Cl — chloride of methyl. Expel another H, and substitute as before, C HH Cl Cl, and we have the Doctor's bichloride of methylene. Expel and substitute again, C H Cl Cl Cl, and we get chloroform. Repeat the process once more, and tetrachloride of carbon results — C Cl Cl Cl Cl. We have arranged the symbols so as to clearly show the changes by substitution. This is certainly an interesting and remarkable series of changes; and the results show how closely allied in chemical character the three anæsthetics are.

Chloroform may be regarded as an *old* anæsthetic, and one which has been administered to thousands of human beings for the alleviation of suffering. We certainly ought to know by this time, whether it is a good and safe agent or not. Is it safe? Let us answer the question by asking another. How can an agent be regarded as very unsafe, which has been constantly used for twenty years all over the civilized world, and no more than about one hundred cases of alleged injury from its employment been recorded? It was administered to *eighty thousand* soldiers in the French army in the time of the Crimean war, and not a solitary instance of death occurred from its use. More persons, three times over, have lost their lives by drinking cold water during the last twenty years, than have been killed by chloroform, and cold water is not regarded as very dangerous when properly used. It is certain that many of the instances of death alleged to be due to the employment of chloroform, have resulted from other causes. Undue excitement or emotion, physical weakness, defective organization, etc., may have had much to do with these fatal cases. Also some bad effects have certainly resulted from the use of impure or imperfectly manufactured chloroform; and still further, the very integrity and purity of the article furnished by competent and honest manufacturers, has undoubtedly been the cause, in some cases, of injury.

Chloroform absolutely pure, or as nearly so as is attainable, has been very properly demanded by surgeons, the world over. It was not known by them or by chemists, until within a few years, that absolutely pure chloroform would not keep well; that it underwent spontaneous change, evolving free chlorine. We well remember the anxiety and perplexity experienced ten years ago, when it was learned that some packages of chloroform, prepared with the greatest care, and perfectly pure, had, after several months' keeping, undergone partial decomposition. The same experience was had by the Messrs. Smith of Edinburgh, by Dr. Squibb, and others. Chloroform for anæsthetic purposes should be prepared perfectly pure, by the sulphuric-acid process, or any other which will reach the same end, and then five per cent. of pure alcohol must be added to preserve it. This is indispensable to its keeping, and the small amount of alcohol is in no respect objectionable. If properly prepared, and administered in the right way, the risk in the use of chloroform is small — certainly very small.

Ether is also an old, in fact the oldest anæsthetic, unless we except the nitrous oxide gas, administered by Mr. Horace Wells, of Hartford, nearly a quarter of a century ago. We are inclined to think that Mr. Wells's use of this gas for producing anæsthesia, was prior to the experiments of Morton or Jackson, and therefore his claims to the discovery are well founded. It is quite unnecessary to devote space to remarks upon ether. Its merits are too well understood to require any discussion. It cannot be denied that chloroform and ether have been found to possess nearly or quite all desirable qualities as anæsthetics; and although far from cherishing or expressing doubts as regards the capabilities of chemical science to enlarge the number of these agents, or point out better ones, we still think it will be many years before they will be displaced by others worthy of greater confidence.

Spontaneous Combustion. — In a recent number of the *Journal* we cautioned our readers against accidents occurring from the spontaneous combustion of oily rags, charcoal, etc. Two striking illustrations of the dangers from this source have come under our immediate notice within a few weeks. The Peabody Memorial Church, at Georgetown, Mass., just completed, narrowly escaped destruction from the spontaneous ignition of some rags used in oiling and polishing the wood-work of the slips. These rags took fire, and before discovered, a considerable space was burned in the body of the church. The other instance occurred at the house of a neighbor. He had just completed an elegant dwelling-house, and the workmen threw some oily rags upon the floor of the bathing-room, which had been employed for the same purposes as those at the Peabody Church. In one hour after being thrown aside, these rags burst into a flame; and the house would have been burned, had not the owner fortunately discovered and extinguished them. Here are two palpable instances of the spontaneous ignition of oily rags; and if they had not been discovered, the destruction of the property would have been attributed to incendiaries, and great uneasiness and unjust suspicions would have resulted. Let every one remember these important facts.

☞ A quite remarkable product was placed in our hands a few days since, for chemical analysis, by Doctor Whittemore, of Haverhill, Mass. We have found time as yet, to submit it only to superficial examination; but this has revealed some interesting points, perhaps worthy of notice. The substance is presented in the form of well-defined granules, transparent, and of remarkable uniformity in size; each being about 1-250th of an inch in diameter. Under the microscope they present a most beautiful appearance, closely resembling garnets in color and form. Upon fracturing the crystals, the deep crimson hue disappears, and the fragments become of a pale straw color. The crystals are insoluble in water, ether, alcohol, and acetic acid; partly soluble in sulphuric and muriatic acid; and wholly soluble in strong nitric acid. The solution is attended with decomposition, carbonic acid being evolved. The nitric acid solution evaporated to dryness, and treated with ammonia, gave the blue tint, characteristic of uric acid. Caustic potassa also dissolves the crystals, affording to the solution a most beautiful deep crimson hue. Heat destroys the crystals; the whole being volatilized by heating in the open air. The results of the examination would seem to show that the crystals are largely made up of uric acid; the beautiful color being due to the presence of purpurine, or purpurate of ammonia. We have only to state further that this product is formed in the alimentary canal, or some of the connecting organs, and appears in large quantities in connection with the ordinary dejections of a dyspeptic or ænemic patient. The patient is of spare habit and nervous temperament, and has long been afflicted with what has been regarded as dyspepsia. The form and character of the crystalline substances examined, and the source from whence they originate, present circumstances of perhaps an unusual character; and, therefore, we have ventured to allude to them, although in an imperfect manner.

Glycerine. — Glycerine must be regarded as one of the many useful substances developed by modern chemistry. If pure, its effects are mild and bland, when placed upon tender and broken skin. Sore lips, sore eye-lids, chapped hands, etc., are soothed and healed under its application. When mixed with soft water, one part glycerine to two of water, it may be applied to all abrasions of the skin with advantage. These desirable qualities are only found in *pure glycerine*. The abominable liquids sold in the shops generally, as glycerine, possess opposite qualities from those belonging to the pure article. They produce burning and inflammatory action, and other disagreeable effects. They contain oxalates, formates, ammonia, etc., which have not been removed by any process of purification. The only way to arrest the production and sale of impure glycerine and other chemical and medicinal agents, is for physicians and consumers to *demand* of druggists a true and pure article, and use no substance, especially in medicine, because it is *cheap*.

Microscopes. — The advertisement of the Boston Optical Works will be found upon the last page. We have had in use for a considerable time, and thoroughly tested, the instruments made by this company, and hesitate not to say that they are first-class instruments.

Medicine and Pharmacy.

New Haven, Jan. 2, 1868.

Jas. R. Nichols, M.D.

Dear Sir: — In answer to "H. C. P.," in January number of *Journal of Chemistry*, may I say that, in the case he cites, phthisis was not contracted from the wife, but developed from circumstances very likely to produce the disease in any healthy person?

First, typhoid fever, depressing more or less the nervous system; immediately thereupon, a year or so of watching anxiety and confinement with a dying wife in the close air deemed indispensable to the consumptive, especially in the night-time; and then the further depression and loneliness attendant upon his loss.

Chronic phthisis being dependent directly upon a local difficulty, viz.: incomplete epithelial excretion from deficient expansion of the air vesicles in ordinary breath motion; this defective breath motion being due to any continued depression of the nerve force of the system.

Respectfully yours, etc.,

Chas. L. Ives, M.D.

HALLUCINATIONS OF REPTILES IN THE STOMACH.

Items like the following are ever and anon appearing in the newspapers, and circulated, apparently well authenticated, as facts:

"A boy aged eight years, son of Benj. Whislel, residing in Mefflin township, Cumberland county, Pa., has been seriously afflicted for some time past on account of having a living snake in his stomach. The presence of the young reptile was discovered about two years ago, and by a rapid growth it has attained a size that renders it very painful to the boy. Thirteen physicians assembled at the family residence last week and held a consultation, when it was decided that the only manner in which the snake could be removed was by cutting open the stomach of the sufferer. The boy has not eaten any food except sweetmeats and new milk for more than a year past, and has a horror of everything else in the shape of nourishment."

Now physicians know that there are certain entozoa that exist in the human organism, and often cause distressing symptoms, and continued ill health. But that a "snake," or a toad, or other reptile, could maintain an existence in the stomach for two hours, much less two years, is a fiction that our profession should lose no opportunity to combat. Cases where reptiles are supposed to exist in the stomach are most likely of a hysterical character, and the contortions of the reptile, its "gnawing," and its violent efforts to escape from its prison house, are all imaginary.

We once had a patient, a very respectable lady, who fancied that she had a snake in her throat that was trying to escape. She could feel it with her finger! Would open her mouth, and wonder that we could not see it, and pluck it out! She forewarned us that it was of no use to try to convince her that there was nothing there, for she *knew* better! Had turned away several physicians because they would not believe her. There was nothing left but to prescribe *something*. We succeeded, in course of time, in relieving her partially, at least of the irritation in her throat, but she insisted that our remedies were *bringing the reptile away piecemeal!*

We have heard of a case in which a patient insisted that she had a toad in her stomach. Her physician at last admitted the statement, and prepared to relieve her *mind* of the toad in this way. Giving her an emetic, he awaited its operation; in his officiousness in supporting her head as she vomited, he managed to cover her eyes while he adroitly threw a live toad into the vessel! It was enough, — the patient, with a "I told you so," was cured from that hour.

Such a "pious fraud" was perhaps excusable under the circumstances; but it is always better, and much more in accordance with the spirit of our calling, if we can cure the hallucination by removing the ill-health that causes it.

If any of the "thirteen physicians," who met in consultation in the case quoted above, are readers of the *Reporter*, we trust that they will give us the result of their deliberations, the treatment adopted, and its effect. "Thirteen physicians" would embrace all of the profession of most of our counties — and if the item above is true, "the cause" must have attracted much attention. What is there of it in Cumberland county? — *Medical and Surgical Reporter.*

PULMONARY CONSUMPTION: ITS INOCULABILITY AND CONTAGIOUSNESS.

When the cholera sweeps across a continent and snatches thousands from the midst of busy life to the grave, nations are prostrate with terror. The pestilence that destroys its tens of thousands every year hardly fixes for a moment the general attention. Nothing so shears danger of its terrors as familiarity. The general mortality is twenty-two to the thousand per year; of this one seventh fall victims to a disease, not indeed so sudden in its onset, but which ever seeks by preference its victims among the young, the beautiful, and the talented — pulmonary consumption.

Hitherto little has been achieved toward ascertaining the precise nature of tubercle; still less toward either a remedial or a preventive treatment of its attacks. It is due to M. Villemin, adjunct professor at the Military Hospital at Val-de-grace, Paris, that within a year the scientific world has been awoke to the fact that probably consumption is contagious, that certainly it is inoculable. Like other communicable diseases, only a limited number of species are susceptible to its poison, perhaps none but man, the monkey, the cow, and possibly the rabbit. Carnivorous animals seem not at all liable to the disease, and sheep, birds, etc, though subject to complaints very similar in symptoms, never present cases of real tubercles.

The experiments of inoculation were made by taking a portion of tuberculous deposit and inserting it under the skin of a living animal. Subsequent dissection showed that in from ten to twenty days, the lungs indicated unmistakable evidence of tuberculization, and by the twenty-eighth day, not the lungs only, but the kidneys and the spleen as well, were far advanced in the characteristic degeneration. Inoculated in a pregnant female, abortion was the almost invariable result, and always the progeny met with an early death.

When it is remembered that in consequence of the fixed belief that the disease was not communicable, no precautions have ever been employed to counteract its virus or to put on their guard and protect from its influences those who are obliged to be exposed to it, we see at once the important bearing of these researches.

In France alone the mortality from phthisis reaches the enormous figure of 200,000 every year, and in this country the proportion is probably greater. Although M. Villemin's theories have not been received with entire favor, and have in some quarters been severely criticized, they seem based on careful experiments, and explain many otherwise inexplicable facts in the history and diffusion of tubercules. We believe they will yet be found to be of great service in furthering our knowledge of the disease. — *Medical and Surgical Reporter.*

THE THERAPEUTICAL VALUE OF DRUGS.

Dr. James Grey Glover is communicating to the *London Lancet* some valuable articles on the Therapeutical Value of Drugs. The following is his introduction of the subject: —

No department of medical science has undergone more change than the therapeutical department. In not a few best minds in the profession there is great loss of faith in the utility of medicines, properly so called; and the only materia medica believed in is food and air. This scepticism is only excusable as a rebound from the credulity which, on the flimsiest grounds, credited all sorts of substances with the most mysterious actions on the human frame. It is quite true, that the whole theory of the action of medicines will have to be reconsidered. It is also true, that the study of the natural history of many diseases has shown the uselessness, to a great extent, of medicines in them. But, if I am not mistaken, facts enough will emerge from the present chaos of therapeutics, to show that medicines are of the greatest utility in disease, and that the physician who uses them judiciously, and in a spirit of faith, has really very much the advantage over the physician who sits down at the bedside as a mere student of disease. It is very desirable to ascertain the extent to which disease will get well of itself; but it is possible to overdo the experiment which is to determine this. Our business as physicians, after all, is not with the natural history of disease, but with its history as encountered by art and opposition. Not a few of us would altogether decline to be physicians on the natural-history view of our duty. The natural history of a surgical operation is a very discreditable history as compared with the history of the same operation modified by the medical discoveries of chloroform and the ether spray. And so, without professing to have altogether escaped the prevalent medical scepticism of the time, I believe the natural history of many a disease greatly inferior to the history of the same disease judiciously opposed by medicines as well as by food.

IODINE AND CARBOLIC ACID.

The *Journal des Connaissances Medicales* publishes a letter addressed to Dr. Caffe on Dr. Percy Boulton's late discovery of the action of carbolic acid on iodine. "The inconvenience," says the writer, "attending the external application of iodine and its preparations, is so serious that physicians are often compelled to abandon a remedy the therapeutic efficacy of which is undoubted, nay, almost unequalled in *materia medica*. The great objection to the external use of this remedy is, that it leaves marks both on the linen and on the skin. This is a sufficient motive for seeking some means of getting rid of this drawback, especially in the case of ladies. Dr. Percy Boulton's method consists in adding a few drops of phenic (carbolic) acid to the iodine solution to be employed. This addition renders iodine perfectly colorless, so that it may be applied with impunity. But this combination has another advantage. It appears from that practitioner's observations, which I can confirm, that, so administered, carbolate of iodine, which is the new substance in question, is not only one of the most powerful antiseptics we possess, but is intrinsically a more efficacious agent than iodine alone. I have used this compound under the form of injections, gargles, and lotions, in all cases in which iodine is prescribed. In sore throat, ozæna, abscess in the ear, etc., this preparation is a sovereign remedy, since, besides its disinfecting qualities, it modifies the mucous membrane, causes all local sensibility to disappear, and cures the patient much sooner than if either of the two agents were employed separately. The formula I employ is as follows: Compound tincture of iodide, 3 gms.; pure liquid carbolic acid, 6 drops; glycerine, 30 gms.; distilled water, 150 gms.

Hay and Rose Colds. — Dr. Pirrie has just written a little monograph upon these common and painful affections, dividing them into two classes — one depending upon asthma, the paroxysms of which are excited by different odors; and another which he attributes to the debilitating or paralyzing effects of great solar heat or high temperature, associated, in many cases, by intense light on the cerebro-spinal and sympathetic systems of certain peculiarly constituted people. By a careful examination the physician may discover the causes of the affection, and, if it belongs to the first class, may follow the treatment of asthmas, keeping the patient, of course, away from the exciting causes as much as possible. Cases of the second class are much relieved by confinement during the day in a cool and shady room. As the amount of exercise taken is less, the amount of albuminous food should be diminished, and all excesses in saccharine, spirituous, or other substances which go to form the elements of respiration, should be avoided. This attention to diet is of material importance. After the period of febrile discomfort, the patient needs judicious support. Much importance is attached to the prophylactic treatment, which consists in attention to the general health, and especially to the functions of the skin. Arsenic, judiciously administered by a competent physician, is often of signal advantage. A soothing local treatment is recommended during the paroxysms of either species.

Simple Treatment for Itch. — Dr. Durkee, in the Boston *Medical and Surgical Journal*, recommends common soft soap as an application in itch. The patient should rub the soap upon the parts affected until it produces a pretty severe smarting or tingling sensation, when it may be washed off in warm water. Sometimes one application is sufficient; sometimes two or three may be necessary, and should be practised at intervals of three or four days. When a large part of the body is affected, different parts can be treated in succession.

PROPOLIS AS A REMEDY FOR DIARRHŒAS, ACUTE AND CHRONIC.

By H. O. Hitchcock, M.D., Kalamazoo, Mich.

I take pleasure in bringing to the notice of the members of this Society, an article whose medicinal properties have not, as yet, I believe, been laid before the profession. I am confident that, on thorough and honest trial, it will be found to possess virtues that make it worthy a place in our pharmacopœia.

Some time during the last spring (1866), a gentleman made some statements to me in relation to the efficacy of a certain article in diarrhœas, acute and chronic. He claimed for it, also, great efficiency in the treatment of dysentery, and also in cholera.

I promised to give it a fair trial as soon as any cases indicating its use should present themselves. The article then brought to my notice is thus alluded to, and briefly described, in Vol. III. of the New American Encyclopædia, under the article "Bee;" viz., "Wax is not the only material used by bees in their architecture; besides this, they employ a reddish-brown, odoriferous, glutinous resin, more tenacious and extensible than wax, called *propolis*, which they obtain from the buds of the poplar and birch, and from various resinous trees."

During the past summer, I have prescribed it as a medicinal remedy in numerous cases of acute and chronic diarrhœa, and also in several cases of dysentery. I have also presented samples of it to several members of the Society, requesting them to give it a fair trial, and note faithfully its efficacy.

In my own experiments with it, it has proved one of the best and most reliable remedies I have used, in nearly all cases of simple mucous diarrhœa, even when violent, and accompanied by severe pains, vomiting, and collapse. In many cases, a single dose has been all that was required. In several cases of diarrhœa in children, it has acted like a charm. It appears to possess an anodyne and soporific property, and yet it does not cause constipation of the bowels, but brings them to a normal action at once.

In several cases of dysentery, when given early, it has appeared to have a marked effect in arresting the disease. But in cases where the disease had become established, and especially in those cases where malarious congestion of the mucous membrane characterized the disease, it has appeared nearly worthless.

I have prescribed it in several cases of chronic diarrhœas, in some of which the disease was contracted in camp. All of these patients have reported to me, "that the medicine has acted like a charm;" being far more efficacious than any other medicine they have ever used.

The experiments of Drs. Porter, Fisk, and Southard, of this village, have fully corroborated my own. Below I have given several cases.

The propolis is a green resin of a dark-reddish, or yellowish-brown color, of a glistening fracture, slightly conchoidal, of an aromatic taste and smell, entirely insoluble in water, and nearly so in ether, but readily soluble in alcohol and in liquor potassæ. At first, I used the tincture, which is of a beautiful wine-color.

The following is the formula by which I prepared it for use:

℞ Selected propolis . . . . ʒij.
Alcohol . . . . ℥iv.

Dissolve.

Dose for an adult, ½ to 1 teaspoonful, in sweetened water; for a child, 5 to 20 or 30 drops, after each stool.

When the alcoholic solution is mixed with water or simple syrup, there is a copious deposit thrown down. The taste is pungently aromatic, but is not unpleasant even to children.

Lately I have used an alcoholic solution, as follows:

℞ Propolis . . . . ʒji.
Liq. potassæ . . . . ʒi.

Solve *et adde* aq., simpl. syrup, partes aa ℥ij.

Dose, ½ a teaspoonful after each stool.

The advantage of the alkaline solution is, that its admixture with water or simple syrup does not cause a deposit.

Case I. — G. S., a man seventy-two years of age, called me to see him in the middle of the night, Nov. 14, 1866. He had, the day before, drank a glass or two from a cask of recently manufactured beer; otherwise, he had taken nothing unusual, and appeared at bedtime in his usual health. I found him vomiting and purging very frequently,—vomiting an ashy-looking substance, with dirty, green floccules in it; and the stools were mostly of a thin substance like rice water. There was great pain at the epigastrium and throughout the abdomen, with decided and very troublesome cramps in the legs. Skin was cold and clammy, except about the head; the eyes were sunken; the pulse very feeble, scarcely to be felt at the wrist. I gave him a teaspoonful of a saturated tincture of propolis, and nothing else, except to apply extremely dry heat. He did not vomit again, but had a stool in about 15 minutes. This was followed by another teaspoonful of the medicine. His pain now began to subside, the pulse to be less in frequency, but fuller and stronger. In about an hour, he had another stool, which I followed by a dose of ½ a teaspoonful of the remedy. He required no more, and became speedily convalescent.

Case II. — I was consulted, about this time, by a young man, for a friend of his, who had gradually increasing on him, for some months, a chronic diarrhœa, accompanied by pain and soreness throughout the abdomen. I gave him the alkaline solution above indicated, in doses of ½ a teaspoonful, three times a day. Three days after, the pain and soreness had all passed away, and the stools were nearly or quite normal in frequency and consistence.

Case III.—(By Dr. Porter.) H. P., during a typho-malarious fever, was attacked with diarrhœa. Dejections every 20 or 30 minutes; very dark and watery, and accompanied by vomiting. Ordered a teaspoonful of a mixture of equal parts of tinct. propolis, and simple syrup, to be repeated every two or three hours. The first two doses were rejected. After the third, vomiting ceased, and no stools for two hours; and another dose ended the diarrhœa entirely.

Case IV. — (By Dr. Fish.) October 31, 1866, was called to see Mrs. P., who had had chronic diarrhœa for two years, not having had a natural stool within that period; stools generally were from two to four per day. There was attending the diarrhœa a great deal of soreness over the liver, stomach, and bowels. In one week, the tincture of propolis, in doses of ½ a teaspoonful, three times a day, had entirely cured her.

I take pleasure in submitting the above to the profession, and in submitting the article to, and asking for it, the careful and honest test of its experience.—*Chicago Medical Journal.*

Jeffersonville, Ind., Jan. 3, 1868.

Editor Journal:

In regard to bromide of potassium, I can say, from my experience with it, that, in cases of nervousness, restlessness, and inability to procure sound sleep; also, when there is twitching of the muscles, particularly the muscles of one side of the face, from excessive mental labor, or dissipation, the bromide, in five-grain doses, three times per diem, has produced the most happy results.

A dose of the above size seems to do as well as larger doses. In *any* cases where a powerful nervous sedative is needed, the bromide claims a great deal of respect. It is peculiarly efficacious where you have *periodical* nervous attacks; preventing the paroxysms from returning, or greatly lessening their violence. Therefore it will be found useful in neuralgia and nervous pains generally.

Yours, etc.,

D. L. Field, M.D.

Formulae.

USEFUL IN MEDICINE AND THE ARTS.

Editor Journal of Chemistry:

Substitute for Calomel in Torpor of the Liver, or Biliary Congestion with Coated Tongue, etc.

℞ Pulv. opium . . . . 10 grs.
Sulph. quinine . . . . 5 grs.
Podophyllin . . . . ℈i.
Leptandrin . . . . ℈i.
Sup. carb. soda . . . . ʒii.
Pulv. Rad. Glyrrch. . . . . ʒiii.

Mix. Fiat powder. *Dose.*—5 or 6 grains, repeated every six hours, to extent of four or five doses; to be followed with castor oil.

Garry H. Miner, M.D.

Morris, Conn.

Editor Journal of Chemistry:

I take the liberty of transmitting to you a formula which I have found very satisfactory and efficient as a chologogue laxative and cathartic. It is as follows:

℞ Hydrarg chlor. mit., podophyllin, leptandrin, juglandin, rhei pulv., gamboge . . aa, ʒi.
Al. ext. hyoscian . . . . ʒiss.
Ol. menth. piperit . . . . gtts lx.

Mix, and triturate thoroughly. Fiat pilulæ, CCXXV.

Dose.—As a laxative, from one to two pills; as a cathartic, from two to four, to be taken at bedtime.

As a laxative and cathartic for ordinary purposes, the calomel might well be omitted; but in cases of obstinate congestions of the liver and portal system, accompanied with extreme torpidity of action, its presence in the compound is not only essential, but quite indispensable.

Truly yours, J. Newton Lowe, M.D.

Titusville, New Jersey.

Editor Journal of Chemistry:

As an excellent cathartic and remedy for bile accumulations, I send you the following recipe:

℞ Sal Rochell. . . . . ℥i
Podophyllin . . . . gr. ii
(As a powder, or) with water, ℥vi, suspended.

Peppermint water is the best vehicle to prevent griping.

Direction.—Every two or three hours, a tablespoonful.

Very respectfully,

I. M. Rupp, M.D.

Tell City, Ind.

OINTMENT FOR CHILBLAINS.

℞ Essence of turpentine....................... ℥i
Olive oil.................................... ℥iss
Sulphuric acid............................... mxv

M. *Cazenave.*

Substitute for Coffee.—The seeds of grapes are very generally used in Germany as a substitute for coffee, and they make a very excellent substitute. When pressed, they yield a quantity of oil, and afterward, when boiled, furnish a liquid very similar to that produced by coffee. Its flavor is said to be delicious.

Alkanet Root for Coloring.—In selecting alkanet root for coloring hair oils, wax, marble, etc., the smaller roots should be chosen, as they contain more bark than the large ones in proportion to their weight. The coloring matter exists only in the bark.

Cleaning Marble. I.—Brush the dust off the piece to be cleaned: then apply with a brush a good coat of gum arabic, about the consistency of a thick office mucilage; expose it to the sun or dry wind, or both. In a short time, it will crack and peel off. If all the gum should not peel off, wash it with clean water and a clean cloth. Of course, if the first application does not have the desired effect, it should be applied again.

II.—Make a paste with soft soap and whiting. Wash the marble first with it, and then leave a coat of the paste upon it for two or three days. Afterward wash off with warm (not hot) water and soap.—C. G. F., in *Sci. Am.*

Formula of Hall's and Ring's Hair Restorative.

B. Lactis sulphuris,
Plumbi acetatis............................ aa ʒ j.
Sodæ muriatis.............................. ʒ ij.
Glycerine.................................. f ℥ ij.
Spir. myrciæ (bay rum)..................... f ℥ viij.
Spir. jamaica (jamaica rum)................ f ℥ iv.
Aquæ, oj.

M. S.—Shake before using.—*Druggists' Circular.*

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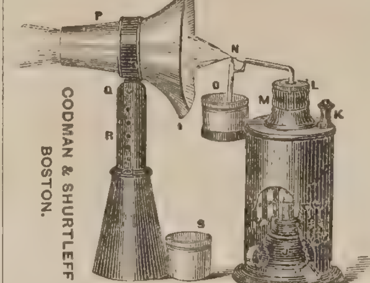

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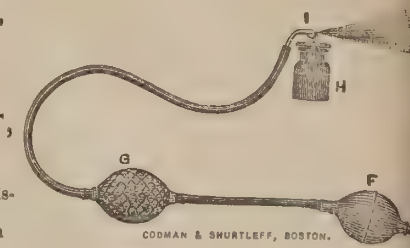

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BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, MARCH 1, 1868. No. IX.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

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Contents.

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Familiar Chemistry.

HEAT AND COLD.

Prof. Tyndall is giving a course of lectures to boys and girls, on *heat* and *cold*, at the Royal Institution, London. We present a brief extract from the introduction to the first lecture, as illustrative of the familiar style of this truly great man, before a juvenile audience:—

Now, I suppose all of us, twenty times a day—perhaps more—make use of the word "*I*." Every boy here present says, "I eat," "I drink," "I sleep," "I feel;" but perhaps very few boys or girls either ever ask themselves, "Who is this *I* that does all these things?" and if you went to the biggest man in the world, or the greatest philosopher, you would puzzle him exceedingly if you asked him, "Who is this *I* that sleeps, and drinks, and eats, and feels?" In fact, philosophers, great as they may be—and great they are—find that there are things altogether beyond their knowledge and beyond their power to understand; and this wonderful human *I* is one of those things. Hence, I do not want you to be able to answer me if I ask, Who is this *I*—what is this *I*—that sleeps, and drinks, and eats, and feels, and makes use of its senses? In fact, as I have said, the best of us know very little about it; but we know a great deal of that peculiar instrument by which the *I* operates upon the world, and by which it understands the things that are going on in the world; and that instrument is the wonderful human body. When we examine that body, looking into its interior parts, we find bones and blood and muscles and tissues of various kinds; and, passing through these muscles, we find strings of whitish matter—strings going from the spinal marrow, and going from a mass of matter that rests in this wonderful cavity called the head. I say those strings of white matter go through the body, and they are called the *nerves;* and it is by the intervention of these nerves and this wonderful brain, that we human beings are able, so to say, to hold converse with the world round about us. Now, these nerves transmit the impressions from without. If I prick my finger, a nerve is affected; it is lacerated by the pricking of the pin or the penknife, and that nerve thus lacerated sends intelligence through itself up along the arm to the brain; and, until it arrives at the brain, you do not feel anything. It travels up to the brain at the rate of about 180 feet in a second. This is one of these wonderful things that have been measured by able men. You do not feel the exact moment your finger is pricked.

A CURIOUS application of electricity has been made by a jeweller in the Rue Therèse, M. Trouvé. He makes scarf-pins, etc., with heads upon them, which, at the will of the wearer, move their eyes. They are delighting fashionable Paris. The electro-motor is usually carried in the waistcoat pocket. It is formed of one couple, either zinc and carbon, or zinc and platinum. The carbon is fixed in the vessel which holds the exciting liquid,—a saturated solution of sulphate of mercury,—there being an outer case in which this vessel is placed. The zinc is fixed to the lid of the case, and does not plunge into the liquid, which only fills the lower half of the vessel. So long, therefore, as the apparatus is in an erect position, there is no action; but when placed horizontally, the current is formed. The whole apparatus makes a little case of the most trifling size.—*Chem. News.*

A TALK ABOUT LABORATORIES.

Considerable curiosity is manifested by those unacquainted with practical chemical processes, regarding the workshop where chemists carry on their labor and researches. The rooms or establishments are called laboratories, and, in regard to arrangements and appliances, are entirely unlike other places devoted to labor or study. Laboratories are fitted up with reference to the special work for which they are designed. Students' laboratories, or those devoted to instruction in schools and colleges, are usually not very imposing in dimension or fixtures. The room contains a furnace or two, often very rusty or dilapidated, being seldom used; an assortment of glass tubing, beaker glasses, test-tubes, wash-bottles, funnels, reduction tubes, chloride calcium, bulbs, blowpipes, etc., and a full set of re-agents for wet and dry testings. Air-mixed illuminating gas is now generally used for heating purposes, instead of coal-furnaces; and the numerous ingenious contrivances for procuring an intense heat are so convenient and perfect that coal heat is seldom resorted to. By the aid of the gas-furnace, many of the most refractory metals and minerals are fused, disintegrated, or volatilized, in a very few moments; and this, without dust, smoke, or exposure of the operator to unpleasant glare or heat. The little Bunsen burner, so-called, is much employed for drying and evaporating purposes, and it is wonderfully convenient and economical. Laboratories for research or instruction, such as were fitted up in the early days of Sir Humphrey Davy, or Faraday, had but few points of resemblance to those of modern times. The engravings often seen in old books, in which are figured curious stills with worm-condensers, big mortars, stone jugs and crucibles, huge furnaces, etc., seem absurd to modern chemical students. Some of these are evidently got up for effect; as the flames are represented as very fierce in the furnaces, darting out like those from the hot oven in which were confined Shadrach, Meshach, and Abednego, in times of King Nebuchadnezzar. Faraday lived long enough to witness and to assist in all the improvements of half a century; and we have often thought of the marvellous changes which passed under his observation in the course of his long laboratory life. The old alchemists and quack experimenters of the middle ages had their laboratories or dens in subterranean cavities or dark attics; and the superstition and ignorance of the times lent its aid to invest them with a peculiar awe or mystery. Nothing is more perplexing to the student of modern days than the history of those years before the exact chemical nature of even common substances like water, air, earth, plants, etc., was known. It is perplexing, because it is impossible to conceive of such ignorance, or how people, with any light at all, could fall into such vagaries and absurd notions.

The mystery so long associated with laboratories has never been fairly lost from the popular mind; and

some, even now, regard chemical manipulation as a kind of wizard's work, or necromancy, which few can understand. The results of the chemist's labors are so wonderful, it is no matter of surprise that his vocation seems to the uneducated almost allied to the black art. As before intimated, laboratories for study or experiment, require but little space, and comparatively little apparatus. Almost any room may, at small expense, be fitted up for analysis or research, and meet all requirements of the student. Those of some of our most expert analytical chemists are small rooms in, or connected with, the dwellings in which they reside, the few gases, or disagreeable odors evolved in such work being no serious objection to the close proximity of a family.

It is far different, however, with technical or practical laboratories, where chemical and therapeutical substances are manufactured in a large way. The work performed in such is of another character, requiring unusual skill, judgment, ingenuity, and experience. There are hundreds of men, who have spent years in lecture-rooms and college laboratories, and some who have witten or compiled chemical text-books, who could not superintend a chloroform-still, or an ether apparatus successfully. Our experience with chemists of this kind has not only been very vexatious and expensive, but decidedly amusing. The blank look of astonishment and mortification of some young men, fresh from the schools, who have found all their knowledge at fault, and all their confident undertakings failures, in practical laboratories, is among the mirth-provoking incidents not easily forgotten. It is very certain that passing over the three or four years' course of study in our college laboratories, performing the routine of experiments, and tracing diagrams upon blackboards, does not make chemists, any more than blowing the bellows of a smith's forge makes blacksmiths. The world is full of graduates from the chemical schools of our own country and Europe, but there are very few chemists. The order of talent required to conduct successfully chemical manipulations in an industrial way, is, it must be confessed somewhat rare; and there is but poor encouragement for young men to undertake this work, unless they possess an enthusiasm for the study not common, and an amount of industry, perseverance, and ingenuity, which would insure a fortune in any other pursuit in life.

The apparatus in use in practical laboratories is usually quite extensive, and of a singular and complex character. A large establishment, where different substances are produced, may be regarded as a kind of combined laboratory, made up of many special ones. Each article manufactured requires apparatus complete in itself; and the product must be as separate and independent as if it were the only one produced. Operators engaged in the fabrication or isolation of the opium alkaloids know nothing concerning the work of those occupied in extracting the alkaloids from bark, and *vice versa*, although they may be under the same roof. The same may be said of other products; and this is necessary to insure safety, order, economy, system, in the labor.

The work involving the exercise of the highest scientific skill and ingenuity, is connected with the construction and arranging of apparatus, and the devising of new chemical processes by which the greatest economy and facility of manipulation may be secured. To solve a difficult and intricate problem connected with the production of a chemical substance, months of hard study and experiment may be required.

Specific or original research is usually demanded upon the production of each substance introduced into manufacture. Books afford but little aid to the practical chemist. There are plenty of cyclopædias and technical works, some of them by experienced chemists; but they reveal no secrets. It is well understood, that no chemical processes having industrial value are published, or permitted to be known, until other and better ones are devised. A chemist starting off in the manufacture of chemical products leaning upon books for guidance, would soon not only discover the absurdity of his position, but the bottom of his purse.

After a substance has been carefully studied, and the most economical method of its preparation devised, and suitable apparatus constructed, it passes into the regular line of manufactures. It becomes a part of the constant products of the laboratory; and operators are instructed in all the details of the various processes through which it passes. The operators or workmen are not usually chemists; and in a large laboratory it is no uncommon circumstance to find some of the most careful and valuable assistants not only unable to read the simplest chemical formula, but the simplest sentence in any book. Sober, careful men are selected; men whose perceptive faculties are keen, and who have a natural tact for the business. These are drilled in the routine of the special departments to which they are assigned, and not the slightest deviation or alteration is permitted in any stage of their work. A subdivision of labor is carried out to the farthest practical point; and when any substance passes through several distinct processes, each one is placed under a separate charge.

For example: In the laboratory of the writer, one man has been employed for years in removing scale-irons, the tartrate, citrate, pyrophosphate, etc., from glass plates as they come from the drying-room. He knows nothing of precipitating irons, or of the chemistry of the processes through which they pass before reaching his department. The bromides and iodides, the mercurial bismuth, gold, silver, zinc, copper, lead, tin, etc., preparations, in well-conducted laboratories, have all separate departments, in charge of those whose business it is to attend to the manipulating processes connected with each article, and nothing else.

A vast amount of knowledge and experience is required in conducting many operations of a practical laboratory which may not be stirctly connected with chemical re-actions. The crystallization of soluble salts is a natural process, and one which, to the inexperienced, would seem to require but little care; but it is far otherwise. Well-defined, uniform, brilliant crystals are demanded for use in medicine and the arts; and in the sale of these products, very much depends upon appearances.

To procure such from solutions, the density and temperature must be very nicely adjusted, and all disturbing agencies carefully guarded against. A slight jar given to a capsule or crystallizing pan, may instantly cause the crystals to shoot out into the most fantastic shapes, or the atoms to aggregate in the form of fine powder and precipitate to the bottom of the vessel. A slight deviation in the density of liquids may cause the crystals to assume unusual forms or size, and they have to go again into solution. In this department the chemist has much to combat, as the weather and the seasons of the year are serious disturbing agencies.

No one can experiment in a large way without soon discovering that chemical re-actions are greatly influenced by *quantity*. The re-actions, for example, which take place between bleaching salts and alcohol, in the production of chloroform, are supposed to be well understood by chemists, who have prepared a few ounces or pounds of the article; but without instruction or experience, it would cost them many dollars to learn that a mixture of several hundred pounds requires altogether different treatment, and a more careful adjustment of temperature, than a mixture of a dozen pounds; and this affords the reason why so many young chemists, who have been well instructed in the schools, break down when brought into contact with the industrial labors of the laboratory. They find they have another trade to learn, and this leads to discouragement and distrust.

It has been intimated that many methods of chemical manipulation are not known or understood outside of the laboratories where they originated. These processes have cost money, time, research, etc.; and the discoverers feel that they have a right to the rewards of their labors. Hence, we always see the provoking words, "*Positively no admittance*," posted at the entrance to laboratories; and the notice has a fixed and positive meaning. It is impossible for any one, unless by stealth, to obtain admittance, either to gratify curiosity or to gain information; and of this no one has a right to complain. As a rule of ethics, it is well understood among manufacturing chemists, that peculiar apparatus and peculiar processes are a kind of property which may be held as a monopoly, and enjoyed, until better ones are discovered by others; when the monopoly immediately passes to new hands, as a reward of superior ingenuity and skill.

It may be said, in closing this brief talk about laboratories, that they are not usually quite as nice and tidy as a lady's parlor, or as some other workshops. The odors, vapors, gases, and dust present, and oxidizing processes going on, are not favorable to fastidious cleanliness. A laboratory is no place for fine silk dresses or broadcloth coats; as these would be likely to speedily receive some "spots" which neither ammonia nor "benzine" would remove. At a future time, we may favor our readers with "A Walk About a Laboratory."

Chemistry Applied to the Arts.

HOME-MADE BAROMETERS.

Take two sheets of pasteboard paper of any convenient size,—say three feet long by two feet wide. Bring the ends together, and glue or paste them tight, each sheet by itself; and they will look like two pieces of paper stove-pipe. Cut thin, round boards exactly to fit in the ends of these paper cylinders. Carefully glue or nail them tight. Now you have two air-tight paper drums with wooden heads. Take a pole of any length you desire—three feet or twelve feet—let one drum be fastened to each end of the pole. Now balance this pole with the drums on each end, on nice pivots, in the middle. Then bore a gimlet through the end of one drum, and you have a good farmer's barometer. One drum is air-tight. One has a hole in it; so there will be more or less air in one drum than there is in the other, according as the surrounding air is dense or rarified. Consequently, in dense or heavy air, the tight drum rises, while the one with the pinhole in it goes down. Crosswise through the middle of the bar or pole, should run a stick as large as one's finger, a foot long, with wire-gudgeons, on which the instrument should vibrate or teeter. Let the ends of the pole be slightly lower than the middle, that the whole do not make a somerset; smear all with glue or oil, so that no air enter only in the puncture mentioned. Have something you can slide through the bar, to keep it nearly level. Mark, if you please, figures along the pole, to show how far you have moved the balancing poise; though for this there is but little need.

This instrument may not be so perfect as a costly barometer; but, for all practical purposes, it is all one could ask. I have had one more than a year. I look at it a dozen times a day. They could be made and afforded for fifty cents apiece. They could be made as long as a barn, and placed in the loft, with an indicator, to show the distant mower when to make his hay.

EXAMINATION OF BLOOD-STAINS.

Dr. Thomas Price, Professor of Chemistry, Toland Medical College, has the following communication in the *Pacific Medical and Surgical Journal:* —

On the 28th of February last, the clothes of an Indian, who, it was suspected, had murdered an old woman of seventy years of age, at Martinez, Contra Costa Co., were brought to me, in order that I might subject the blood-stains found on them to a chemical and microscopical examination. The evidence against the prisoner was entirely circumstantial, and created great interest during the whole trial. The Hon. J. W. Dwinelle, the presiding judge, remarked that he had never sat upon a more interesting case. The evidence, although entirely circumstantial, was overwhelming; and, as the able and indefatigable prosecuting attorney, H. Mills, remarked, "formed a complete and perfect chain, without a single link missing." When the Indian was examined at first, and before being committed to jail, he accounted for the blood-stains found on his clothes by his having helped a lady to kill a turkey a few days before. This statement rendered my examination a very easy one. Had he contended that he had been assisting to slaughter some of the domestic mammalia, the science of chemistry and microscopy would have failed in adding a link to the chain of evidence against him, especially as the stains were some thirty days old when the clothes were handed over to me.

The following is a description of the method I adopted in my examinations, *to prove that the stains were really blood:* —

1st. By chemical tests. Portions of the smeared clothes were digested in water, alkaline salts, and glycerine, which yielded me, after several hours' soaking, a solution having the characteristic red color of blood, which suffered no change on addition of ammonia, and coagulated on boiling and on addition of nitric acid. These chemical tests were only used to establish the fact that the stains were or were not due to blood. So far, we are not able to find any distinct difference between the blood of man and that of any other animal by chemical tests; yet it was contended at one time, by specialists in this department, that they could discover, by the smell of the blood, to what animal it belonged; and possibly one may so educate his nose as to be able to form an opinion, and probably the blood of a goat may be pronounced upon with certainty by the odor; but it is my experience, that it is better not to rely upon the odor.

2d. By microscopical examination. The red-colored liquid obtained above, presented, under the microscope, the well-known blood-globules in the form of circular flattened discs. This fact, connected with the chemical tests, proved that the spots were due to blood; and more than that, the form of the corpuscles showed conclusively, that it was the blood of a *mammalia.* The micrometer was now attached to the microscope, and the corpuscles measured, with the following result: size, 1-2000 of an inch to 1-4000 of an inch; average, 1-3200 of an inch; from which result it was possible that the blood could be human blood, as these measurements are the same as those given by eminent microscopists as the size of man's blood. And they agreed very nearly with measurements of the globules of my own blood, that of my assistants, and others; but from the fact that the stains were old, I could not state positively that the blood I found on the clothes was that of a human being. I could, and did state, that it was not the blood of a turkey, and that it must be the blood of a mammalia. The size of the corpuscles corresponded with those of man. I could not swear that it was human blood; nor could I, on the other hand, state that it was not. Since there are no means of ascertaining that the dried globules have assumed their original size, their measurement affords no positive proof that they are from the blood of man.

At this stage of my examination, and at the request of Judge Dwinelle, I telegraphed to San Francisco for my microscope, as some of the jurors had made up their minds that it was impossible to detect any difference between the blood of the various animals, birds, fishes, and frogs. They could see no difference with their own eyes; and never having looked through a powerful microscope, they thought it purely imaginary.

The jury were shown, under the microscope, the following bloods: that of a frog, chicken, turkey, hog, calf, cow, dog, and horse, and each of them compared with blood from my own finger. The whole of the jury were much interested in these experiments; and the most skeptical of them confessed that the difference between the blood of the turkey, chicken, and frog was so great, that it was impossible to mistake one for the other. Some of them even went so far as to say, that they could distinguish with their eyes, and, without the use of a micrometer, detect the difference between the blood of a hog, cow, and calf, and my blood. All of them were now entirely convinced of the value and reliability of the microscope.

The jury found the Indian guilty, and on the last day of July he suffered the extreme penalty of the law.

To Place Water in a Drinking Glass Upside Down. — Experiments of this kind are not only amusing but instructive; they illustrate what at first sight appears to be the "laws of Nature reversed," while, in truth, when we are familiar with them, they teach the "immutability of Nature's laws." The more experiments a boy makes, the greater number of rounds will he ascend up the "ladder of learning;" and when he is at the top, how bright is the prospect before him! All is beautiful, wonderful, and lovely. Then can he come down, and

> Find tongues in trees, books in the running brooks,
> Sermons in stones, and good in every thing.

But to our paradox. Procure a plate, a tumbler, and a small piece of tissue or silver paper. Set the plate on a table, and pour water in it up to the first rim. Now very slightly crumple up the paper, and place it in the glass; then set it on fire. When it is burnt out, or rather just as the last flame disappears, turn the glass quickly upside down into the water. Astonishing! the water rushes with great violence into the glass! Now you are satisfied that water can be placed in a drinking glass upside down. Hold the glass firm, and the plate also. You can now reverse the position of the plate and glass, and thus convince the most skeptical of the truth of your pneumatic experiment. Instead of burning paper, a little brandy or spirits of wine can be ignited in the glass; the result of its combustion being invisible, the experiment is cleaner.

The Value of Milk as an Article of Food. — Mr. Horsley, analyst to the county of Gloucester, in a paper on this subject, says that a milk may be of high density, and yet give but comparatively little animal matter, such as cream and caseine, whilst the amount of lactine retained in solution in the whey may be greater than usual; on the other hand, a sample of milk may be of lower density, and yet yield far more animal matter than ordinary, though each may be perfectly genuine; the difference in the relative value of the constituents depending much on the time of year, the mode of keeping and feeding the cow, etc. He found only one degree of difference between a sample purchased at Cheltenham and a sample supplied to the workhouse; but an analysis of the two specimens shows not only a vast difference in the amount of solid matter, but also that very little reliance can be placed in any of the instruments usually employed in determining the value of milk; for the fatty matter of the milk, unlike any other aqueous solution, helps to keep up the instrument, and gives no idea of the actual density of the sample, nor of its value. — *Chemical News.*

Liebig's Extract of Meat. — The Government have contracted with Liebig's Extract of Meat Company (Limited), for the supply of the Company's extract to the troops of the Abyssinian expedition. The extract is packed in small jars which a soldier can easily carry with him; being enabled thereby to dispense with fresh meat for a number of days, and to cook a palatable soup in fifteen or twenty minutes at any halting-place where hot water can be procured. The Government were no doubt guided in this decision by the experience gained in the last German war; it having been acknowledged by many officers and men that they owed to the use of this extract of meat the preservation of excellent health. — *Chemical News.*

THE SPECTRUM OF THE CRIMSON TIDE.

BY RUFUS KING BROWNE, M.D.

If Newton put our sun and the planets in a scale and accurately estimated their weight, so the discoverers of spectral analysis, by *means* of the light of both sun, planets and stars, placed them in a sure testing tube and analyzed them, ascertaining their constitution, their stage of aggregation, and nearly completely their chemical composition, with the same certainty with which we analyze in a crucible a fragment of the crust of our earth. The one was a vast physical problem solved; the other a vast chemical revelation.

Almost everybody who has learned the meaning of the name, knows the wonders that spectral analysis has accomplished in the varieties and states of matter near to and most remote from us.

It has *shown* the world the actual existence of burning stars, those apparently just kindling, flashing, and extinguishing bodies. Astronomy was forced to suspect more than existed, and has ascertained the chemical character of their conflagrating substance.

This it does because the brilliancy of such a substance or any substance, in such a vaporous state, will present to the view, transmitted through a prism, — a three-cornered piece of transparent, polished glass, — a telescopic lens, of which two the spectroscope consists, — one or several colored lines, — which appear only (each one or several) from the light of each substance.

But it has achieved far greater wonders with the matters within us; the changing and transforming substances of our flesh and blood. But what is most marvellous is, that in this field of employment, it has met with substances far more delicate in their powers of revelation than itself; that is to say, substances without the intervention of which, the spectroscope itself would fall far short of detecting in such infinitesimal quantity. Let us briefly narrate the story: — Rushing in all the minute blood channels, which in great part constitute our fleshy structure, frequently at a velocity which no mass of either living or inert matter, either least or greatest in nature, has yet equalled,* mingling with the amber-colored stream of liquid of the blood, are certain minute reddish, rounded, soft, solid bodies, the blood-red corpuscles.

High powers of the microscope in the hands of the most skilled observers reveal, that scarcely any two of these *are of precisely the same size;* some of them are from five to six times the size of others. It is agreed, that in human beings, their average length is about the 1-2400 of an inch. It would be possible, if they were closely packed together, for 8,126,464 to lie in a space occupied by a pin's head. The tiny red drop which issues from the puncture of living flesh, by a prick of a needle, consists of about 5,000,000 of these bodies; and a room sixty feet long, thirty feet wide, and fifteen feet high, could not contain so many grains of corn as there are red corpuscles in a single teaspoonful of human blood.

The chief and peculiar office of these little bodies has been long suspected, by the circumstance of their regularly undergoing two changes of color during their round of the circulation. One change from a purple hue to a scarlet, and another change from the latter hue to the former. These little bodies are the carriers of oxygen from the lungs, where they take it from the air, throughout the body. During its passage through the bloodvessels of the lungs, the blood expels carbonic acid and appropriates oxygen. This oxygen, it is now known, is taken up by the red corpuscles. Ever since this fact was discovered, it has been assumed by physiologists, that the coloring matter of the corpuscles was capable of combining with oxygen in the lungs, and of afterward giving out that oxygen again in small increments, as it were, to the substances surrounding the bloodvessels; *i.e.*, the tissues. Spectral analysis gives us the perfect demonstration of the fact.

Years ago, somebody recorded the curious fact, that when a ray of white light passes through a *solution* of blood, and is then passed through a prism, *two* dark bands make their appearance in the green color part of the spectrum. Lately a distinguished English physicist verified and repeated the fact; but in his hands it became the initial step of a new train of research.

* I have calculated, that the blood-red corpuscle moves four hundred times its own length in a second.

This observer treated a solution of red blood corpuscles with a "reducing" agent, — that is, an agent which steals away the oxygen from the reduced substance, — and observed the color of the solution. It almost instantly changed from the color of the red corpuscles of arterial blood, scarlet, to purple red, the hue of venous blood. On examining the spectrum of this by means of the spectroscope, he observed that the two dark lines had disappeared, and that only a single line, intermediate in position between them, was visible. On shaking a part of the solution of red corpuscles in a tube with air, the scarlet hue returned; and when again examined by the spectroscope, the two lines in the spectrum characteristic of the scarlet-colored substance re-appeared; but these again, after a few minutes, disappeared, and the solution showed by the spectroscope the one-line characteristic of the now purple-hued substance of the solution of red blood corpuscles.

The spectroscope thus demonstrated that the scarlet arterial blood lost its oxygen in the first instance to the reducing or deoxidizing agent, and subsequently appropriated oxygen again from the air, when shaken in it.

This, to physiology immensely important, because truly demonstrated conclusion, was thus stated by the discoverer: —

"The coloring matter of blood (of its red corpuscles) is capable of existing in two states of oxidation, distinguishable by a difference of color and a fundamental difference in the action on the spectrum. It may be made to pass from the *more* to the *less* oxidized state by the action of reducing agents, and recovers its oxygen from the air."

But even more wonderful, physiologically considered, is an unnarrated fact, which has not yet travelled beyond the private records of observation. This is the fact: That these red globules are not, as is universally believed, carried by the fluid, as impelled by successive contractions, from the heart, but move through the liquid blood at a much faster rate than the liquid itself. Each globule may, therefore, move at a rate different from time to time, and different from its fellows, although, in general terms, they concur or move together at a certain rate. Upon the perception of this fact, no doubt, will turn many future discoveries of the condition of varying states of health and disease. Mankind have always had a dim instinct, hitherto uncorrected and unsupported by science, that many states of disease are dependent on the blood.

May it, indeed, turn out to be at least scientifically true, that "*The life is the blood.*"

In these observations, there was a perfect demonstration, that this coloring matter, constituting the distinctive matter of the red corpuscles, named *cruorine*, could easily pass from one state to the other, and the reverse.

In the more oxidized, the scarlet state, that in which it is found giving, by the corpuscles, to the arterial blood its scarlet hue, it is distinguished as *scarlet cruorine;* and in its reduced or less oxidized state, that in which the red blood corpuscles give to venous blood its purple hue, it is known as *purple cruorine.*

It is hardly necessary to designate what a consummate explanation these facts afford, of the oxygen appropriating and carrying capacity of the red blood corpuscles, nor what a soul-inspiring exemplification it is of the achievements of spectral analysis.

In the lungs, the purple cruorine of the red corpuscles of venous blood appropriates the oxygen from the atmosphere, and becomes *scarlet* or arterial cruorine; and in the whole of the general circulation, in the minute blood channels, this cruorine of the red globules having passed through the arterial part of the circuit, loses a part of its oxygen, and passes back to the purple or venous state.

But those results, high though they be, have been exceeded, in direct practical consequence to the world at large, by those achieved with the micro-spectroscope.

An eminent London optician, Mr. Lorby, has, in inventing and using it, supplied medical jurisprudence with a new and certain means of identifying the character and variety of dried blood-stains. By it a scrap of blood-stained fabric 1-10 of an inch square, containing, possibly, not more than 1-1000 of a grain of red corpuscle coloring matter, may be ascertained to have received the blood from one or another source.

But, the at present crowning result of these observations is, that the cruorine itself is a sure test for a far smaller quantity of substance by itself than either th spectroscope or micro-spectroscope can take account of, except by means of it.

If a weak solution of blood be inverted in a test-tube over mercury, it reduces itself to the state of oxidation of venous cruorine, and a small prism will then show the one-line spectrum, characteristic of purple cruorine; but if a single drop of distilled water be added, the oxygen in solution (not in combination) in that drop will restore the cruorine to its scarlet state.

This change of state in the oxidized substance, the cruorine, will be at once shown in the spectroscope; but the amount of oxygen by itself which the cruorine thus appropriates, and by which it changes its state, would never be revealed *by itself*, or in any other way known to us, even by the spectroscope.

In presence of these scientific triumphs, we are impelled to inwardly exclaim, that the blood, which is the life, the most wonderful of fluids, is no longer the hopeless mystery it was, but has yielded its most ulterior secrets to the patient worker. — *Dental Register.*

Boston Journal of Chemistry.

BOSTON, MARCH 1, 1868.

☞ Any one sending us the names of *three* subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For *five* subscribers, we will send the *petite microscope*. For *twenty-five*, we will send, in addition to the microscope, a copy of *Stockhart's Chemistry for Students*, the best elementary treatise yet published. For *one hundred* subscribers, we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring-rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. Downes is general travelling agent for the *Journal.*

☞ All letters relating to *Journal* matters should be directed, "Boston Journal of Chemistry, Boston, Mass."

☞ The *Journal* will be enlarged in July, at the commencement of Vol. III. We hope to be able to maintain the same *exceedingly low price*, 50 *cents per annum, making it the cheapest scientific journal in the world.* It is only by having an immense circulation that it can be supported at this price. If our patrons will assist us by sending in each a new subscriber, we shall soon have a list of *fifty thousand*, which will render the *Journal* self-supporting. All names sent in before July, will be credited for Vol. III. in full; and the remaining numbers of the present volume will be furnished as a *gratuity.*

☞ The shocking occurrences called kerosene lamp explosions, still continue to be reported in all parts of the country. Five persons have been killed and six wounded by an explosion at Winesburg, Ohio. A little girl aged eleven, and two other children, were dreadfully burned by another, at Norwich, Conn.; a child at Chelsea, Mass., seriously injured, etc., etc. These are not accidents; they are *murders.* No accident of a serious nature can result from the use of true kerosene oil, which will stand the fire test of 110°. The wicked men who are engaged in manufacturing dangerous naphtha mixtures deserve the severest punishment. Let us drive these men to the wall; let us expose the frauds, and thus prevent a vast amount of human suffering. Disseminate far and wide the information regarding kerosene presented in former numbers of the *Journal.* Consumers should test the kerosene they purchase. We will add a word to former directions given. Take a common quart bowl; fill it one third full of boiling water; now add cold water, a little at a time, until a thermometer placed in it indicates a temperature of 110° F. A tablespoonful of the oil to be tested may be turned into the water, and stirred about with the thermometer. It will float on top, and it may be touched with a lighted match or bit of paper. If it ignites, or takes fire, the oil is dangerous; and the seller can be prosecuted under the United States law. It must not be used in the family. In this experiment, so simple that all can make it, an accurate thermometer should be used. The common thermometer in a japanned iron case, is usually sufficiently accurate. To test the thermometer, bring water into the condition of active boiling; warm the thermometer gradually in the steam, and then plunge it into the water. If it indicates a fixed temperature of 212°, the instrument is a good one.

Testing Silk Thread or Silk Stuff for Admixture of Wool. — For the testing of silk thread and certain silk stuffs for admixture of fibres of sheep's wool and animal hair, the microscope is often entirely useless. For this purpose, Prof. Rudolf Wagner has used the following method, which he says gives very accurate results, with extremely small quantities of the silky substance tested. It depends upon the fact that sheep's wool, the woolly, downy hair of the goat, known as cashmere wool, mohair alpaca wool, and vicogna wool, are dissolved by boiling in pure caustic potash or soda (perfectly free from sulphur), giving a liquid containing sulphide of potassium or sodium, which is easily discovered by the magnificent violet color, with nitro-prusside of sodium.

Silk is a substance containing no sulphur; and, though dissolved by the alkali, nitro-prusside of sodium produces no change in the solution. This method succeeds in discovering the presence or absence of woolly or hairy fibres in a piece of silk stuff one half a square centimetre in size. It is best to dissolve the stuff under examination (the weight of which should be full 0.1 grain) by boiling with about 5 to 10 c. c. of caustic potash; make up the solution with distilled water to 100 c. c., and test about 1 c. c. of the liquid with a drop of dilute solution of nitro-prusside of sodium If there is no violet coloration, it is certain that no wool was mixed with the silk. It is advisable, as a check, to add to the unchanged liquid remaining, a drop of a prepared solution containing wool, whereby a violet color should appear at once.

Pure Water for Men and Animals. — For many years, we have urged upon the attention of heads of families, owners of stock, etc., the importance of a supply of pure water. A vast amount of injury results from the use of impure water, both in dwellings and farm-yards; and the instances of unusual or mysterious disease are often explained by a chemical examination of the water.

We have recently received, from a gentleman in Vermont, a sample of water supplied to the horses and other animals connected with his farm; and, upon analysis, we found it heavily loaded with organic matter and lime in the form of a sulphate. Upon standing, this water underwent spontaneous change; and, by the peculiar action of the sulphate upon vegetable matter, sulphhydric acid was liberated in considerable quantities. The water was thus rendered poisonous; and the gentleman informed us by letter that he had *lost four valuable horses* by the use of this water. The importance of the use of pure water cannot be overestimated.

☞ The substance sent to us for analysis by Dr. Whittemore, alluded to in our last number, proves, upon more extended examination, to be of a complex and remarkable character. The nature of the deposit has changed within a few weeks, and is now largely made up of organized matter. The case is a remarkable one, and will be more fully reported upon at a future time.

CATARRH.—There is no common affection from which quacks reap so rich a harvest, as from what is known as *catarrh*. With their wretched appliances in the form of nasal injections, and douches, and "snuffs," and "oxygenized air," immense mischief is accomplished, and credulous men and women robbed of their oftentimes scanty means. Catarrh, or chronic irritability of the mucous surfaces of the air-passages, generally results from neglected colds, and from want of attention to those hygienic measures which tend to fortify the system against sudden changes of temperature.

The best method of treatment is dry friction over the whole surface of the body. The use, night and morning, of a coarse towel, or hair mitten, so as to produce a glow upon the surface of the body, will not fail to cure, or benefit, nine cases out of ten. Let all the clothing be removed, no matter how cold the weather; and, with the "air bath" thus secured, and friction over the entire surface, the troublesome difficulty is soon removed.

A CHANGE.—Well done! the world moves! Our neighbors of the *Medical and Surgical Journal* have made some radical changes in their establishment. They have donned a new dress, and secured new editors; and the venerable and excellent journal makes its appearance in a form so new and fresh, we almost failed to recognize it as an old acquaintance. The readers of this publication cannot but have noticed a vast improvement in its conduct during the past year; and we trust, under its new direction, it will not fail to meet the highest anticipations of its friends.

THE "VAPORIUM" IN CONSUMPTION.—Dr. Felix Bricheteau, in the *Bull. Gen. de Therup.* for July, 1867 recommends the "vaporium," or chamber filled with the vapor of water in pulmonary consumption. For a room of ordinary size, a trough 4 or 5 feet long, 10 inches wide, and as many deep, is sufficient. Steam can be made to pass through this from a steam-pipe, if there are facilities, or from a small boiler heated by a gas-burner or lamp. With this management, a temperature of from 74° to 80° F. may be easily maintained. A more or less extended residence in the moist air is required. The value of steam in diphtheria and œdema glottidis is well established, and certainly merits a trial in consumption. Dr. Trousseau was the originator of the idea.

POLISHING POWDER FOR GOLD ARTICLES.—Dr. W. Hofmann has analyzed a polishing powder sold by goldworkers in Germany, that, from its undeniable goodness, has commanded a very high price.

He says it has a very simple composition, since it is merely a mixture of about 70 per cent. of sesquioxide of iron and 30 per cent. of sal ammoniac. It is easily prepared very cheaply by dissolving iron in hydrochloric acid, and treating the protochloride of iron thus formed with liquid ammonia, as long as a precipitate is obtained. Collect the precipitate on a filter, and dry it (without washing out) at such a temperature that the adhering sal ammoniac shall not be volatilized. The protoxide of iron precipitated at first becomes changed into sesquioxide.

NUX VOMICA IN CHRONIC DYSENTERY.—In the September No. of the *Bull. Gen. de Therup.* is an article by Dr. De Savignac, upon the use of nux vomica in dysentery and dysenteric paralysis. His theory is, that the cause of the disease lies in an affection of the spinal cord, which causes paralysis of the motor nerves of the large intestines, and of the varo-motor nerves which supply its bloodvessels. If this be correct, nux vomica would appear to meet the indication precisely. Dr. Savignac, who has large opportunities for observation in the marine hospitals of Toulon, claims excellent results.

ADMINISTRATION OF ESSENCE OF TURPENTINE.—Essence of turpentine is a medicine difficult to administer. The potions in which it is an ingredient have a disagreeable odor, and the capsules in which it is inclosed have the inconvenience of carrying it in a state of purity into the stomach, causing an irritation more or less lively. M. Daunecy proposed to make it into pills, associating wax with it. The following is his formula:

Essence of turpentine............... } Equal parts.
White wax........................ }

Melt at a gentle heat; cool, and add

White sugar pulverized.............................q. s.

Divide into pills, each of which should contain 3 grains of essence of turpentine.

QUESTIONS AND ANSWERS.

C. W. P., *Indiana.*—What is the process of manufacturing Cod-Liver Oil?

The process is very simple. The livers, fresh from the fish, are cleanly washed, and thrown into a cauldron heated by steam, where they gradually yield their oil. The oil is dipped out hot, and strained, first through conical felt bags, and then through those made from white moleskin. This renders the oil very white and clear. Straining it hot, or in warm weather, leaves behind all the *stearine*, and it congeals, or becomes hard, in cold weather. There is a demand for oil strained in the cold; but we are inclined to the opinion, that the stearine should not be removed, as it forms a part of the natural constituents of the oil, and partakes of its nutrient properties. Its appearance is more attractive with a portion of the stearine removed.

FARMER, *Reading, Mass.*—Does the addition of *salt* to kerosene improve the light, and render the oil safe?

No, no! There is *no substance* on the earth, or under the earth, known to chemists, that by mixing with dangerous burning liquids will render them safe, unless their illuminating power is destroyed. Use only pure kerosene of *legal standard*, and keep salt, pepper, and all other condiments out of your lamps.

M. D., *Meriden, Conn.*—We hear much of "white metal." What is its nature or composition?

The amalgam known as white metal is used principally in the manufacture of vessels designed to be covered with a coating of silver, by the process of electroplating. The composition varies considerably, every manufacturer having some method of his own for producing it. One will employ 16 pounds of copper, 8 pounds zinc, and 3½ pounds of nickel; another, 8 pounds copper, 3½ of zinc, and 2 pounds of nickel; while a third declares, that to obtain a perfect metal, 28 pounds copper, 13 pounds of nickel, and 7½ pounds of nickel are demanded.

Probably the most perfect mixture is 8 pounds of copper, 13 pounds zinc, and 3 pounds nickel. This forms a beautiful compound, hardly to be distinguished from pure silver. A tea-service made of this compound metal, and well plated with silver, is as beautiful and serviceable as one of pure silver.

S. T., *Albany, N. Y.*—Will you please inform me how I can make a waterproof cement?

A moderately thick solution of India-rubber, made by dissolving shreds of pure rubber in turpentine or bisulphide of carbon, mixed with an equal quantity of copal varnish, makes a good waterproof cement.

DRUGGIST, *Springfield, Ill.*—Fulminating mercury, or quicksilver, can be made by taking one ounce of mercury and dissolving it in ten ounces of pure nitric acid. Pour the solution into three gills of alcohol, and the result is a precipitate in the form of a dense gray powder. This is the fulminate of quicksilver, and is a very dangerous article. It must be handled with care.

M. S., *Springfield, Mass.*—We advise you to remove the green room-paper at once. Undoubtedly your family are suffering from the poisonous arsenical dust which is detached from the paper. Green window-shades, green paper, the green leaves of artificial flowers, green paint, articles of confectionery colored green, are all dangerous. We have analyzed wall-papers which contained from ten to fifty grains of arsenic to the square foot.

MECHANIC, *Portland, Me.*—We advise you to give up your attempts to substitute electrical for steam power. The idea is a fallacious one, certainly upon the plan you are pursuing. If you could overcome the obstacles in the way of suitable machinery, still the great difference between the cost of zinc and coal would render all your experiments worhless. You must burn or oxidize one or the other to obtain power; and zinc is more than one hundred times as costly as coal. The cost of the zinc added to the acids used, would bring your power to cost more than two hundred times as much as steam.

L. P. M., *Auburn, N. Y.*—You do not understand the chemistry of steel. It occupies an intermediate position between cast-iron and bar-iron. Cast-iron has 5 per cent. of carbon; bar-iron has only about 50-100 of 1 per cent. The first has too much carbon; the last, too little. Cast-iron can be changed into steel by removing all the carbon but 1½ per cent.

MARY, *Castleton, Vt.*—The colors of flowers are due to the power which they possess of reflecting the various tints of the solar spectrum. Color is a physical and chemical phenomenon very imperfectly understood in the scientific world. The various objects in nature present an immense variety of tints, many of them of exquisite beauty. It has been estimated, that leaves and flowers together afford no less than 15,000 different hues capable of being recognized.

PROPOLIS.—We have already explained the nature of this substance in a former number of the *Journal*. We know of no sources from whence a supply can be obtained other than the bee-keepers scattered over the country.

☞ The old and highly respectable druggists of Lowell, Messrs. Carleton & Hovey, have devised a new form of grain weights, which must be very convenient for physicians and druggists. Also, they have prepared, from pure white metal, the decimal weights, which we hope soon to see universally employed. See their advertisement.

SUPPLEMENT.

The press of reading matter and advertisements compels us to issue a supplement with this number of the *Journal*. Several book reviews and items of interest are crowded out for want of room. They will appear in our next.

Medicine and Pharmacy.

[*Communication.*]

ANDOVER, MASS., Feb. 5, 1868.

Editor Boston Journal of Chemistry: —

I have three things I want to say to you, and, if you think best, to the readers of your journal.

First: An aged patient of mine, who was suffering from urinary calculi, passed several small garnet-like substances from the bladder, as near as I can judge, exactly such as you describe in the February number of your *Journal*. On being broken down, the peculiar color was gone, as you describe. I found that they were also soluble, as you describe; and my conclusion was that they were largely uric acid colored with purpurine. But I am not much of a chemist; and although I had never met with any such, nor seen them described, I presumed that they were nothing so very new. The patient passed several small phosphatic gravel about the same time. He was soon after operated upon for calculi successfully by Dr. Kimball, of Lowell. Four calculi, the smallest of which was nearly as large as a robin's egg, were removed. He is now quite well — aged 82.

I can have no doubt but that those handed you passed from the bladder.

Second:

FOOD FOR BABES.

Writers generally speak as if all cows' milk was equally good, or nearly so, for babes. I wish to say that, about twelve or thirteen years ago, I was led to notice that cows' milk which retained its color after the cream had been taken off, would sit well upon the stomach; while that which was either bluish or greenish after the cream was taken off, would uniformly disagree. For the last dozen years, I have not met with a single instance where an infant has failed to be well nourished and to flourish well upon such milk as first mentioned; nor have I met with a single instance where one fed upon such as last named, did not suffer from colic, green dejections, and general ill health. The rule is, the less change of color between the new milk and the same milk after standing twelve hours and having the cream removed, the better the milk for infants; and, on the contrary, the greater the change of color, the more unsuitable for their purpose. This is an item that I have never seen noticed by any writer excepting by the author of the "*Mother and her Offspring.*" No analysis is necessary to indicate to mothers the kind of milk their children require. The color after the removal of the cream will indicate its positive or relative fitness or unfitness for infants' food.

Some milk affords a great deal of cream, and yet is very bad for babes; and other milk affords very little cream, and yet is very good for them. It seems to be caseine rather than oleine that babes want. Probably there are other ingredients also, which render it more or less fitted for infants' use.

Third: I have recently met with several instances of *very persistent* acidity of stomach, which have at once yielded to the discontinuance of the use of tea. They were, beyond all question, caused by the use of this article; in some instances, only a very moderate quantity was used. Nothing seemed to be of any service in removing the acidity, till the tea was abandoned. Then the recoveries were very rapid; in some instances, without the use of any remedy whatever.

Yours, etc., S. TRACY, M.D.

ANIMAL VACCINATION. — Animal vaccination is superseding, to a great extent, vaccination from the human subject in Europe. Prof. Depaul, the director of vaccination in France, is one of the strongest advocates of this system. To procure the virus, a healthy heifer, four or five months old, is chosen and fastened to the leaf of a table of convenient construction. The leaf is then raised to a horizontal position, so that the heifer is lying on her side. The uppermost side is then shaved, and the virus introduced by the lancet in some sixty or seventy punctures upon the shaven portion. From the fourth to the sixth day of the pock, the virus is taken and used or reserved, like that from the human subject. The heifer is worth as much as ever for the market after the operation.

PREVENTION AND CURE OF CONSUMPTION.

A little more than a year since, Dr. Charles L. Ives, of New Haven, read a dissertation before the Connecticut Medical Society, upon *Prophylaxis of Phthisis Pulmonalis*, which contains so much good sense and so many valuable suggestions to physicians and invalids, that we are led to present some extracts to our readers. We only regret that our narrow limits prevent printing the entire paper.

The Prophylaxis of Phthisis Pulmonalis, whether it has reference to the state of the lungs, or of the system generally, resolves itself into one plain, simple rule. Raise the physical condition of the whole system to the highest vigor possible. Physical culture is the safeguard against consumption.

But a preliminary question may arise, as to the precise limit of the treatment we may style prophylactic. One calls that phthisis, and rightly so, where, on careful examination, a slight deposit in the lungs is detected, although the rational signs are few. Another refrains from pronouncing the dreaded name, until the constitutional disturbance has so far progressed as to leave but faint hopes of recovery. But this disagreement, practically, is of little importance. It is virtually the same thing, whether we avert the possibility of a tubercular deposit, or, after its recurrence, prevent fresh deposit, and so assist the cure of that already there.

That phthisis is curable, so far as any disease is curable, though some even in the profession still doubt it, no longer admits of a question. Not to cite reported cases, and the opinions of various standard authors, the experience of every physician at all expert in Auscultation and Percussion, furnishes numerous instances where tubercular deposit, of an inch or more below the clavicle, is found sensibly diminishing under appropriate treatment. And the revelations of the dead-house of any large hospital are proof enough on this point. Autopsy after autopsy is made, as the writer can testify, of patients dying of disease other than pulmonary, whose lungs, scarred and puckered by lines radiating toward a central cicatrix, attest the healthy closure of large tuberculous cavities, to the number of two, or even three. Why should we not expect such a result? The system will dispose of foreign bodies in other parts; here a like process of suppuration is set up, with expectoration, to get rid of the softened tubercle; and if, during the debilitating process, the strength is sustained, and the healthy portion of the lung kept expanded, so that no further deposit takes place, an entire cure, as a matter of course, will result.

Now for the practical application of the rule we have adopted for the Prophylaxis of Phthisis. *How* shall that completeness of physical vigor required to ward off tubercular consumption be best secured?

First, as regards the lungs themselves. These may be expanded and strengthened; *from within*, by the dilating force of the air drawn in by deep, forcible inspirations; *from without*, by the methodical development of the muscles concerned in respiration.

To take deep, forcible inspirations, although, apparently, a very simple thing, requires no little effort and practice to accomplish it to the best advantage. Most persons, especially those with a predisposition to phthisis, when told to draw as long a breath as possible, will inhale with much outward display, then exhale; the whole a matter of a second or two, and that is actually the extent of their ability. They have not yet fully learnt how to breathe. But a vast improvement will be witnessed after a little training. Let the patient sit or stand with the shoulders carried back and downwards; through an ⅛ inch tube, or a similar orifice made with the lips, direct him to draw in his breath slowly, and for as long as possible; when he thinks his lungs are full, let him make still further efforts, raising the ribs and catching for breath, as one in asthma, until no more air can possibly be drawn in; then hold the breath for a moment or two, at the same time forcibly carrying the shoulders still further back and down, after which the air is suffered gradually to pass out of the lungs. Any one watching the process in himself, will observe, that the air, at first entering the lower and more movable part of the lung, does not fill or expand the apex till the last forcible inspiratory effort, and that it is especially pressed into that part by the drawing back of the shoulders at that time. This exercise is performed preferably in the open air; or, if a warm room is required, it should be well supplied with oxygen. As the pure, cool air enters deeply into the lung, a sense of warmth and refreshment is felt over the whole body. A few deep inspirations have often sufficed thoroughly to warm the writer when riding out and suffering from the cold. A good degree of proficiency in the operation will be recognized, when sixty seconds shall be consumed in one uninterrupted inspiration. Of course, in case of actual deposit, the inspiratory effort should be graduated to the strength of the patient; and, in any case, the experimenter will hardly feel like trying it twice in immediate succession. The slowness with which the effort is performed is essential, giving all parts of the lung time to expand, and accustoming the respiratory muscles to the varying positions required for the complete act of respiration. * * * * * * * * * *

The whole system is to be invigorated; and to this the due exercise of all parts is essential. He who announced to our first parents that law of mortal life, "In the sweat of thy face shalt thou eat bread," bestowed a blessing in the curse itself, in it revealing to them the condition upon which depends the perfection of physical health. Exercise sufficient to excite perspiration is daily needful, if we would have the most robust health; and such general exercise, bringing the lungs into more vigorous action, greatly promotes their expansion and health. In addition to general gymnastic exercises, and the various out-door games, the following exercises are especially worthy of note: — walking, at the rate of at least three to four miles an hour, particularly with a companion; riding on horseback, a gentler form of exercise, which, the body being supported, may be prolonged much beyond the preceding, with the advantage of fully engaging the mind between the care of the horse and the rapidly passing scenes; rowing, the body again supported with alternating action and rest of the muscles; and lastly, hunting, for one fond of the sport, who, with gun on shoulder and a fair prospect of game, will endure an amount of exercise to which, without these accompaniments, he would be entirely unequal. That these forms of exercise require the open air is a special recommendation.

Can it be necessary here to urge the value, the absolute need of pure, fresh *air?* How strangely is this point overlooked by the community in general, and even by many physicians. The experience gained by our soldiers in this matter during the past war, if the coming generation will but profit by the lesson, we might almost say is well worth the cost, putting the lives lost against lives to be gained. With our tightly-ceiled houses, our closed fireplaces, our horror of drafts, leading us to shut off every avenue of ventilation essential to health, we were indeed rapidly becoming an enervated race, unfitted to occupy the places once filled by our sturdy forefathers.

To derive the full benefit of fresh air, it is scarcely necessary to premise that it must be made free use of. Much is said, and justly, of the pure, bracing air of Minnesota. Yet those who go there to shut themselves up in the hotels or boarding-houses, gain little more than they would at home. An instructive case came under the writer's observation there during the summer of 1862. A lady in feeble health, with a tubercular deposit and accompanying cough, came to try the effect of the climate. Having improved but little after a month's stay, she joined a camping party of ladies and gentlemen, and with an open, two-horse wagon and tent for the night, they started out. The third day, toward dusk, they lost their way; and it was after nine o'clock in the evening ere water was reached, where they might encamp. Notwithstanding this prolonged exposure to the falling dew, in an open wagon, this lady took no cold, while a similar exposure a few days before had produced a serious aggravation of her symptoms. This diminished susceptibility to taking cold was, unquestionably, due to the uninterrupted exposure to the open air for the three days previous. A continuance of the same out-door life so strengthened the constitution of this invalid, that in two months thereafter she was sleeping with impunity with the air blowing freely across her, from a window on one side of the bed's head to another at the foot. A similar experience of life in the open air has been repeated in numberless instances among the young men of our army.

Delicate young men, going out to camp life against the remonstrance of friends and advice of physician, have returned in improved physical development, notwithstanding untoward circumstances of fare and fatigue, with the same story, — "They could not take cold in camp."

Let, then, those dreading consumption, as well as those attacked, give to the pure fresh air every facility to invigorate their constitutions. Let them be out of doors to breathe it, of course, with sufficient clothing, whether the weather be fair or inclement; let them admit the air freely into their living rooms, and especially into their sleeping apartments. One third, or thereabouts, of our lives we spend in bed; do we consider what our physical frame must lose in being deprived of pure air for so great a portion of our lives? Would you admit a draft? Yes; as soon as the system has gradually become habituated to it, let the air blow in freely, without let or hindrance, if not across and through the room, at least from one side. Little do those sleeping in close, confined bedrooms suspect the refreshment and invigoration of a night's rest with the pure, cool air passing freely over the sleeper's face; and still less, having once enjoyed it, would they return to their former habit. I speak from experience. * * * * * * *

But let us not, by any means, underrate the vital importance of a sufficiency of hearty, wholesome food, or of fatty articles of diet. In our land of plenty, but two classes in good circumstances are likely to suffer in this respect; infants, about the time of weaning and onward, who, giving up their animal food, the mother's milk, are often restricted in the use of fats and animal food, and those tending towards phthisis, who voluntarily restrict themselves. The latter class, indeed, might almost be pointed out by their uniform rejection of fats. It is very desirable, that such be habituated freely to partake of butter, cream, milk, and fat meats (if the stomach can be trained to receive the latter). I would never press the eating of fat meat; other forms of fat may be substituted for it; and experience has convinced me, that the difficulty with which in the stomach the gastric juice reaches through to the albuminous envelope of the inner oil globules ere they can be set free to pass on into the duodenum, renders the digestion of fat meat so slow a process as to tease the stomach, often causing it entirely to reject the offending substance. * * * *

The protection to the skin against atmospheric changes which the *dress* affords, is a matter bearing strongly upon the health of the lungs, and of late, rather more than formerly, has been regulated by the dictates of common sense. The value of woollen clothing next the skin, of warm, thick coverings for the extremities, especially the feet, is becoming more generally appreciated and adopted. Yet there are still to be found those of more vanity than discretion; enough to furnish quite a crop of consumptives for some time to come.

Since we attribute so much importance to exercise, it follows, that the dress should be so constructed as to afford full play to all the muscles. A lady's dress with the shoulder-seam some two or three inches down the arm, presents no little obstacle to raising the elbow even to the level of the shoulder, especially when a tight-fitting waist farther imprisons the respiratory muscles. The other sex are more fortunate in the fashion of their dress; yet caution is needed that the upper garments do not bind or button tightly across the front of the chest.

Who will not acknowledge, that if these suggestions were faithfully carried out by any one in health, that for him phthisis is well-nigh an impossibility? For my own part, I could almost guarantee exemption from the disease to any one who will, six times in the course of each day, and in the open air, thoroughly inflate the lungs in the manner before described. Even in a most unfavorable case, where overburdening care or grief is pressing down the spirits, impairing the digestion and every vital process, if the requisite pains be taken to keep the lungs expanded, may we not feel assured that these organs, at least, will be able to stand the pressure? If this is so, is there any reason why one person among the thousands of our State now in health, if he may be made acquainted with the principles herein set forth, and no physical or mental defect interpose, — is there one such who, from that time, need fall a victim to chronic phthisis? It may require a little pa[illegible]ence and perseverance, and the summoning up of all one's energies, but it may be done; aye, even when the torpor of the deceptive disease, like the death-sleep of the snow-benumbed traveller, is already settling down upon him, if he will but go resolutely forward to what is for him for the time the business of his life, — there is hope for him yet.

(Communicated to the Boston Journal of Chemistry.)

PULVIS IPECACUANHÆ ET OPII.

BY J. H. GILMAN, M.D., LOWELL.

Perhaps there is no medicine in the *materia medica* more frequently prescribed by physicians than Dover's Powder; and it is quite essential that it should be the best possible preparation that it is susceptible of being made. According to the Dispensatory, its largest constituent (the sulphate of potassa) serves no other important purpose than by its bulk to dilute, and, by its hardness, to promote the minute division and thorough intermixture of the other ingredients. There is another salt of potassa (the chlorate) which, in addition to the above requisites, possesses valuable medical properties well suited to increase the efficacy of the compound, and can never be contra-indicated in any disease in which the Dover's Powder is administered. There are a great many diseases in which the powder is used more or less, that are complicated with a sore mouth or throat, which the chlorate would rapidly cure; and I have been pleased with the enhanced efficiency of the preparation in those febrile states consequent upon taking cold and attended with a sore throat; also in the bowel complaints, diarrhœa, cholera infantum, etc. Now I respectfully suggest, that the sulphate of potassa in the Dover's Powder be displaced by the chlorate of potassa in the next edition of the U. S. Pharmacopœia.

Jan. 21st, 1868.

RESORTS FOR INVALIDS.

A correspondent of the new *Continental Gazette*, after speaking of Mentone, and Nice, as places of resort for invalids in the winter months, remarks as follows: —

There are places much nearer home to which Americans might resort for a better climate than that of any place in the South of Europe. Tampa Bay in Florida, and the interior of Georgia, have the same advantages, with this additional recommendation, that fires are not required there at night, except occasionally in March; and the invalid is consequently not so much exposed to drafts. Here the moment the sun disappears, it becomes very chilly, and the little wood fires do not create the same uniform warmth in the house which is supplied by our steam furnaces at home, where the cold is much greater. At present however, the places I have mentioned are without proper accommodation for invalids, which it is to be hoped will be supplied before long by Northern enterprise. The climate of Nassau, in New Providence, four days' sail from New York is better than either of the others. There is a fine hotel erected by the Colonial Government, which was not well kept last year, but I understand is in better hands at present. Fire is never required there, and the patient can at all hours breathe fresh air without artificial warmth, which is the great desideratum. I make these remarks more for the benefit of Americans who may be on their way home than of those who propose to remain here. If a winter away from New York is recommended to you, don't be persuaded to cross the ocean under the idea that you will find a better climate here than at Nassau or Florida. The chief reason for coming out at this time is the superior accommodation and good supplies; but this is, I think, often counterbalanced by the exposure of previous or subsequent travel. After coming so far, the temptation is irresistible on the part of an invalid to avail himself of the first moment of partial relief, in order to see some of the wonders around him — the churches, public buildings, etc. The physicians here ascribe many returns of illness to colds taken by frequent visits to St. Peter's, at Rome, and other large stone structures. An Englishman can resist the temptation, because he can run to any of those places for a winter's trip at any time; but one who has travelled three thousand miles feels that he cannot afford to await a future opportunity.

Formulae

USEFUL IN MEDICINE AND THE ARTS.

The tungstate of soda is the best substance for rendering clothes incombustible when they are required to be ironed after washing. The sulphate of ammonia is equally as good respecting its non-combustible qualities; but the iron does not run so smoothly over clothes that are prepared with it.

How to Have Warm Feet. — It is said that the wearing of cotton stockings under woollen ones will prevent cold feet. It no doubt will when caused by moisture. The woollen stockings will absorb the moisture as it accumulates in the cotton sock, and keep the latter comparatively dry. But when the cold arises from the lack of circulation, the woollen sock will be found the most comfortable worn next to the foot.

To Treat Chilblains. — Take balsam of Peru, ½ drachm; alcohol, 1½ ounce. Dissolve, and add hydrochloric acid, ½ drachm; comp. tincture of benzoin, ½ ounce. A little is to be occasionally rubbed on the affected part; or, if preferred by the patient, a small piece of linen can be moistened with it, and applied to the part. It causes some smarting for a few minutes. When the skin is broken, the calamine ointment, or the carbonate of zinc cerate, is a good dressing.

Removing Grease-Spots. — A simple agent for removing grease-spots from silk and woollen fabrics is very useful. Carbonate of magnesia, saturated with benzole, and spread upon a grease-spot to about one third of an inch in thickness, answers well for this purpose. A sheet of porous paper should be spread upon the benzonated magnesia, and a flatiron, moderately warm, put upon the top of all. The heat of the iron passes through and softens the grease, which is then absorbed by the porous magnesia. The flatiron may be removed in the space of one hour, and the magnesia dust brushed off. Soapstone dust may be used in the same manner, and answer nearly as good a purpose.

A Substitute for Writing Ink. — Not long since, I read, in one of your papers, a dissertation relative to the qualities of writing ink. I will simply state to you, that, for the last twenty years, I have been doing a large amount of writing; and that, during that time, I have used common India ink, simply dissolved in water. It being composed of carbon, and little else, it will keep in any climate or place, from year to year, perfectly sweet. Even freezing does not injure its good qualities; a simple cover is all that is required to prevent evaporation and keep the dust from falling into it. I have never used any kind of ink that would flow from the pen with that ease and agreeable freeness that this *hydrate* of *carbon* does. The stroke of the pen made with it is quite black if desired, and will endure unchanged to all time, provided the paper or parchment remain sound; and even papers that have been burned and not fallen to pieces, with this kind of writing upon them, remain quite plain to be read. F. S.

Stain for Twisted Gun Barrels. — The following is the usual recipe for staining twisted barrels: — Take of tincture of sesquichloride of iron half an ounce, corrosive sublimate one drachm, sulphate of copper half a drachm, nitric acid one drachm to one drachm and a half, spirit of wine six drachms, water eight ounces. Dissolve the corrosive sublimate in the spirit of wine, then add the solution to the other ingredients, and let the whole stand for a month or six weeks, when it will be fit for use. The barrels are first cleaned carefully with lime, and this being removed, the browning mixture is laid on with a sponge five or six times a day, till the color is dark enough for the fancy. Once or twice a day a scratch-brush is used to remove the rough oxide, and allow the acid to get a deeper bite. When it is considered that enough has been done, boiling water is poured over the barrels for several minutes, and, while hot, they are rubbed with flannels, and finished with a leather and a little beeswax and turpentine.

The mercury in a good thermometer should move freely in the tube when inverted, and should stand at exactly 32° degrees in freezing water, and 212° degrees in boiling.

BOSTON JOURNAL
OF
CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, APRIL 1, 1868. No. X.

THE
Boston Journal of Chemistry
IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY
JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Science.

THE LOST ARTS.

BY THE EDITOR.

Much has been said regarding the lost arts; and a general impression prevails, that there were many wonderful processes, arts, and contrivances known to the ancients which have been lost to us. Is this idea correct? Is it true, that the old Egyptians, Grecians, and Romans were our superiors in any kind or branch of knowledge? Did they excel us in any department of art or mechanical labor? From a somewhat thorough examination of the treasures of ancient art found in the museums of Europe, and from a careful study of the works of the writers of antiquity, especially Pliny, who is the acknowledged source from which very much of this kind of information is drawn, the conclusion is reached, that there is great looseness and exaggeration in the statements of those who have taken the affirmative of these questions. arts or processes belonging to the ancient civilization

It would be absurd to say that there were not some which have been lost, or are now imperfectly understood; but that the number is large, or that, if known, they would be of any consequence to us, are points we are unwilling to admit. A considerable number of the elegant and useful arts which are so pleasing and essential to our comfort and happiness, were undoubtedly known to the ancients; and this is indeed remarkable. We are not, however, in any sense indebted to them for a knowledge of these, as they have been re-discovered through the instrumentality of modern genius and research. We had none of their models to imitate: they have been secured to us through independent thought and skill. We have re-invented and re-discovered nearly or quite every thing wonderful or useful known to the early races. And how vast and amazing the triumphs of modern science and discovery in directions entirely unknown and unsuspected by them!

No fact is more apparent than that human ingenuity, when directed by culture and intelligence, runs in certain specific channels, and is made competent to construct such devices and appliances as the age demands; or, perhaps we may say, just such as are most convenient and indispensable to the existing civilization. Thus the civilization of the old Roman world demanded, in the working of wood, planes, saws, squares, levels, bits, augers, hammers; the workers in iron and other metals required forges, blast-furnaces, anvils, tongs, sledge-hammers, punches, dies, etc.; the farmers wanted sickles, pruning-knives, hoes, shovels, spades, forks, ploughs, harrows; the warriors shields, swords, spears, battle-axes, crossbows, and javelins. These the inventive faculty of the age was competent and prompt to supply. The artisans went on through successive ages, manufacturing and improving upon these implements, until they reached that degree of perfection which is so clearly shown and illustrated in discoveries at Herculaneum and Pompeii. In a considerable number of instances they reached the highest stage of perfection in the mechanic arts; at least, we are led to adopt this view, as, with all our modern science and skill, we are unable to make any essential improvements. Their planes, sickles, shovels, spades, hammers, saws, knives, swords, and a hundred other articles, in *form* and *construction*, were almost precisely like those in use among us at the present time. How has this happened?

During the dark ages which have intervened since the downfall of the Roman civilization, all knowledge of the form and construction of these implements was lost; and our devices must be, as before stated, original inventions. We knew nothing regarding the *form* of a Roman plane, or sickle, or spade, until Pompeii was disentombed, about a hundred years ago. When these discoveries were made, our inventors and artisans were amazed to find that, seventeen centuries since, the same form of tools and implements were in the hands of husbandmen and workers in wood, iron, and stone. There is a limit to human skill as well as to human thought, and the same culture and ingenuity will reach about the same ends in any and every age. The ancient Grecians and Romans attained the limit of perfection in several departments of art; we have reached the same end in a much larger number. And it is reasonable to infer that, if our civilization was destroyed, and ages of barbarism should intervene before a new one arose, the ground which inventors, artists, and men of science have gone over in this age would once more be travelled; and if the same degree of civilization was attained, the same mechanical inventions and arts would again be reproduced.

Let us examine a few of the different branches or departments of the mechanical or industrial arts as practised by the ancient Romans, with the view of ascertaining if they possessed any processes not known to us, or if they excelled us in the products of their skill. It is alleged by some popular writers and lecturers, that in the art of glass-making they were greatly our superiors. In proof of this, they quote largely from the gossiping Pliny, and present his statements regarding the production of specimens so perfect and beautiful they could not be distinguished from precious stones. He mentions artificial hyacinths, sapphires, and emeralds, and a kind of black glass, which closely resembled the obsidian stone. It is certain that great excellence was reached in this department, as in one of the collections of antiquities at Rome imitations of chrysolite and emerald are shown, which are very perfect. They have not the smallest blemish, either externally or internally, and the colors are faultless. In coloring glass, the ancients must have been acquainted with the metallic oxides, as they offer the only pigments capable of withstanding the intense heat required in glass fusions. They colored glass so perfectly, and imitated gems so successfully,

that the hucksters and cheats of those times were able to deceive even the wives of the emperors. For Trebellius Pollio informs us of the whimsical way in which Gallienus punished an adventurous wretch who sold his wife a piece of glass for a jewel. Granted that they manufactured some excellent or even remarkable specimens of glass; that they gave tints most exquisite; that they made costly vessels, or drinking-cups, tables, vases, or even panelled rooms with it, — what did they more than we? Do we not make gems so perfect as to deceive those most experienced? Are not two thirds of the *brilliants* that refract light so beautifully in the bracelets and rings worn by modern females constructed simply of glass? Have we not made an imitation of the great Kohinoor diamond so perfect that, by the eye, it cannot be distinguished from the original? As regards colors, no specimens of ancient glass excel, or even compare, with those produced in the present century. The brilliancy of our tints and their permanency have never been surpassed. But what of the *malleable glass* of the ancients? We do not believe any such glass was ever produced. The statements of Dion Cassius and Petronius Arbiter regarding the production of ductile glass by a celebrated Roman architect, is probably only another version of the story told by Pliny regarding the artificer, who, for making the same discovery, had his workshop demolished by a mob, who feared it would lower the value of gold, silver, and brass. The story is, that a vessel of this glass was brought into the presence of the Emperor Tiberius by the discoverer, and dashed upon the floor without breaking, the effect of the blow only indenting or bruising it a little. The inventor then took a hammer from his pocket and beat it out into its original shape as if it had been made of thin metal. This is absurd. Glass is a vitrified substance; and it is now, and always has been, impossible to associate with it the property of malleability.

The glass of the ancients, like our own, was a true silicate of soda, or potassa, and any substance constructed of other materials could not properly be called glass. It is possible for modern chemists to prepare, from some of the metals or metallic salts, a ductile material having a glossy appearance, which might pass for glass. From the fusion of chloride of silver a substance of this kind is formed, which, among the unscientific Romans, would readily be called glass. If they possessed the art of *spinning* glass, of which there is no evidence, vessels might have been constructed which would be flexible, and admit of being dashed upon the floor without breaking; but no bottle or vessel capable of holding liquids could be thus constructed. The writer has in his possession a card plate, procured of the glass-workers of Venice, made of glass in this form, which is a wonderful specimen of ingenuity and skill. It can be bent and thrown about without breaking, but *hammering* would soon reduce it to powder. In all that pertains to glass manufactures, — in the vastness of the production, cheapness, quality, colors, variety of forms and uses, we have made great advances over any race or races that have preceded us.

In the working of metals, in the various combinations and alloys formed, and in chemical treatment, we may justly claim a like superiority. Iron, although well known, was comparatively but little used among the ancient Romans, Grecians, Egyptians, etc. They did not understand easy processes for working it, and consequently articles constructed of iron bore a very high price. The iron ores of England were undoubtedly worked by the Romans, in the first centuries of the Christian era, as heaps of scoriæ, the refuse of their bloomaries, occur in various localities. Their processes of reduction were very simple, consisting of the deoxidation of the ore and the cementation of the metal by long-continued heat. They were not very far in advance of some of the ignorant tribes who now work iron in the interior of Africa.

We have no positive evidence that the ancients were acquainted with more than seven of the metals. Their list embraced copper, iron, gold, silver, lead, quicksilver, and tin. How insignificant this appears in contrast with the noble list of more than fifty metals known to us! Copper and its alloys were their favorite metals. They certainly knew as much regarding bronze, its composition and working, as we do. The enormous statue of the sun, known by the name of the Colossus of Rhodes, was composed entirely of this compound metal. It was indeed a huge structure, one hundred and five feet high, with legs spread, so that ships could pass between. There is no evidence that the legs extended across the harbor of Rhodes, although that is the popular idea. Chares, a celebrated artificer, spent twelve years in constructing it, and Pliny says that there were few that could clasp its thumb. A spiral staircase led to its summit, from whence might be descried Syria, and the ships proceeding to Egypt, in a great mirror suspended to the neck of the statue. It was overthrown by an earthquake, B.C. 224, and the fragments laid on the ground for nine hundred and twenty-three years, when they were sold to a Jew by the Saracens, who loaded nine hundred camels with the brass, A.D. 672. This was one of the wonders of the world; and vast as would be the undertaking, it is certain that modern skill would construct a like image in one fourth the time it took to construct this, if the large sum of money requisite could be supplied. The statue of St. Charles Borromeo, at Arona, Italy, is sixty-six feet high, composed of brass. This is the largest statue existing in the world. We have found that the *nose* of this statue afforded a very spacious but comfortable seat after a tedious climb to that high elevation. Immense quantities of copper and tin must have been mined by the ancients, as we are informed by Pliny, that Rhodes alone was adorned by no less than one thousand colossal statues of the sun in bronze, and Rome and all the large cities of the empire were filled with them. How can we account for the almost complete disappearance of these many thousands of tons of bronze?

It is generally supposed that the ancients were acquainted with a method of hardening copper, so as to make it subserve the purposes of iron and steel in the working of wood and stone. If this be true, the art is a lost one, as we certainly are ignorant of any such process. It is, however, hardly probable or possible that this supposition can be strictly true. Modern alloys of copper have been made of great hardness, but nothing that possessed the characteristics of steel. The sword-blades, spear-heads, hatchets, and cutting instruments of the ancients were probably but alloys of copper and tin, which were capable of meeting many wants in the absence of the harder and more refined ferruginous metals. It is, indeed, a mystery how they could, with the implements of metal at their command, construct such stupendous works of solid masonry, the remains of which are now seen in all parts of the old world. They worked in the hardest stone apparently with as much facility as we do with our steel hammers, drills, and bars. The mystery, however, connected with metallic hand implements is no greater than that regarding the mechanical appliances by which such huge masses of solid rock were detached from the mountain sides, and transported long distances. They had no gunpowder to rend assunder the aggregated atoms; no steam-engines to lift from their rocky beds the wrought columns of marble, tufa, syenite, etc., and send them forward to their distant temples and palaces. Did they possess mechanical arts and contrivances unknown to us, which rendered those great labors easy and of speedy accomplishment? We think not. The ancients depended upon *brute force*, upon *numbers*, to carry forward their vast undertakings. The element of *time* hardly entered into their calculations. Time and human life were not held in very high regard in the old heathen world. They accomplished by slow, tedious, and imperfect processes, what we do rapidly and perfectly by the aid of science, skill, and the most suitable machinery and tools. The fluting of their columns, the elaborate working of their bas-reliefs, friezes, entablatures, etc., were done by the slow picking and chiselling of many imperfect tools in many hands. The raising of a block of marble was accomplished by direct human strength which was secured by the aid of many strong muscles.

In the time of the Roman emperors, the whole known world was *owned* by about *thirty thousand* men. These rich nobles and patricians held as slaves all the rest of mankind, and could command their services. In great works, like those upon which we employ a thousand workmen, they would employ a hundred thousand, and thus, through force of numbers, compensate in some degree for our superior mechanical appliances and intelligent skill.

No structures ever erected by human hands have excited so much wonder as the pyramids of Egypt. According to Herodotus, one hundred thousand men worked forty years in constructing that of Cheops. It rises into the air four hundred and fifty-two feet, and covers a square whose side is seven hundred and sixty-eight feet, and is built of vast blocks of stone, brought from quarries many miles distant. We are entirely ignorant regarding the means employed to transport and raise these stones to their resting-places It is not probable, however, that any art or mechanical contrivance superior, or in any respect equal, to those known to us was brought into requisition. It has been estimated, that ten thousand men in our age, with our machinery, would raise a structure equally vast and imposing in a period of less than fifteen years.

The subject upon which we have entered, to be treated in a satisfactory manner, requires much more space than the columns of the *Journal* afford. There are so many interesting points crowding themselves upon the attention, there is danger of being led into a field too extensive for our present purpose. The design has been, to give some brief reasons for dissenting from the popular idea that the ancients were acquainted with many arts and processes of superior merit which have been quite lost to us.

Sensible Advice. — Prof. Silliman, of New Haven, gives the following sensible advice to young men: — "If, therefore, you wish for a clear mind and strong muscles, and quiet nerves, and long life, and power prolonged in old age, permit me to say, although I am giving a temperance lecture, avoid all drinks above water and mild infusions of that fluid, shun tobacco, opium, and everything else that disturbs the normal state of the system; rely upon nutritious food, and mild, diluted drinks, of which water is the base, — and you will need nothing beyond these things, except rest, and due moral regulation of all your powers, to give you long, happy, and useful life, and a serene evening at the close."

☞ Dr. Letheby, of London, says there is no such thing as *animal food*. All food, directly or indirectly, belongs to the *vegetable* kingdom.

Chemistry Applied to the Arts.

CRYOLITE AND ITS PRODUCTS.

BY EVAN T. ELLIS.

This remarkable mineral, which, as you will observe, is partially transparent, of a vitreous lustre, and brittle texture, is a fluoride of sodium and aluminum, containing, —

13 per cent aluminum,
34 " sodium,
53 " fluorine.
———
100

It is found in an immense deposit in Greenland, at Iviktout, at the head of Arksut Bay, near Cape Farewell. The first discovery was made by one of the missionaries, who carried a specimen with him to Copenhagen. Its true composition was determined by Vanquelin.

There is a bed eighty feet thick, and three hundred feet long, at the above-mentioned place.

It is frequently associated with the salts of metals, and beautiful crystals of galena, or sulphide of lead, chalybite, or brown spathic carbonate of iron, resembling spar in lustre, copper pyrites with silver, iron pyrites, etc., are found therein, arranged in masses segregated from the white, transparent, ice-like cryolite.

It remained for the "Pennsylvania Salt Company" to introduce to our country this valuable material. This energetic Company, whose works are in western Pennsylvania, has secured the privilege of using a large part of all that is mined, and has, within two years past, imported into Philadelphia thirteen cargoes, or nine thousand tons, which have been sent to their works for manufacture.* The greater portion of this has been used for their patent Saponifier. They are now devoting their attention to the preparation of caustic soda, carbonates, and other salts of soda, sulphate of alumina, etc.

Soda is obtained from cryolite by simply mixing with lime, and subjecting to heat. The fluorine combines with the calcium, forming fluoride of calcium; while the remaining metals absorb oxygen from the air, and become alumina and soda. Carbonic acid is then passed through the solution, forming, with the sodium, a carbonate of soda, which remains suspended, while the alumina, being insoluble, is deposited at the bottom of the vessel. The carbonate of soda is deprived of its acid by means of lime in the usual manner, and thus rendered caustic, and fitted for the use of the soap-maker.

One hundred pounds of cryolite yield, —

44 lbs. dry caustic soda,
or 75 " " carb. "
or 203 " crystal carb. "
or 119½ " bicarb. "
and 24 " alumina.

The sulphate of alumina contains 2.82 of sulphuric acid to 1 equivalent of alumina; therefore this is more than a neutral salt (3. being neutral), which is very desirable for manufacturers of paper, calico printers, etc.† It is also entirely free from iron, another very important characteristic.

There is another very important use to which cryolite can be applied. By a fusion of one part of cryolite with from two to four of pure silex, a beautiful glass is formed, susceptible of mould and polish, and capable of being manufactured into an endless variety of useful and ornamental articles, and probably many utensils for chemical and pharmaceutical use will be made of it. A company has been operating in Philadelphia for some time past, on an experimental scale, entitled the "Hot Cast Porcelain Company." The results have been so satisfactory, that they have now taken a large establishment, and will be prepared to carry on the manufacture quite extensively. The cost is, at present, from ten to twenty per cent higher than ordinary flint glass. The ware seems to be stronger than glass.—*Proc. Am. Pharm. Association*, 1867.

A CUBIC inch of gold is worth one hundred and forty-six dollars; a cubic foot, two hundred and fifty-two thousand two hundred and eighty-eight dollars; and a cubic yard, six million eight hundred and eleven thousand seven hundred and seventy-six dollars. The quantity of gold now in existence is estimated to be three thousand millions of dollars, which, welded in one mass, could be contained in a cube of twenty-three feet.

* They will import this year (1867) eight thousand tons.

† The English often contains as high as 3.27 of acid.

Chemistry Applied to Agriculture.

SUPERPHOSPHATES.

Several of our agricultural friends have written to us, asking which *kind* of "superphosphate" we would recommend them to purchase. Certainly there ought to be only *one kind* of superphosphate, and that a genuine superphosphate of lime, containing at least ten per cent of soluble phosphoric acid, and an equal quantity of insoluble, in addition to the phosphate of lime. We do not know of any brand we can recommend as being properly-manufactured, genuine superphosphate of lime. If there is any in the market, we have not been able to find it, and we have searched diligently. As the inquiries are presented, we can make no answer. If the questions should assume another form — "What compounds, composts, or mixtures, such as are put up in barrels, and labelled 'superphosphate,' we would recommend"— we should still be unable to reply; as we have found these mixtures to vary so exceedingly in fertilizing value, little reliance can be placed upon them. In *color*, some are quite dark; others gray, or light yellow. In *odor*, one is like fish offal, another like carrion; others have a kind of sulphurous smell. The color is due to an admixture of charcoal, or bone-coal, or sugar-refiners' waste, in varying quantities. As regards the origin of the differing odors, we suppose, when the manufacturers run short of cheap fish pomace, they substitute dead cats and dogs, or other decomposing flesh. As a rule, that "superphosphate" which has the darkest color and the most abominable smell, sells the best, as it is regarded the "strongest." Manufacturers understand this, and take advantage of it. True, genuine "superphosphate" is almost *colorless*, and has but a faint acid smell, not in the least unpleasant. To manufacture such, all that is required is to dissolve fine bone-dust in oil of vitriol,— 150 lbs. of the former to 80 of the latter, with the addition of sufficient water to form an intimate and perfect mixture. In the home manufacture of this fertilizer, 60 lbs. of acid, with 150 of fine bone, may be employed, as it is better to avoid the risk of any free acid remaining in the mixture after the action is over. We have given, in a former number of the *Journal*, full directions for making superphosphate upon the farm. Farmers can and should make their own superphosphate.

AN EXCELLENT FERTILIZER.

One of the very best artificial fertilizers used upon our farm, for all the cereal grains and root crops, we have prepared in the following manner: Take one barrel of pure, finely-ground bone, and mix with it a barrel of good wood ashes; during the mixing, add gradually about three pailfuls of water. The heap may be made upon the floor of an outbuilding, or upon the barn floor; and, by the use of a hoe, the bone and ashes must be thoroughly blended together. The water added is just sufficient to liberate the caustic alkalies, potash and soda, and these re-act upon the gelatine of the bone, dissolving the little atoms, forming a kind of soap, and fitting it for plant aliment. In this way, the most valuable constituents of bones can be made immediately available, and the addition of potash and soda aids in the formation of a fertilizer of inestimable value. The water added is not sufficient to make a pasty mass, difficult to dry, but is enough to liberate the strong alkalies from the ashes. This preparation is so cleanly, convenient, and useful, every farmer should prepare as much as possible for his crops during the coming season. A gill placed in a hill of corn will work wonders. It is excellent for garden vegetables, and for all kinds of roots. It must be used in small quantities, or in about the same way as the so-called superphosphates. A barrel of this mixture is worth two of any of the commercial fertilizers, and the cost will be but about half as much. It remains to be added, if the bone-meal and ashes are very dry, four pailfuls of water may be required; but care must be exercised not to have it inconveniently moist. It will be ready for use in a week after it is made. *Pure, raw, finely-ground bone* and the best of ashes should be employed. We think the *Journal* readers will thank us for calling their attention to this excellent fertilizer.

THE RAISING OF WHEAT.

It will be for the interest of all our readers who have land, to raise a field of wheat the present season. At present prices of the grain and flour, nothing is so profitable to raise as wheat. Spring or fall wheat can be successfully produced in all the New-England and Northern States; and there is no good reason why an extensive breadth of land should not be laid down to it during the month of April, if the season is an early one. It must go in early; and, for the New-England States, what is known as the Black-Sea wheat is the best variety. It is not liable to mildew, and stands up well against rain and winds. We raised thirty bushels to the acre, the past season, and intend to increase the yield the present year. For fertilizers, we use our home-made superphosphate, or the mixture of bone and ashes described in this number of the *Journal*, 500 lbs. to the acre, sown broadcast. If the farmer has plenty of good barnyard manure, it is well to add to this dressing five or six loads to the acre.

FISH GUANO.

This refuse of the fish-oil manufactures is of much value when used as a top-dressing for grass lands. We experimented with five or six tons of it, the past year, and found the best way to fit it for application was to compost it with moist peat or soil. When a bed is formed of alternate layers of fish and peat, and kept moist, the fish soften and undergo putrefactive fermentation, liberating valuable gases, which are absorbed by the peat or soil. After a few weeks, the bed may be shovelled over, and allowed to ferment again. In this way, a compost is formed of great value and of easy application To increase its value for grain crops, ashes, bone-dust, or superphosphate may be mixed with it. It gives an early start to corn, producing a luxuriant stalk, and vigorous, rapid growth. The phosphoric acid element of the bone is needed to give weight and plumpness to the kernel.

Professors Müller and Eisenstuck, of the Royal Agricultural Academy of Sweden, made analyses of the mixed milk of fifteen cows (five Ayrshire, five Pembrokeshire, and five Swedish cows), which were highly fed and milked four times a day at regular hours. These analyses, extending throughout a whole year, gave the following results:

Fat (butter)	4.05
Albuminoids (caseine, etc.)	3.32
Sugar of milk	4.71
Ash	0.73
Water	87.19
	100.00

The lowest percentage of water was 85.92; the highest, 88.35. The composition of the milk varied but little during the year, whatever the changes in temperature or the weather.

BEES.

Few of our readers, we presume, are aware of the extent of the *importation* of bees. It is stated that, during the summer, scarcely a steamer arrives from Hamburg or Bremen, without bringing an invoice of bees. The common honey-bee is not a native of the American continent, having been brought here from Europe early in the settlement of this country. Recently, within the last few years, *Italian* bees have been introduced, and, still more recently, the *Egyptian* bee, which, from its beauty and activity, bids fair to become a great favorite. Strange to say, bees can be purchased in California cheaper than in any other State of the Union; and yet they have been carried there since the discovery of gold. The climate and the unusual skill of *cultivators* of the bee on the Pacific coast, have developed the *mellificatory* insect to an extraordinary extent.

These intelligent little creatures, as remarkable for their geometrical instincts as their industrious habits, are well worthy of the care which is bestowed upon them, to say nothing of the delicious product of their labors.

THE FALL OF LEAVES.—M. Trécul and others have been engaged in investigating the cause of the fall of leaves, and their researches would seem to point to the conclusion, that in many plants a phenomenon occurs just before the fall of the leaf, which is not unlike the process which accompanies the shedding of horns in animals. It consists in the obstruction of the proper vessels at the base of the petiole or leaf-stalk. This obstruction is caused by the multiplication of cells, which first occurs in the parietes of the vessels. The cells increase and multiply, till at last the vessels are completely choked up in the neighborhood of the insertion of the leaf, and thus a differentiated plane is formed across which the leaf-stalk breaks, and the leaf accordingly falls.

THE SCUPPERNONG GRAPE.—J. D. M. Miller writes from Mississippi to the *Scientific American*, that this grape is destined to revolutionize grape-growing and wine-making in the United States. It has no equal in productiveness or quality. It never rots, never mildews, never fails to bear immense crops. A vine will live a hundred years, bearing, every year after ten years of age, from twenty to fifty bushels of grapes, yielding from fifty to one hundred and twenty gallons of wine. It needs no training, no pruning, no trellising. He cites the opinion of Dr. Jackson, of Boston, that "Scuppernong wine can be made so fine as to excel all others made on this continent." It has never been tested at the North. Mr. Miller claims for this grape more good qualities and less imperfections than are to be found in any other kind. If one half these claims can be made good, this grape is well worth a trial everywhere, North and West.

☞ THE loss on the potato crop of the last season is estimated at thirty per cent of the whole. The average crop of good seasons, throughout the Union, is about 150,000,000 bushels. Estimating the price per bushel at $1.00, the loss on last year's crop amounts to the vast sum of $45,000,000 on a single article of produce—a serious matter with small farmers, by whom mainly it must be borne.

Cheese factories, or associated dairies, first organized at Rome, N.Y., about seven years ago, now number twelve hundred, involving in their outlay $3,500,000.

THE NEW-ENGLAND FARMER.—There are three things which New-England men in middle life, who have migrated from the country to the city, remember, as particularly associated with the old farm homestead,—*Scott's Commentary, Robert B. Thomas's Almanac*, and the *New-England Farmer*. This sterling agricultural paper is one of the institutions of New England, and its visits to the firesides of thousands would be missed as much, almost, as those of brothers, sisters, or cousins. The genial, pleasant, instructive essays of the farmer-editor, whose cottage upon the banks of Concord River is the home of so much refinement, social happiness, and generous hospitality, lend a charm to its columns which is found in but few publications. The *Farmer* often speaks words of kindness and encouragement, but never those of bitterness or envy. The agricultural interests of New England and the country, in their present advanced condition, are greatly indebted to the *Farmer*, and long may it continue to exert its healthful and elevating influence.

MOVEMENTS OF THE SENSITIVE PLANT.—M. Bert and M. de Blondeau have published in the *Comptes Rendus* some extremely interesting observations on this subject M. Bert shows that the natural and regular movement of the leaves, which takes place in the sensitive plant is produced by a different cause from that to which the sudden contraction is due when the plant is touched by the fingers. M. de Blondeau's observations are exceedingly curious and well worth further examination. He submitted three plants to the influence of an electric current from a Ruhmkorff's coil. The first he acted on for five minutes; when left to itself, the plant seemed prostrated, but after a quarter of an hour the leaves opened and it seemed to recover itself. The second specimen was acted on for ten minutes. The plant was prostrate for an hour, after which it slowly recovered. The third specimen was galvanized for twenty-five minutes, but it never recovered; and in twenty-four hours it had the appearance of a plant struck with lightning. A fourth plant was etherized, and then exposed to the current. Strange to say the latter had not any effect; the leaves remained straight and open; thus proving, says M. de Blondeau, that the mode of the contraction of the leaves of the sensitive plants is in some way allied to the muscular contraction of animals.—*Quar. Jour. Science.*

PRESERVATION OF POTATOES.—If potatoes are immersed for four or five days in ammoniated water containing an ounce of the common liquor ammonia to a pint of water, they will, on removal, be found to have their vegetative principle greatly checked or altogether destroyed, so that they may be preserved throughout the year. *Dried* in an airy situation, potatoes so treated have been used after ten months' keeping in a warm kitchen closet, and were found to be perfectly good.

☞ It seems that insects have a strong antipathy to the odor of vinegar, and that in some cases they are destroyed by it. The *American Naturalist*, quoting from the proceedings of the London Entomological Society, informs us that a solution of strong vinegar, one part to nine of water, sprinkled on the branches of fruit trees, will drive away or destroy the insects which lay their eggs in the blossoms.

The application must be made just before the blossoms appear, with a garden engine, syringe, or common watering-pot. Vast quantities of fruit may be saved by this simple means.

Boston Journal of Chemistry.

BOSTON, APRIL 1, 1868.

☞ Any one sending us the names of *three* subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For *five* subscribers, we will send the *petite microscope*. For *twenty-five*, we will send, in addition to the microscope, a copy of *Stockhart's Chemistry for Students*, the best elementary treatise yet published. For *one hundred* subscribers, we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring-rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. Downes is general travelling agent for the *Journal*.

☞ Our patrons are flooding us with inquiries to which answers are requested. We can only answer those, through the *Journal*, which are of general interest to our readers. We are anxious to please and serve our friends in every possible way; but there is a limit to our time and strength. We cannot answer any inquiry, either through the *Journal* or by mail, unless the *name* of the correspondent is given in full. All anonymous communications go into the waste-basket.

☞ We are greatly vexed to learn of the trouble many of our subscribers have to obtain their papers. We have reason to believe a considerable number fail utterly to get them through the mail. No publication in this city is more carefully and promptly mailed than this *Journal;* and if not received, it is the fault of the Post Office Department. Our subscribers must call for their numbers at the local offices, and *insist* upon having them promptly delivered.

J. W. BARNEY, Esq., of Lancaster, N.H., sends us a fine list of subscribers, and writes as follows:—

"The merits of the *Journal*, and *not* the premiums you offer, make me interested in extending its circulation; and I do think that no family can invest the sum of fifty cents a year to so good advantage as in your *Journal*."

ANTHRACITE AND HEALTH.

We have read, with much pleasure, a little tract, just published, upon *Anthracite and Health*, by George Derby, M.D., of this city. The object of Dr. Derby is to inquire into the influence upon health, of anthracite coal, when used as fuel for warming houses. A very large number of those who use hard or anthracite coal as a source of household warmth, entertain the idea that it is detrimental to health; that it causes headache, dizziness, difficult respiration, and a train of affections destructive to all comfort and happiness. The impression prevails among such, that wood or soft coals may be burned in the same stoves or furnaces, without producing these unpleasant results. Is it true that the heat from anthracite is different, or in any respect unlike that from other and softer kinds of fuel? We think not. This matter has been briefly discussed in a former number of the *Journal*, and our readers may remember the views presented in the article upon "Household Warmth." The radiant heat being the same from all sources of combustion, the inquiry comes up,—What is the cause of the peculiar, unpleasant effects of the burning of hard coal upon so many consumers? Dr. Derby thinks they are due to the

presence of *carbonic oxide gas* in houses where this coal is consumed.

This view coincides in part with our own. No doubt the character of the fuel and the conditions under which it is burned are such as to furnish this insidious and dangerous gas in large quantities; and no doubt it often escapes into rooms, even when the coal is burned under the most favorable circumstances; but we think it is not the only source of trouble. The intensity of chemical action in ignited anthracite coals, is greater than in any other form of fuel; and the undue or abnormal elevation of the temperature of dwellings warmed by this fuel, has much to do with the illnesses resulting from its use. In no other combustible material is there so great condensation of pure carbon as in anthracite coal; and in its combustion there is an entire absence of the milder illuminating gases which proceed from the bituminous varieties and from wood, and which render their ignition so pleasant in the grate or upon the hearth. The peculiar blue flames of carbonic oxide, which play around and dart through a bed of anthracite coals, are suggestive of intense *dry* heat; and watching them often causes severe headache. What electrical effects the fierce rays from anthracite may produce upon the air or inmates of rooms, we will not venture to conjecture. Perhaps none at all; and yet, from what we know of the electrical effects of heat upon air and other bodies, under peculiar conditions, it may not be unphilosophical to suppose this kind of influence may be exerted.

However considerable may be the detrimental influence of hard-coal fires, it is quite impossible to dispense with them. We must try, in every possible way, to render the use of this fuel healthful, and all defects in methods of burning it must be pointed out and obviated.

Air-furnaces, it must be confessed, are open to many serious objections; and yet, how can they be dispensed with? Twelve years ago, we discarded the air-furnace in our own dwelling, and devoted more than fifteen months' time to devising a simple steam apparatus as a substitute. This little portable, compact device, not much larger than a flour-barrel, we have had in constant use ever since, and it has afforded a vast amount of comfort. A uniform, equable, pleasant temperature is constantly maintained during all the winter months. Air-furnaces are cheaper than steam apparatus, and therefore will be employed. Those that use them should look well to the draft-flues; and, at this season of the year, all obstructions of ashes and cinders should be removed, so that the gases may have a free orifice for escape. Allow a generous current of fresh air to flow through the air-box, and maintain open dampers. As the warm weather approaches, the draft of flues decreases, and the doors of stoves and furnaces, which could be left open or ajar with safety during the night in midwinter, cannot in the spring months. Thousands have been made seriously ill, and many have lost their lives, by the escape of poisonous gases from stoves in the night-time. It should be a point with those having furnaces in cellars and basements, never to retire at night without giving them personal examination. A furnace in the cellar from which poisonous gases escape, is as dangerous as if placed in rooms above. The law of the diffusion of gases is a most important one, and should be understood. Gaseous bodies, when liberated, move freely in *every* direction, and no wooden or even brick partitions offer obstacles to their circulation. A person asleep in an attic will suffer nearly as much from escaping gas in the cellar, as those in lower rooms. These suggestions are important, and should be heeded.

☞ The class of men engaged in making and mixing dangerous light naphtha illuminating oils, are beginning to feel the influence of our exposures of their frauds. Our friends must aid us, and soon we will break up the business, and secure perfect exemption from the terrible explosions which are occurring. We have seen a copy of an order sent by a dealer in the country to one in the city, which reads as follows:—

"*To* ——— ———. Please send us immediately, 6 barrels Kerosene Oil, 3 barrels Naphtha, with bill, at lowest prices."

It is evident, the design was to mix these fluids when they reached the hands of the dealer, and thus furnish an explosive mixture to be placed in the hands of consumers. If kerosene of legal standard costs forty cents a gallon, and light naphtha twenty cents, a mixture of equal parts brings the price down to thirty cents. If the article is retailed at fifty cents, the dealer makes ten cents more upon a gallon than if he sold a true article; and here is the motive for adulteration. Apply the tests as published in the *Journal*, and when a dangerous article is furnished, make the dealer responsible for the sale.

Yearly Mercury Production of the Earth.—This is estimated at 61,000 cwt., of which 20,000 come from Spain; California, (New Almaden) 28,000; other California mines, 7,500; Peru, 3,000; and from Germany, Austria, and France, 2,500. Mexico, Peru, Chili, and Bolivia consume yearly 23,000 cwt. in the production of silver; China and Japan, for making cinnabar and producing silver, about 10,000. The remainder is consumed in Australia and California for gold and silver extraction, and in Europe and the United States for various industrial purposes. The supply is about equal to the demand.

Cheap Preparation of Oxygen.—When manganate and permanganate of potash or soda, together with watery vapor, are heated to 450° C. (842° F.), they give up a portion of their oxygen, while oxide of manganese and hydrate of potash or soda are left behind. This residue can be again oxidized to manganate of alkali, by exposure to a low red heat in a current of air. To prepare oxygen, put into one or more retorts a mixture of proportional parts of alkali and binoxide of manganese, and peroxidize in a current of air as given above. In the course of a few hours the mixture will be changed into manganate of potash or soda, which can be deoxidized again in a stream of aqueous vapor. The latter operation may be carried on either in the same retorts used for the former, or in vessels especially designed for the purpose. The oxygen and watery vapor go into a condenser, where the latter condenses and the oxygen passes into a gasometer. As soon as all the oxygen the manganate will yield has been evolved, reverse the process, and oxidize again the residue from the air, and thus continue indefinitely.

Mineral Riches of Japan.—A British consul gives a rose-colored account of the deposits of coal, iron, and lead on the island of Jeddo. He says there is one place where the coal forms cliffs on the shore; at another place, he travelled 4 miles over a ferruginous sand of more than 60 per cent of iron. Also, there are indications of gold and copper.

If coal really can be obtained in any quantity in Japan, it will be of very great value. Within the past few years, the number of steamers plying in those waters has very largely increased, and a large bed of good coal would be a great desideratum.

Muscular Force of a Snail.—Professor Goss placed over a snail a bottle containing a quart of milk, and soon saw it move slowly over the table. The bottle and milk weighed 1 kilo., 580 grm.; the snail only 14 grm. The snail, therefore, moved a weight 112 times its own.

New Soldering Powder for Soldering or Welding Iron and Steel.—Bernard Leitar, of Brussels, has recently obtained a patent for an improved composition for welding iron and steel. It consists of 1,000 parts iron or steel filings, 500 parts borax, 50 parts balsam of copaiva (any resinous oil can be used instead), and 75 parts of an ammoniacal salt (chloride of ammonium, carbonate of ammonia, or any other). Mix intimately, heat, and pulverize finely. The mode of using the powder is as follows: Sprinkle the parts to be joined together with the powder, and then expose them to heat strong enough to melt the powder; about a cherry-red heat will be necessary. Take the pieces from the fire, and weld in the usual manner.

INQUIRIES AND ANSWERS.

Printer, *Norwich, Conn.*—Is it possible to make a paste which will be *waterproof*?

The English calico-printers make a paste as follows, which is said to resist the action of water: Take 1 lb. acetate of copper, or verdigris; 3 lbs. sulphate of copper, dissolved in one gallon of water. This solution to be thickened with 1 lb. gum arabic, 1 lb. British gum, 4 lbs. pipeclay, 2 oz. nitrate copper.

L. M., Jr., *Columbia, Pa.*—How can I make a glue insoluble in water? They have in England what is called "marine glue," used for fastening and sizing paper for boats—the purpose to which I wish to apply it.

Marine glue is made in the following manner: Macerate for ten days, 1 lb. of india-rubber in 37 pints of coal-tar naphtha, or benzole; then add two parts of shellac to one of the mixture. Heat the mixture, and pour on plates to harden. When it is used, it must be heated to about 250° F. The adhesiveness of this glue is remarkable. It is not affected by water or the heat of the sun.

G H.—Accept our thanks for the items sent to us.

Dr. H. C. B.—We have not at hand the analysis of the Empire Spring water. Send to any one of the physicians or hotel-keepers of Saratoga, and they will forward you a little circular giving all desired information.

W. T. L., *Chelsea, Mass.*—How can I remove verdigris and dirt from coins?

A strong solution of oxalic acid is very good for this purpose. The coins may be placed in it for a few moments, and then cleaned with a stiff toothbrush.

G. W. D., *Faribault, Minn.*—The shower of dust which recently fell in your State, was, indeed, a remarkable phenomenon. If, under the microscope, it proves to be silicious in its character, or fine sand, it must have come from some region beyond the reach of frost. Dust is often transported immense distances in a short period of time, by atmospheric action. It probably came from the great sandy desert near the Mexican boundary, so often described by travellers. It is a curious fact, that the fine particles of partially carbonized matter, which give the peculiar haze or smoky appearance to the atmosphere of the Atlantic States, during the Indian summer, come from a region entirely across the continent. These minute atoms, examined by the microscope, are found to belong to vegetable organisms which are only produced on the plains at the base of the Rocky Mountains; and the atoms are wafted hither through some wonderful meteorological agency.

Prospect of a Cheap Light.—From *Galignani*, we learn that MM. Marechal and Tessier Du Mothay are engaged in perfecting a method or process calculated to increase the lighting power of *gas* enormously. The process simply consists in subjecting common gas to complete combustion by oxygen. A small cylinder of magnesia put into the flame becomes luminous enough to project a light sixty times stronger than that of common gas. This very nearly constitutes what, about fifty years ago, was called the Drummond light, consisting of a mixture of oxygen and hydrogen lighted at the orifice of a tube and projected on a piece of chalk. The merit of MM. Marechal and Du Mothay, however, consists in their having imagined an economical way of producing oxygen, at a cost of 72 centimes per cubic metre. Now, three cubic metres of illuminating gas and four of oxygen, costing in all 9 f., will, according to the latest experiments, yield as much light as 180 cubic metres of gas alone, which costs 54 f. There will be a saving of five sixths of the present cost.

Limits of Sound. — Helmholtz, in a recent work, places the minimum limit of musical sounds perceptible to the human ear at 16 vibrations, and the maximum limit at 38,000 vibrations, per second, a compass of about 11 octaves. All these sounds cannot be used in music.

☞ The "movable wheel question" is puzzling the readers and correspondents of the *Scientific American.* The question is,—"How many revolutions on its own axis will a movable wheel make, in rolling once around a fixed wheel of the same diameter?" The editors and perhaps a majority of the correspondents say "*one;*" while several of the latter contend, with much positiveness and spirit, for "*two.*" In the times of the old schoolmen such questions would be debated in open arena, with mingled logic and fisticuffs.

BOOK NOTICES.

Annual Abstract of Therapeutics, Materia Medica, Pharmacy, and Toxicology, for 1867. By A. Bouchardat. Philadelphia: Lindsay & Blakiston.

This is a translation of Bouchardat's yearly abstract of those practical branches of medical science, of special interest to druggists and physicians in active practice. All theoretical abstractions are omitted in the work, the selections being made with the view of affording the most recent and useful information, so much desired by medical men and pharmaceutists. It is a work which should be in the hands of all dispensers of medicine, and all interested in the progress of *materia medica* and pharmacy.

The Diagnosis, Pathology, and Treatment of the Diseases of Women. By Graily Hewitt, M.D., London F. R. C. P. Philadelphia: Lindsay & Blakiston. 1868. One hundred and sixteen Illustrations.

The first edition of this magnificent work was published in 1863, which, being rapidly exhausted, was out of print before the present edition was issued. Many improvements and additions have been made, and pathology has been considered in conjunction with the treatment of the diseases of women. The work is enriched by the addition of numerous illustrations, upwards of sixty of which are original, and are of a high order of excellence. This extended treatise may be said to be exhaustive in its treatment of the special subjects brought under discussion, and the views expressed are of the highest authority. Without this work, so full of practical suggestions in regard to the treatment of the various affections incident to women, the physician's library may almost be regarded as defective.

Philosophy of Eating. By Albert J. Bellows, M.D. New York: Hurd & Houghton. 1868.

We hardly know what influence this book may have upon the mind of the non-professional reader; but it certainly would be placing a rather low estimate upon the general intelligence of the people to suppose them incapable of detecting its errors and absurdities. These begin with the preface, and thenceforward they are found upon almost every page. When a writer, discoursing upon the chemistry of the cereal grains, speaks of their being composed of "nitrates" and "carbonates," we conclude his book is intended for the inhabitants of some planet other than our own, where the wheat-grains elaborate these fixed salts, and present them all ready for use in the arts. Wheat grown on our earth *contains no "nitrates" or "carbonates."* The chemists of our schools recognize a difference between the phosphorous and the *hypo*phosphorous "combinations;" and the statement on page 83, that "insects abound in phosphorous," if intended to apply to the combustible material so familiar to "professors" and juvenile experimenters, must be deemed slightly absurd. It is something to be informed that "nitrogen is the basis of beefsteak;" that nitric acid is "unwholesome;" and to be cautioned against the "exploded notions" of Baron Liebig, and the bad effects of "disorganized phosphorous." We fear Prof. Bellows will blow wind into the stomachs of his readers which will hurt them more than "disorganized phosphorous."

Handbook of the Stars. For Schools and Home Use. By W. J. Rolfe & J. A. Gillet. Boston: Crosby and Ainsworth. 1868.

An exceedingly interesting and instructive little work, and one which will find its way into many schools and families. Although printed, it is not yet published, as there has been some delay on the part of the engravers in furnishing the star maps which are designed to accompany the book. Not many weeks will elapse before it will be placed in the hands of readers.

☞ We remember hearing a lady friend exclaim, as a small quantity of illuminating gas escaped into the room from the pipe, "Oh, this horrid odor! What a pity gas cannot be made pleasant or odorless!" Now, this odor of gas, so unpleasant, is one of its most important characteristics. If it were odorless, how should we ever know when the dangerous, invisible body was escaping into our rooms? Without this peculiar smell, it would be quite too hazardous to introduce into our dwellings for purposes of illumination. And so with smoke and coal gases. Carbonic oxide gas, liberated from burning coals so largely, is a deadly poison, and it has no odor. If this were the only gas or vapor proceeding from coals, the most serious accidents would constantly occur; but, fortunately, coals contain a small amount of sulphur, and, in burning, oxygen unites with it, and forms sulphurous acid gas. This is very suffocating and unpleasant; and when carbonic oxide escapes from stoves or furnaces, the sulphurous gas accompanies it, and warns us of danger. Everything in this world is most wisely and beneficently adjusted.

☞ We are pleased to have our articles copied by journals, but we *do wish* proper *credit* might be given. It is no unusual circumstance to notice several items from the *Journal* copied into a single number of some publications without any acknowledgment whatever of the source from whence they were derived. This may be unintentional, but it is very annoying.

Medicine and Pharmacy.

NOTE REGARDING PROPOLIS.

Bethel, Ky., Feb. 8, 1868.

Dr. Nichols.—*Dear Sir:* I see, in the last number of your valuable paper, *The Journal of Chemistry*, a notice of a therapeutic agent called "Propolis," and recommended as approximating a specific in the relief of acute and chronic diarrhœa. This notice attracted my attention more especially because I had used, with very desirable success in similar cases, a wax derived from *Myrica Cerifera.* The whole plant is supposed to possess medical properties. Like that of which the bee constructs its cell, the bay wax is composed of cerin and myricin, the former having an affinity for alcohol, the latter for oil. There is, however, a bitter principle extracted by boiling ether, which seems identified with the coloring matter of the wax. While I have found others who esteemed the myrtle wax very highly as a remedial agent in dysentery and diarrhœa, yet there has been a diversity of opinion as to the *nature* of its effect, some thinking that it was only *mechanical*, not chemical.

As *Propolis* is obtained from the buds of resinous or balsamic trees, and the bay wax is thus procured, does it not contain a considerable portion of propolin? or, in other words, is not the effect of the wax chemical, and derived from the presence of this principle?

As a constant reader of your interesting *Journal*, I would be pleased to elicit something more from you on this interesting subject. My mode of using the wax is as follows: Scrape the wax very fine; mix equal quantity of white sugar, and give a teaspoonful every time the bowels move.

Respectfully,

I. L. Richardson, M.D.

A QUESTION.

Mr. Editor:—Your subscriber, in the hope of adding a little to the interest of others, and a great deal to that of himself, would most respectfully submit the following:—

In 1864, while in the army, South, I endeavored to prepare a compound for acute dysentery, which was then quite prevalent in camp.

I placed two ounces of saturated solution of Sulph. Magnesia in a bottle, then added Spts. E. Nitre, two ounces, Tr. Opii, ℥ iv., corking tight. I turned to administer a dose to a patient, and, upon shaking it, behold, it congealed! The more I agitated it, the harder it became. Thinking the Tr. Opii might, by the alcohol it contains, cause this phenomenon, I made more of the compound, omitting it (the Tr. Opii); when, upon shaking it, the same result was obtained. I endeavored to solve the problem; but, failing to convince myself of a proper theory, I applied to others, better versed in chemistry than myself, and, more recently, to a *professor* of that branch of science; but I yet remain in ignorance. I pray you, therefore, to enlighten me.

I may add that the above mixture, with and without the Tr. Opii, has proved of great use to me in the treatment of dysentery. For want of a term more expressive, it was then called "ice-cream," and given in teaspoonful doses, every four hours.

I feel that, if my medical brethren will try it, they will concur in my views of its efficacy.

Yours respectfully,

Frank L. Peiso, M.D.

Macon, Mo., Feb. 24, 1868.

Answer.—A saturated solution of sulph. magnesia is instantly changed physically by the addition of alcohol or any liquid containing alcohol. Spts. nitre dulcis is simply a solution of hyponitrous ether in alcohol; and therefore, when it is added to the other solution, the sulphate of magnesia, by abstraction of water, is made to assume the crystalline form; and this it does in very minute crystals, giving the mass the appearance of ice-cream. If these are melted by heat, upon cooling, two classes of crystals are formed, in different strata, the upper furnishing very beautiful ones of delicate, silky fineness.

BISULPHITE OF SODA IN DYSPEPSIA.

My experience with the sulphite of soda, in the treatment of diarrhœa, dysentery, cholera morbus, as well as dyspepsia, has been most decidedly beneficial. From five to twenty, forty, or sixty grains, according to the age of the patient and the severity of the symptoms, administered two, four, or six times a day, have, in almost every instance, had the effect of speedily arresting the discharges, and relieving the nausea and the colicky irritation. I could cite several cases in which its efficacy has proven as prompt as any other remedy before tried, and in not one have I seen any bad effect or failure. As to its *modus operandi* in these complaints, it seems to act in the double capacity of an antiseptic and astringent. On the latter principle, its influence appears sometimes almost as speedy and efficacious as opium. In cases of constipation derived from torpor of the liver, or deficient peristaltic power of the intestinal tube, its corrective influence over almost all functions aids to restore a healthy action of the muscles of the bowels.

In dyspepsia, its efficacy has been most marked, especially when the disorder is accompanied with flatulence and eructations of food. These symptoms are doubtless the result of the decomposition and fermentation of the foreign material in the stomach itself, from one or more of the causes before mentioned. In such cases, the sulphite salt operates, in the first place, as a direct and powerful arrester and preventive of the decomposition of the food, in the same manner as it does on the outside of the body; and, in the second place, its acid constituent, either in its original sulphurous form, or by its advancement to the sulphuric form, doubtless compensates for some of the deficiency of the gastric juice, and in this way completes the digestive process as far as the gastric function is concerned. The form of administration which I have found most useful and successful in dyspepsia and its attendant circumstances, is in combination with tonics and carminatives, avoiding alcoholic stimulants on all occasions. My chief combination is tincts. of cinchonæ comp., and cardamoms, and syr. aurantii, with the sulphite salt in separate solution, combining the two at the time of administration.

It speedily arrests the fermenting process which the contents of the alimentary canal so frequently undergo, eliminating gases, producing symptoms of flatulence, and which doubtless, in many cases, is the cause of the diarrhœa, nausea, colic, and other attendant symptoms. For the arrestation of this process of decomposition and fermentation, I have found no means equal to sulphurous acid in the form of a sulphite salt. In several instances in which flatulence was a very prominent symptom, one or two doses of the salt appear to have immediately arrested and removed it. As an illustration of its value in dyspepsia, the following extract is quoted from a letter received from a recent member of the General Government in Washington:—

"WASHINGTON CITY, Jan. 8, 1867.

"DR. J. H. GRISCOM.

"*Dear Sir:*—You remember your medical prescription. I procured it; and, from taking the first dose, I felt no more of that dyspeptic trouble. I took faithfully the twelve powders and the liquid, and believe they have been of more benefit to me than all the medicine I have taken for years. Since then, several of my friends have been complaining, in my presence, of the same trouble I had, and I have immediately given them the apothecary's number of your prescription; and in the only report I have had, it cured the gentleman just as it did me. I am not sure I shall not set up 'Doctor for Heartburn,' on your capital."

There is another disorder in which the intestinal canal is chiefly involved, and accompanied with other serious disturbances, in which, though it has not fallen to my lot during the past two years, to have obtained any experience in the treatment with this or any other remedy, having seen no case of it, I yet should unhesitatingly and with full confidence administer it. I refer to *cholera Asiatica.*

Sulphuric acid, diluted in the form of a beverage, has gained, in France, considerable reputation in the treatment of epidemic cholera, its remedial effects being attributable to its antiseptic powers, and to its influence in destroying cryptogamic parasites and organic germs. In sulphur*ous* acid, we have a preparation of the same ingredients in different proportions, possessing the same advantages combined with the additional one of being a powerful antiseptic and deodorizer, in its native form, and then, by conversion into sulphur*ic* acid, possessing all the advantageous properties of the latter.—DR. GRISCOM, *in Med. and Surg. Reporter.*

Gleanings.

TREATMENT OF NIGHT-SWEATS IN CONSUMPTION.

Powdered borax .... ʒ vss.
Washed sulphur .... ʒ i.
Sub-nitrate of bismuth, each............ ʒ iss.

and divide into forty powders, one to be given every two hours (twelve in a day). Four or five days of treatment will suspend or much diminish this troublesome and exhausting symptom, and give much relief to the patient.—*Rodolphé.*

DISINFECTANT PROPERTIES OF COFFEE.—It is not generally known, that slightly-roasted and ground coffee, placed on a warm surface, such, for instance, as a fire-shovel, will neutralize vapors of ammonia and sulphuretted hydrogen.

NO THOROUGHFARE.—The character of Walter Wilding, in Charles Dickens's and Wilkie Collins's *Christmas Story*, is an able study of epilepsy—what the French call LE PETIT MAL.—*Lancet.*

AFTER-TREATMENT OF SCARLET FEVER.—Dr. Boulton, of London, strongly recommends iodine, in the form of the syrup of the iodide of iron, or iodide of potasii, in the debility following scarlatina.

A SYMPTOM OF CONSUMPTION BUT LITTLE KNOWN.—Dr. Nelson, of London, has mentioned a stretched and shining appearance of the skin, investing the root of the nail, as an empirical but perfectly certain sign of tuberculosis in its earliest stages.

TREATMENT OF CHLOROSIS.—Prof. Fabre, of Marseilles, gives the following resumè of a part of his new work upon La Chlorose: In the treatment of chlorosis, we have one excellent remedy, a change of air; a good remedy, iron; a tolerably good remedy, hydrotherapy; and a passable remedy, substantial nourishment.

PETROLEUM AS A REMEDY FOR WORMS.—Dr. Perrin, of Paris, employs kerosene oil against intestinal worms. For pinworms, he makes an emulsion with half a dessert spoonful of oil and the yolk of an egg, and administers this in a small injection of lukewarm water. For the round worms, he gives from one to two drops of the oil in a capsule.—*L'Union Medicale.*

THE DANGER OF COPPER UTENSILS IN COOKING.—A late number of the *Journal de Chimie* contains a long article by M. Chevallier, including a large number of cases which prove positively that there is danger in the use of copper vessels for cooking purposes. Utensils lined with tin are safe, but the tin should be pure, and not alloyed with zinc or lead.

TO PREVENT PITTING IN SMALL-POX.—Dr. Yates, of the Kingston (Canada) General Hospital, has been trying the following treatment for the prevention of pitting in small-pox. An ointment composed of carbolic acid ʒ ii., mutton suet ʒ ii., and colored with lampblack, was spread thickly upon black cotton wadding, of which a mask had been made, holes having been cut for the eyes and nose. This mask was changed every second day, and the face gently washed with soap and warm water, and then, like the whole body, washed with water impregnated with carbolic acid. There was none of that intolerable itching, and no secondary fever; and the eruption, which had been remarkably well marked, left no trace. One of the arms treated in this manner was much less disfigured than the other, which had not been interfered with.—*Lancet.*

ALOES.—Aloes should always be given in the solid form. It takes twice or thrice the quantity in solution to produce the same effect. All the tinctures, wines, and elixirs are as wasteful as nasty. Even the favorite decoction is a mistake. It were far better to give one grain of the watery extract in a pill, and a dose of potash and cardamoms in a draught, than to waste four grains of the extract in an ounce of decoction.

The best aloes should always be given, no matter its price. It would not fetch the money if not worth it.

The watery extract should also always be given; the crude is barbarous. How is the dose to be fixed of a drug of which from twenty to sixty per cent may be inert?

All the preparations containing alkalies are nonsensical barbarisms. The active principle of aloes is as soluble as sugar; and what is dissolved by alkali is useless, if not mischievous.—*Med. Times and Gazette.*

Formulae

USEFUL IN MEDICINE AND THE ARTS.

REMEDY FOR PILES.

Editor Journal of Chemistry,—I herewith enclose a formula for the relief and cure of piles which has been used with immense success for the last thirty or forty years. Patients have come miles to obtain the remedy. I do not say that it always cures, but I have never known it to fail of giving relief in all cases of that most distressing complaint.

℞ Manna . . . . ℥iij.

Dissolve in boiling water q. s., so that, upon cooling, it will be about the consistence of thick cream; to this add sulphur ʒ iiss, previously triturated in a mortar with mercury q. s. to give the sulphur the color of gunpowder. (The mercury will entirely disappear from the trituration) Mix the sulphur with the manna; then add rhei pulvis q. s. to make mass, and divide into balls about the size of rifle bullets. Roll in rhei pulvis, and set away to harden. One of the balls, previously dipped in olive-oil, may be introduced up the rectum every night, or every other night, as the case may be.

Yours, respectfully, A. E. HULL, M.D.,
Berlin, Rensselaer Co., N.Y.

HARNESS WASH.—Take neatsfoot oil and ivory, or patent black—the latter well pulverized, or to be made so before using. Mix thoroughly, adding the black until the oil is well colored, or quite black. In cool weather the oil should be warmed somewhat before mixing. With a sponge apply a light coat of the mixture, only what the leather will readily absorb, until the harness is dry, which will be in from two hours to a half or a whole day, depending upon the weather and previous condition of the leather; wash thoroughly with soapsuds. In making the suds, use *good Castile soap and cold rain-water* (warm water should never be used on harness leather). Apply the sponge. Rub off with buckskin. This will give the harness a nice glossy surface, and the leather will retain a good color and continue pliable for months. If it becomes soiled with mud or sweat, an application of soap and water, as above directed (without oiling), will be sufficient to give it a bright appearance.

Two applications of this oil and black mixture a year (or once every six months) will be sufficient to keep harness, as ordinarily used, in good order. It may be necessary for livery men, and others who use harness constantly, to apply oil oftener, but in most cases two oilings a year, and washing with suds when soiled, will keep a harness in good trim for sight and service. This process will give a large dividend in extra service and durability, to say nothing of improved appearance. We are assured that the same or a similar application is just the thing for carriage tops which are made of top leather. The only difference in treatment is, that less oil should be used, or rather a lighter coating applied, and it should be washed off before drying in, top leather being thin and much more penetrable than harness. Of course, the mixture would not answer for enamelled leather, of which some carriage tops are constructed.

LIQUID GLUE.—Crack up the glue and put it in a bottle; add to it common whiskey, shake up, cork tight, and in three or four days it can be used. It requires *no heating*, will keep for almost any length of time, and is at all times ready for use, except in the coldest of weather, when it will need warming. The bottle must be kept tight, so that the whiskey will not evaporate. A common cork should not be used; it will become clogged. Use a tin stopper, covering the neck of the bottle, and fitting as closely as possible.—*Am. Artisan.*

WHEN TO APPLY PAINT.—Paint, to last long, should be put on early in winter or spring, when it is cold, and no dust flying. Paint put on in cold weather forms a body or coat upon the surface of the wood that becomes hard and resists weather, or an edge tool even, like slate.

MUSTARD PAPER.—Black mustard-seed in fine powder is freed from oil by pressure or with benzine, and dried, and then spread evenly, by means of a roller, over sized paper previously covered with a varnish made of benzole thirty parts, virgin caoutchouc, in thin shreds, one part, and rosin half a part, digested until dissolved.

BOSTON JOURNAL

OF

CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. II. BOSTON, MAY 1, 1868. NO. XI.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Science.

SPECTRUM ANALYSIS.

Within the last half-century, chemistry has advanced with giant strides. By the discoveries made in organic chemistry within the last twenty-five years, a field for investigation has been opened up, almost limitless in extent. But in no respect is progress more strikingly shown than in that beautiful application of previously known facts, which forms the subject of the present article. Spectrum Analysis has been created within the last decade; yet already, by its means, new elements have been discovered, and the bounds of chemistry enlarged so as to include the determination of the composition of the sun and stars, and the solution of astronomical and cosmical problems of the highest importance.

When a ray of sunlight, coming through a narrow slit into a dark room, is passed through a flint-glass prism, it undergoes two changes: first, it is refracted or bent from its course; second, it is dispersed or spread out; and we obtain an elongated, colored image, called the prismatic or solar spectrum. In the prismatic spectrum, white light has been decomposed into the seven colors of which it is made up; viz., violet, indigo, blue, green, yellow, orange, and red. There is no distinct line of demarcation between the colors, but they gradually shade off towards each other. Of the seven, the violet light is the most refrangible, *i. e.*, the most refracted or bent; the others less so, in the order given above, down to the red, which is the least refrangible. This difference in refrangibility causes the decomposition of the white light into its components; the indigo part of the ray is bent from its original course at a less angle than the violet, and falls upon the screen just to the left of the latter, and so on. Dispersion is, therefore, properly speaking, merely the effect of refraction.

Newton first carefully examined the prismatic spectrum, and upon observations founded his theory of colors. Wollaston, a hundred years later, noticed that the solar spectrum was not, as supposed, continuous, but was crossed at right angles by numberless dark lines or bands. Fraunhofer was the first who carefully examined these lines. He described and mapped a large number of them, which have been called from him, "Fraunhofer's lines." He found that the lines varied in breadth and strength; but their relative positions remained unchanged when the source of light was the same, no matter what kind of prism or refracting agent he used. Sir J. Herschel was the first to examine, with the prism, flames colored by metallic salts, and to point out their availability for analytical purposes. Others made similar observations. But to Kirchoff and Bunsen is due the credit of having constructed, upon the basis of the observations of the spectra of flames colored by metallic salts, a method of qualitative analysis of extreme delicacy and beauty. They contrived an instrument called the spectroscope, for observing these spectra, and comparing them with one another.

The spectroscope consists essentially of a stand supporting a prism, usually of flint-glass, and three brass tubes. One of these tubes is a telescope, through which the observer looks; one of the others has, at its farther extremity, a narrow horizontal scale formed by transparent lines on a dark ground; through the third, the light under examination passes. The first two are equally inclined to one face of the prism; the last is opposite the other face. The lines of the scale are seen by reflected light, simultaneously with those of the spectrum, the lines of which can therefore be read off in divisions of the scale. Within the last two or three years, spectroscopes of great power have been constructed, having as many as nine prisms; but their use calls for great care and skill, and, for almost all purposes, much simpler ones are perfectly satisfactory.

The alkalies and alkaline earths were the first substances Kirchoff and Bunsen examined by the spectroscope. The spectrum of sodium is characterized by a broad, intense yellow line. This re-action is extremely sensitive, as by it 1-2500000th of a grain of sodium can be detected. The potash spectrum is recognized by two lines, one in the red and the other in the indigo. The spectra of the alkaline earths are equally characteristic, but somewhat more complicated. Those of many of the metals are excessively complex, some having as many as fifty, sixty, and even five hundred lines. The spectra of the metals have been very carefully examined, mapped, and their characteristic lines marked, so that an observer acquainted with them, or having the map before him, can in an instant ascertain the presence of perhaps half a dozen different elements in the substance he is examining. The accuracy and rapidity of this process is truly wonderful, and the field for investigation that it presents seems almost boundless. The spectra of the non-metallic elements have not been so thoroughly examined, and are not so well understood as those of the metals. Some of the former seem to give different spectra at different temperatures. It is very probable that further investigation of these anomalies may yield us some information about their molecular constitution.

Within the very short time that has elapsed since Bunsen and Kirchoff gave such an impetus to spectral investigation, many interesting discoveries have been made. In the early part of their research, Bunsen and Kirchoff made an examination of the residue from the mother liquor of the Durkheim salt spring, and obtained two red and two blue lines that they were unable to refer to any known element. They were thus led to make a very careful chemical examination of this residue, and discovered in it two new alkali metals, to which th gave the names, rubidium and cæsium. There were less than seven grains of the chlorides of these metals to the ton of the original water. Crookes, examining the

residue from a sulphuric-acid chamber, noticed an intense green line that he finally found to be due to the presence of a metal not previously known, to which he gave the name, thallium. Thallium, in some of its properties, resembles lead and mercury; in others, the alkalies. Rubidium and cæsium have since been found to be very widely distributed in nature, usually in minute quantities. Thallium has recently been obtained in considerable quantities. In the Paris Exposition of last year, several ingots of it were shown. Still another new metal, called indium, has been found in a similar way, in the zinc blende of Freiberg, by Richter, but as yet nowhere else; and it is not much known to most chemists.

Thus, spectrum analysis has added four new elementary substances to our list. But the most interesting of the discoveries made by its means, is the detection of many of the elements found upon the earth, in the atmospheres of the sun and stars.

We recognize the spectrum of a metal by certain *colored* lines peculiar to it; in many cases, such colored lines correspond precisely with *dark* lines of the solar spectrum. Now, if, according to Kirchoff's theory, the sun has an incandescent atmosphere which, by itself, would give the bright lines corresponding to the metallic vapor it contained, surrounding a much hotter nucleus giving off continuous light, in the place of the bright lines there will be dark spaces or lines; *i. e.*, a shadow will be cast. This is probably the case; for if, behind a sodium flame, we throw the stronger, continuous electric light, the broad, intense yellow sodium line will be *replaced by a dark line or space corresponding* exactly with Fraunhofer's line D. In this way, we are enabled to infer that there are present in the atmosphere of the sun, sodium, potassium, calcium, magnesium, iron, chromium, nickel, and many other elements, whose presence will be more fully demonstrated by future investigation. Vast numbers of lines are found in the solar spectrum, which we are not yet able to assign to any substances. Examining the spectra of the fixed stars, we find them differing in many respects from that of our sun, but resembling it in general characteristics. The lines corresponding to many terrestrial elements have been recognized in them. For instance, on Aldebaran, Huggins and Miller found hydrogen, sodium, calcium, magnesium, iron, bismuth, tellurium, antimony, and mercury. Extending their investigation to planetary spectra, the same observers found that, since the planets shine by light reflected from the sun, the peculiar solar lines were at once seen, but with the addition of new lines indicating that, as supposed by astronomers, the planets have atmospheres. In the light of the moon, however, the solar lines are to be seen unaccompanied by new ones, thus confirming the conclusion of astronomers that the moon is without an atmosphere.

Further investigations by Mr. Huggins led to some astonishing and unexpected results. For many years, with increasing telescopic power, very many nebulæ have been resolved into clusters of stars. This constant resolution of nebulæ considered irresolvable, has seemed to diminish the evidence in favor of the beautiful theory of the origin of the universe called the Nebular Hypothesis. That so many nebulæ, so-called, had been shown by greater telescopic power to be clusters of stars, would seem to indicate that only still greater power was needed resolve the remainder, and that, in reality, nebulæ did not exist.

But Mr. Huggins found, when he examined the light from one of the nebulæ by the spectroscope, that he obtained no spectrum at all, but only a short line of light. More careful examination disclosed another faint line, and finally another, very faint. The first line corresponded with the nitrogen, the second with the hydrogen line; the third, he was not sure what it corresponded to. Experiment shows that only solid or liquid substances give continuous spectra; while from gases are obtained bright lines on a dark ground. Here, then, would seem to be direct proof of the existence of vast masses of gaseous material, perhaps the nebulous matter of Herschel and Laplace. Mr. Huggins has examined a large number of nebulæ. From some of them he got true spectra, showing that they were really clusters of stars. We have not room to give a more extended sketch of these interesting discoveries. We can only hope to have said enough to show their great importance and the interest connected with them.

Looking back over the results achieved by the labor of the last few years on spectrum analysis, we have good reason to be astonished at their amount and variety, and to expect that, in the future, much more will be accomplished.

ICE MADE IN A DRAWING-ROOM. — The operative chemists sell small glass vessels which are called test-tubes; they are of thin glass, and hold from one to four drachms, and are very useful for the purpose of trying small experiments. The following is a simple and singular method of freezing water. Ask mamma to lend you a jam jar, fill the same with powdered sulphate of soda; now pour on the saline material as much muriatic acid as will render it semi-fluid, then fill a test-tube with water as cold as you can procure, and put it into the centre of the chemical mixture; let it remain at rest for 10 minutes or so; finally take out the tube and wipe it dry; you will find the water frozen. To get the ice out of the tube, dip the latter for a few seconds into warm water, invert it and the cylinder of ice will then fall into your hand. — *Septimus Piesse.*

Chemistry Applied to the Arts.

CAST-IRON STOVES A CAUSE OF DISEASE.

When the attention of the Academy of Sciences, of Paris, was drawn, some time since, by M. Carret, one of the physicians of the Hotel Dieu of Chambery, in several papers, to the possible evil consequences of the use of cast-iron stoves, but little interest was excited in the matter. Recently, Gen. Morin has again brought the subject forward with better success. M. Carret does not hesitate to assert most positively, that cast-iron stoves are sources of danger to those who habitually employ them. During an epidemic which recently prevailed in Savoy, but upon which M. Carret does not furnish us with any detailed information, he observed that all the inhabitants who were affected with it made use of cast-iron stoves, which had lately been imported into the country; whereas all those who employed other modes of firing, or other sorts of stoves, were left untouched by the disease. An epidemic of typhoid fever, which broke out some time after at the Lyceum of Chambery, was regarded by the same author as being influenced by a large cast-iron stove in the children's dormitory. Gen. Morin speaks in the highest terms of M. Carret's memoirs, to which the recent experiments of MM. Trorst and Deville give additional importance. These able investigations have established that iron and cast-iron, when heated to a certain degree, become pervious to the passage of gas. They have been enabled to state the quantity of oxide of carbon which may, as they suppose, transude from a given surface of metal, and have shown that the air which surrounds a stove of cast-iron is saturated with hydrogen and oxide of carbon. They conclude that cast-iron stoves, when sufficiently heated, absorb oxygen, and give issue to carbonic acid. Gen. Morin related some comparative experiments which had been performed by M. Carret, and which, he said, corroborate this theory. Thus, after having remained during one full hour in a room heated to 40° (centigrade) by means of a sheet-iron stove, M. Carret perspired abundantly, got a good appetite, but felt no sickness whatever; he had obtained the same result with an earthenware stove; but the experiment, when performed during only one half-hour with a cast-iron stove, had brought on intense headache and sickness. M. Deville, at the same sitting of the Academy, supported these views with considerable warmth. The danger which attended the use of cast-iron stoves, he said, was enormous and truly formidable. In his lecture-room at the Sorbonne, he had placed two electric bells, which were set in motion as soon as hydrogen or oxide of carbon was diffused in the room. Well, during his last lecture, the two cast-iron stoves had scarcely been lit when the bells began to ring.

These facts are certainly startling, if we consider the reputation of comparative harmlessness which these articles of domestic use had hitherto enjoyed. In France, particularly, the lodgings of the poorer classes, the barrack-rooms of the soldiery, the artists' studios, the class-rooms of large schools, etc., are commonly heated by this means. Of course, we are inclined to question M. Carret's conclusions; but the apparently accurate character of the facts recorded, joined to the authority of those who have brought them forward, demands for them a serious investigation. We are glad to be able to add that a committee has been appointed by the Academy, for the purpose of examining thoroughly into the subject. This committee is composed of MM. Claude Bernard, Morin, Freimy, Deville, and Bussy; and we shall not fail, when the time comes, to mention what shall have been the results of their researches. — *Lancet.*

ON SNAKE-POISONS.

BY MR. FRANK BUCKLAND.

The systematic way in which Mr. Frank Buckland sets to work to investigate any scientific point of interest or uncertainty in natural history is most refreshing. In the last number of *Land and Water*, he describes some of his experiences bearing upon the matter of the poison of the cobra. He first of all relates his knowledge of vipers. Being anxious, some years ago, to make the acquaintance of a living specimen of the then new British snake (*Coronella lævis*), he says, "I engaged a professional viper-catcher, one White, to collect for me. I sent him down to the New Forest, with orders to catch every living snake he saw, the common ringed snake (*Coluber natrix*) excepted. In four days, he returned with a bag, and told me he had had capital sport. We went into an empty barrack-room, and, standing on a chair, I unloosed the top of White's bag, and shot its contents on to the floor. The slippery reptiles came tumbling out, first singly and then in pairs, and at last the main body, coiled and twisted together into a solid mass, like Medusa's chignon, and in half a minute I had on the floor about fifteen vipers and two cornellas, crawling about in all directions, and looking as savage as vipers can look. The first thing I did, was to pick up the cornellas and put them carefully away; and then we had to catch all the vipers again, and White gave me a lesson in the noble art of viper-catching." Having caught one of the beasts, Mr. Buckland noticed that, "held in the grasp of the 'professional,' his mouth was wide open, and his tiny, glass-like, and needle-pointed fangs were at 'full cock,' like the lock of a shot-gun. I then tickled his nose with a feather, and immediately learned something I did not know before. My irate friend moved his fangs alternately, first one becoming erect and then the other, and this in quick succession, just like a man sparring at the commencement of a fight; he never moved them both simultaneously, and no poison came out of the fangs. I then got a glass slide out of the microscope, and placed it in the viper's mouth. In an instant both fangs struck down upon it, and were immediately retracted parallel with the gum — their normal position when at rest. The fangs struck the glass with the quickness of a bee's sting, and seemed to attempt to fasten on it with a spiteful earnestness. Upon taking away the glass from between the viper's jaws, I was delighted to observe two drops of perfectly clear, translucent fluid resting upon it, each drop corresponding to the place where the tooth had struck. I at once placed these drops under the microscope, and then saw a wondrous sight. After a second or two, on a sudden, a crystal-like fibre shot across the field of vision,

and then another and another, these slender lines crossing each other at various angles, reminding me of the general appearance of an aurora borealis while these crystals were actually forming, or of delicate frost crystals on a carriage or room-window when there has been a sharp touch of frost set in. I was so delighted with the novel and unexpected phenomenon, that I ran at once into the mess-room and called my brother officers to look into the microscope; but though I could not have been absent from the room a minute, when we returned the coruscations and the crystallizations had entirely disappeared, and nothing but a pure fluid could be seen. The poison afterwards dried up on the glass, without the least appearance of crystals." These are interesting facts in relation to the nature and activity of the cobra poison, which Mr. Buckland thinks acts by "curdling" the blood which is arrested in the heart. He therefore counsels the free use of stimulants; and, in regard to topical applications, asks what is the use of applying these to the external skin when the poison has been inserted by the fang into the deeper parts of the surface. If we wish to destroy the poison by antidotes, they must be injected deeply into the wound. Mr. Buckland is not, at the moment, prepared to say what the antidote may be; but he thinks it may be reasoned out pretty correctly.—*The Lancet.*

A Trap to Catch Sunbeams.—In the optical room of the Conservatoire des Arts et Métiers, at Paris, near a window, is an unpretending frame, containing half a dozen test-tubes filled with powders, bearing a written descriptive label by M. Becquerel. Should any one pause before this object, he need not be surprised if an attendant politely steps forward and closes the window-shutter, for darkness is required to reveal the beauties of the apparatus. The powders then exhibit, in a most striking manner, the phenomenon of phosphorescence, each shining with a different-colored light. A similar series of powders has been arranged for sale in a neat little box, and has been brought under our notice by Messrs. Harvey & Reynolds, of Leeds. It is called, by its French makers, the "Phosphoroscope," though this name has been applied to a very different instrument; but as a scientific toy, it is likely to become known in England as "A Trap to Catch Sunbeams." Most of the powders are sulphides, and the brightest emanation probably from the tube containing sulphide of barium. The phosphorescence may be induced by exposure to daylight for a few seconds, or to the light of a piece of magnesium wire.—*Laboratory.*

Warmth of a Snow Blanket.—Much controversy has existed as to the warmth imparted to the earth by a covering of snow, until M. Boussingault, during the winter of 1841–2, found that a thermometer plunged in snow to the depth of a decimeter (about four inches) sometimes marked nine degrees of heat greater than at the surface.

DYNAMID.

Mr. Nobel, the chemist of Hamburg who introduced nitroglycerine for blasting, has brought forward a new compound, called Dynamid, or Giant Powder, which now commands much attention on both sides of the Atlantic. In Germany, England, and California, experiments have been made with this substance, the results of which are as satisfactory as they are astonishing; and it is reported that a new powder is being used in New Jersey, which may be the same. On this latter point, we have not yet been able to obtain information; and we should be obliged to any of our subscribers who would communicate to us such of the facts as may, without indiscretion, be made public. Meanwhile, we propose to put together, for the benefit of our readers, what is known of the appearance and properties of Nobel's Giant Powder.

One of the best descriptions which has yet appeared was published in the Breslau Trade Journal (*Gewerbeblatt*), 1867, page 88. Mr. Justus Fuchs, the writer of the article, says that he has had the opportunity to learn the manufacture, application, and effects of dynamid; but the first is a secret of the inventor, which he will not at present reveal. On the other points, he is full and explicit. The prepared article is a brownish powder, almost like slightly moistened sawdust, inodorous, and somewhat greasy to the touch. When ignited, whether in small or large quantity, it burns quickly, as damp gunpowder does, but without any explosive phenomena. In the same manner it burns, when a handful, or even a manufactured blasting-cartridge of it is thrown into the fire. To blows and violent agitation of every kind, it is perfectly insensitive; and a cartridge of it can be hurled with the greatest force against a solid body without exploding. When struck with a hammer, upon an anvil, the particles actually receiving the blow do indeed explode, but without even igniting the surrounding powder.

An effective explosion is obtained in the following manner:—One end of an ordinary fuse (those coated with gutta-percha are the best for the purpose) is introduced into a specially prepared copper percussion cap, at least half an inch long, and heavily loaded with fulminating mercury. The fuse is held fast in the cap by the simple expedient of pinching the latter together about a quarter of an inch below the mouth. This closing of the opening of the percussion cap upon the fuse, and the consequent confinement of the fulminate, is a condition essential to a complete explosion. If this apparatus is introduced into a quantity of loosely-piled dynamid, and the free end of the fuse is lighted, the explosion of the fulminate causes a simultaneous explosion of the whole mass, with an extremely violent report. A tablespoonful of dynamid, poured upon a quartz stone, covered with a brick, and ignited in the manner described, produced an almost incredible effect. The brick was blown into the air, and descended in the form of sand and dust over a surface extending at least fifty feet on every side; while the underlying stone, crushed to kernels of pea-size, was scattered far and wide.

A beech-wood plank, two inches thick, was balanced across a saw-horse, leaving both ends free. About two feet from one end, a tablespoonful of dynamid was poured upon the plank, and exploded. The result was a hole through the plank, about three inches in diameter; *and the balance was not disturbed.* A paper cartridge filled with dynamid, and provided with the percussion arrangement, was, after ignition of the fuse, thrown into the Elbe. Soon after, a dull report was heard, and in about half a minute, the surface of the water was covered with countless fishes of all sizes, belly uppermost, and so stunned as to be easily captured by hand. Thrown into a vessel of water, almost all of them recovered in the course of an hour.

Concerning the effects of dynamid in practical mining, extended experiments have been made, and are still in progress, especially in Westphalia, the results of which, so far as they have been published, are indeed extraordinary. The success has been greatest with the hardest and toughest rocks, and under those circumstances of tension, etc., which offer the most resistance to blasting. These results are corroborated by the tests made in California and elsewhere. Prof. Silliman writes, in a recent private letter:—"Its efficiency appears greatest when it is used on the toughest and hardest rocks, where its enormous *initial force* gives it great power."

It remains to be mentioned, that dynamid freezes at a temperature of about 7° Celsius (about 44.6° Fahrenheit), and, when frozen, is very difficult to explode, even in the manner described. It is necessary to warm the powder in a heated space, or the cartridges in hot water, before using, in order to secure the full effect. Finally, it tastes like nitroglycerine, and has the same toxical qualities.—*Journal of Mining.*

Gold Ink.—Take some leaf gold and white honey, and grind them together upon a marble slab until the gold is reduced to an impalpable powder. The paste now formed is agitated in a large glass tumbler with soft water, which dissolves the honey, while the gold falls down to the bottom. The water is now poured off, and the gold washed until all the honey is removed; after which, the gold is dried and then suspended in a mucilage of gum arabic. It is now used for writing upon paper, and when it becomes dry, it may be burnished and rendered brilliant. Silver ink is prepared in the same manner, by substituting silver leaf for the gold. Gold is also obtained in powder by dissolving nitro-hydrochloric acid (*aqua regia*), which is called the terchloride of gold. When crystallized, this is soluble in water, alcohol, and ether, and may be used for gold ink by adding a gum mucilage to the water or alcohol in which it is dissolved. Metallic writing fluids of different colors can be made by mixing bronze powders in gum mucilage.

Chemistry Applied to Agriculture.

WAR UPON BEES.

Persecution of the innocents has again commenced. We have had wars against the robins, wars against woodchucks, wars against all manner of insects and reptiles; and now, for the fortieth time, hostilities have again broken out against the bees.

The staid people of Wenham, *in this State*, have declared in formal town-meeting, by a two-thirds vote, that *no bees shall be kept in that town.* This edict is levelled against the numerous hives of an intelligent and successful bee-cultivator of that town, under the notion that their busy inmates are injurious to fruit-blossoms.

We feel disposed to insert a *stinging article* against the Wenhamites; though, if the bees had a chance, we have no doubt they would willingly dispense with our aid in that particular; but content ourselves with reproducing the following *apropos* remarks by the editor of the *American Bee Journal:*—

BEES AND FRUIT-BLOSSOMS.

A silly prejudice against bees is entertained by some fruit-growers, based on the notion that the crops of fruit are injuriously affected, both in quality and quantity, by the visits of bees during the blossoming period. A more unfounded notion, or one deriving less support from observation and science, can scarcely be conceived. Yet it regularly looms up once or twice in a century, and creates as much alarm and consternation among the wiseacres, as the appearance of a comet used to do in by-gone days.

Repeated instances of the resuscitation of this prejudice are presented in the history of bee-culture in Germany, especially in the period between 1530 and 1800. On some of these occasions, it was so widely prevalent and so rabid in its demonstrations, as to constrain the almost total abandonment of bee-culture in districts where fruit-raising bore sway. To the aid of this came the substitution of cider and beer for the ancient mead or metheglin, as the popular beverage; and amid such opposition and discouragement, bee-culture rapidly sunk to be of very subordinate interest, except in some favorable localities.

In 1774, Count Anthony, of Torrings-Seefield, in Bavaria, President of the Academy of Science at Munich, striving to re-introduce bee-culture on his patrimonial estate, found in this generally prevalent prejudice the chief obstacle to success. To overcome it, he labored assiduously to show that bees, far from being injurious, were directly beneficial in the fructification of blossoms—causing the fruit *to set*, by conveying the fertilizing pollen from tree to tree and from flower to flower. He proved, moreover, by official family records, that, a century earlier, when bees were kept by every tenant on the estate, fruit was abundant; whereas, then, when only seven kept bees, and none of these had more than three colonies, fruit was scarcer than ever among his tenantry.

At the Apiarian General Convention, held at Stuttgard, in Wirtemburg, in September, 1858, the subject of honey-yielding crops being under discussion, the celebrated pomologist, Prof. Lucas, one of the directors of the Hohenheim Institute, alluding to the prejudice, went on to say,—"Of more importance, however, is an improved management of our fruit-trees. Here the interests of the horticulturist and the bee-keeper combine and run parallel. A judicious pruning of our fruit-trees will cause them to blossom more freely and yield honey more plentifully. I would urge attention to this on those particularly who are both fruit-growers and bee-keepers. A careful and observant bee-keeper at Potsdam writes to me that his trees yield decidedly larger crops since he has established an apiary in his orchard, and the annual product is now more certain and regular than before, though his trees had always received due attention."

Some years ago, a wealthy lady in Germany established a greenhouse at considerable cost, and stocked it with a great variety of choice native and exotic fruit-trees—expecting in due time to have remunerating crops. Time passed, and annually there was a superabundance

blossoms, with only very little fruit. Various plans were devised and adopted to bring the trees into bearing, but without success, till it was suggested that the blossoms needed fertilization, and that, by means of bees, the needed work could be effected. A hive of busy honey-gatherers was introduced next season; the remedy was effectual — there was no longer any difficulty in producing crops there. The bees distributed the pollen, and the setting of the fruit followed naturally.

BONES.

The bones of animals, when properly prepared, furnish the most certain and profitable fertilizing material which modern chemistry has suggested. We have experimented quite extensively with them, in the laboratory and upon the farm, and the statements we make are not based on theory alone. It is high time the important fact was understood, that bones, to fulfil their highest office in the soil, need to pass through a process of *preparation* before they are offered as the food of plants. Raw bone, even if finely ground, is not in an assimilable condition; it needs to be decomposed, rotted, disintegrated. Examine with a microscope of moderate power, the finest atoms of bone as they come from our mills. How large and clearly defined is each particle! How tough and refractory they appear! They are a thousand times too large to pass the microscopic mouths of the plant spongioles; and if they could, they would prove indigestible. There are three methods of treating them, one of which should certainly be adopted before applying to the soil: —

1st. — Rotting, by layering with soil kept moist by the addition of water.

2d. — Dissolving in sulphuric acid.

3d. — Dissolving in strong ley, made from caustic potash, or soda, or derived from unleached ashes.

The three methods we have often described in the *Journal*, and in addresses before agricultural bodies, and they are generally understood. If bones were properly prepared before being used, we should seldom hear farmers complaining of the failures experienced in their employment.

Potash in Agriculture. — M. Dehèrain has arrived at a certain number of conclusions regarding the employment of salts of potash in the cultivation of wheat, potatoes, and beet-root. He finds the salts of potash have generally augmented the wheat crops, which have been augmented still more when ammoniacal salts and phosphatic manure have been also added. Pure potash manures have not increased potato crops; when ammoniacal salts and phosphates have been added as well, a slightly greater yield has been obtained, but not sufficiently to make the employment of these manurial agents profitable. In the cultivation of the beet-root, the facts are precisely the same. The experiments upon which these conclusions are based, were made upon a large scale in a part of the domain of L'Ecole de Grignon. — *Chemical News*.

Rust on Grain. — This fungous growth is produced by a species of Uredo. The spots or pits which characterize it are the organs of fructification or sporidia, which are developed from the mycelium growing in the grain (when full grown, a species of ergot), breaking through its surface. The spores belong to three species of Puccinia, viz.: P. graminis, striped rust; P. straminis, spotted rust; and P. coronata, crown rust. After breaking forth from the diseased grain, the spores must first migrate to Berberis vulgaris L., there to form the fungus growth of Æcidium, supposed to be peculiar to this shrub, before they can be fully ripened. Prof. De Bary shows, that one of the most efficient methods for the prevention of this disease will be the destruction of all barberry shrubs from the neighborhood of grain-fields.

Metuchen, N.J, March 16, 1868.

Editor Journal of Chemistry.

Dear Sir: — Your articles on the composition of manures and patent fertilizers have greatly interested me, and in pursuit of further knowledge, I wish to ask your opinion of the "Bommer Method of Manure Manufacture," a patented thing in 1848, but recently brought out by Judd & Co. I know there is value in it; but the question is, Will a careful adherence to the rules he lays down produce the results he claims, or is it uncertain? or can they be reached in an easier way? Is it a better way than the method spoken of in the *Journal*, based on the Virginia recipe? It seems to me that both are valuable; the former, especially, is working up all sorts of vegetable matter.

I find the following recipe in the *Gardeners' Monthly*, credited to the *Southern Cultivator*. How does it compare with those you have given?

Six barrels muck (or any rich earth); forty pounds nitrate soda; sixty pounds sulph. ammonia; one half bushel common salt, dissolved in a barrel of water and added to above; one barrel ashes; one barrel plaster; one barrel ground bones. Mix well together, and use like guano.

Yours truly,

W. H. Coleman.

Answer. — The "Bommer" method of making compost is a very good one, but we very much doubt if the experience of those who manufacture and use it is always satisfactory. It must, however, prove generally useful. The "Virginia" fertilizer is cheap, convenient to prepare, and, we think, worthy of the attention of agriculturists. As regards the formula from the *Southern Cultivator*, we have only to say, that in the use of sulphate of ammonia as the source of nitrogen for plants, we have been uniformly disappointed. We think the other formulæ are to be preferred.

How to Catch Rats. — For catching rats in a cheap and effectual manner, allow me to recommend the following: — Cover a common barrel with stiff, stout paper, tying the edge around the barrel; place a board so that the rats may have easy access to the top; sprinkle cheese-parings or other "feed" for the rats on the paper for several days, until they begin to believe they have a right to their daily rations from this source. Then place in the bottom of the barrel a piece of rock about six or seven inches high, filling with water until only enough of it projects above the water for one rat to lodge upon. Now, replace the paper, first cutting a cross in the middle; and the first rat that comes on the barrel-top goes through into the water and climbs on the rock. The paper comes back to place, and the second rat follows the first. Then begins a fight for the possession of the dry place on the stone, the noise of which attracts the rest, who share the same fate. — *Sci. American.*

Boston Journal of Chemistry.

BOSTON, MAY 1, 1868.

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☞ *Nearly one quarter* of all the physicians in active practice, in the Eastern, Northern, and Western States, are subscribers to this *Journal;* and the publishers feel that they are in monthly communication with as large a number of the profession, at least, as any other house in the country

The Journal in New York. — Our business agents in New York, Messrs. Nichols & Hoadley, Pine Street, will furnish extra copies of the *Journal*, and also receive subscriptions for the same. This enterprising and reliable house is extensively engaged in supplying chemicals and drugs to the trade, and we take pleasure in commending them to the notice of our patrons in the South and West.

Dr. P. P. A., of Chatham, N.Y., has written us a letter, inclosing the names of many subscribers, in which he says: —

"I carry a copy of the *Journal* in my pocket, and when I see a lad who is smart, or who thinks he is, I place it in his hands, saying, 'Here, boy! an *idea* is often worth more than *money*. Take this little paper; from it you will learn many useful things you cannot obtain from any other source.' The next time I meet him, he begs for the other numbers."

☞ A subscriber desirous of securing a complete file of Vol. II. of the *Journal*, advertises on the last page for copies of the issues for *July* and *September*. The edition printed on the first of July numbered *fifteen thousand* (15,000); that of September numbered *eighteen thousand* (18,000); and yet, so great was the demand, we had not a dozen copies remaining upon the first of January. Our editions have all been large — quite large enough, as we supposed; but they have proved wholly inadequate to our wants. Every mail brings requests for numbers we cannot supply. We hope not to be embarrassed in this way in Vol. III.: we shall endeavor to have our editions large enough to meet all prospective wants.

FAILURE OF REMEDIES.

Nothing is so disheartening to the physician in his professional labors as to observe the complete failure of the remedial agents employed for the alleviation of suffering. He is not only disheartened, but filled with perplexity and doubt. In his anxiety, he first questions the correctness of his diagnosis, then the compatibility, or adaptability, of the remedy employed; his judgment, acuteness, and scientific acquirements, are all arraigned and questioned; *but seldom does he suspect that the quality of the drug used is the cause of all his embarrassment and trouble.* A physician is called to a case, and after thorough, careful consideration, prescribes what seems to be an appropriate remedy. The prescription is returned from the druggist, and the medicine taken; upon the next visit, there is found to be no mitigation of suffering; on the contrary, perhaps, an aggravation of all the symptoms. Does he call for the phial or box holding the medicine, and subject it to rigid scrutiny? Does he call upon the druggist, and examine into the quality and source of the separate agents which may enter into the prescription? It is seldom he does this, and yet any one at all acquainted with the enormous extent of the frauds, sophistications, attenuations, mixings and compoundings practised in the drug trade, would seek first in that direction for the cause of failure.

Visiting a lady friend in the country recently, we found her suffering greatly from sore or excoriated nipples. She was undergoing the pangs of martyrdom, and had resolved to wean her child. Her physician had prescribed a solution of tannin in glycerine. This had been faithfully tried, but her anguish was only increased by its use. The mixture was examined, and found to be composed of the miserable, cheap glycerine with which the market is flooded. Returning to the city, we sent to her a phial holding two ounces of *pure* glycerine, in

which was dissolved, or suspended, one drachm of *pure* tannin. The curative effects of this application were immediately apparent. In less than a week the distressing difficulty was entirely removed, and unbounded thankfulness expressed for the relief.

In this case, the prescription of the family physician was excellent and appropriate, and the failure was solely due to the character of the remedy. Confidence in the physician was most unjustly weakened on the one part, and on the other there was loss of confidence in a remedy which, when of a proper character, seldom or never fails to afford prompt relief in the affection for which it was prescribed.

Our indignation has been often excited by happening to become acquainted with the character of remedies supplied to the sick, through the prescriptions of physicians. The agents ordered were most appropriate, and evinced thorough knowledge and sound judgment on the part of the medical attendant; but the articles themselves were not fit to be even "thrown to the dogs."

The powders of medicinal roots and plants so often employed are formed from the crude substances in a damaged state, or from those entirely inert. Rhubarb, columbo, senna, licorice, etc., etc., are seldom powdered unless they are of imperfect character—old, worm-eaten, mouldy, or in such condition as renders them unsalable in the root or leaf. The solid extracts, like belladonna, taraxicum, cicuta, hyoscyamus, etc., are compounded in the cities from bone-charcoal, pitch, sugar, and starch, flavored with various drugs to simulate the true extracts. The chemical substances and new therapeutical agents which have long been held in the highest regard, or which rapidly gained the confidence of the profession, are sophisticated and imitated by a class of self-styled "chemists"(?) who send men to perambulate the country, thrusting their wares into the hands of physicians, many of whom, unfortunately, they succeed in deceiving.

Some of the most important and useful of the agents suggested by advancing chemistry have been discarded by physicians, from the repeated failures of spurious or attenuated articles which fell into their hands. The same may be said of the older and long-tried agents. The failures of remedies of a once popular character have become so common, that many physicians, not understanding their false nature, have been led into doubt as regards the salutary influence of any and all drugs. This is an evil of prodigious magnitude, as it has a direct bearing upon the health and lives of thousands. We shall return to this subject again.

CAST-IRON STOVES.

We have copied on another page an article from the *London Lancet*, upon the use of cast-iron stoves. The statements made and experiments recorded, if corroborated by further researches, are certainly of the highest importance to the people of this country, where stoves constructed of this metal are very generally used. We should be very much inclined to doubt the statements, were they not made by gentlemen of the highest distinction in the scientific world. M. Deville, the illustrious French chemist, so distinguished for his researches upon the metals, aluminum, magnesium, etc., is not accustomed to speak at random, or be deceived by new experimental results. If cast-iron stoves at certain temperatures are permeable to the poisonous gases evolved during combustion, it will at once account for the unpleasant and deleterious influence which has long been supposed to attend their use. The responsibility of the alleged evils must be at once shifted from the anthracite, or the fuel burned, to the stove or furnace in which combustion is carried on. If M. Deville can show, to the satisfaction of a competent board of scientific gentlemen, such as the French Academy have selected, that his bells are rung by hydrogen and carbonic oxide, and that the escape of these is not due to orifices in the stoves, it will amount to demonstration of the truth of his important statements.

It is not only of the highest consequence to the sanitary condition or health of thousands that the truth should be known, but it is a new fact of exceeding interest in chemical science. The law of gaseous diffusion and permeability is as potent and irresistible as that of cohesion or gravitation, and affords a promising field for study and research.

We have long noticed that there was a vast difference in the respirable condition of the air in a shop or room heated by what is known as the "salamander" stove, and one heated by the common sheet-iron stove lined with fire-brick. The former is of cast-iron, sometimes made up of concentric rings in conical form. This stove, and all others made of like material, must be banished from our workshops and households. It will be quite easy to construct all requisite forms of apparatus for burning coal or wood, of sheet-iron, soapstone, or other material which can be used with safety.

We shall keep our readers informed of all new facts in this department of inquiry, as we are certain no greater or more important service can be rendered them.

Eggs by Mail.—We received through the mail, a short time since, a package of rather unusual form and size, and, upon opening it, were surprised to find about twenty dozen of eggs—trout's eggs. The package was from Mr. Seth Green, of Mumford, N.Y., the enthusiastic and intelligent breeder of fishes—the man who sat two whole days in the branches of a tree, to witness the spawning of salmon. What Mr. Green did to the spawn sent to us, we don't know; through his mesmeric influence, or some other, they "took to hatching" as soon as we fairly got them into water. The little eggs, about the size of mustard-seed, would break asunder, one after another, and out would jump a perfectly formed trout. A portion of the egg adhered to the lower part of each. This seems to serve the double purpose of *anchoring* the fish and supplying him with food until he is large enough to go foraging upon his own account. We have arranged in the house a stream of water, so as to keep the little "wigglers" a few months, preparatory to placing them in our trout-pond. At a future time, we may allude to them again.

FECUNDITY OF FISHES.

It is stated that not more than one per cent of the eggs deposited by fishes come to perfection and maturity as fully-developed fish. The progeny of a single salmon, should one in a hundred arrive at full development, would, in sixty years, amount in the aggregate to a mass many times as large as the earth we inhabit. The ova of a codfish have been counted or computed to the number of 9,000,000; and, as the whole annual consumption of these fishes, throughout the world, is estimated at 54,000,000, it would appear that six females of this description of fishes would be adequate to supply the entire demand per annum.

Pisciculturists claim that, by artificial means, ninety per cent of the ova can be hatched, and the young protected and developed.

ATTAR, OR OTTO, OF ROSE.

The principal source of this delightful perfume is a valley at the foot of one of the highest mountains of the Balkan range, on the Lower Danube, in Turkey. The town of Kizanlik is the great mart from which supplies go to all parts of the world.

The Kizanlik rose is of the variety of *damascena*. It is not remarkable for beauty, being half-double, generally red, though sometimes white, and not particularly fragrant. It is planted in hedges, grows to about the height of six feet, and such are the numbers of flowers, that the country, for miles around, is redolent of their perfume.

The whole annual product ordinarily does not exceed 3,000 or 4,000 lbs.; to produce which, 7,000,000 lbs. of rose-leaves are required.

Pure attar of rose is too costly a luxury to admit of its general use. It is therefore adulterated by the addition of a large percentage of geranium-oil, sometimes as high as eighty or even ninety per cent.

The long, angular vials in which, in this country, it is generally supposed to be kept, contain little else than a few drops of geranium-oil—the bit of bladder which is tied over the stopper being smeared with the attar of rose.

A long article on the manufacture of this substance is contained in the *London Pharmaceutical Journal, for Dec.*, 1867.

QUESTIONS AND ANSWERS.

Mrs. S. T. C., *Burlington, Vt.*—"Will you please inform me how to remove ink-spots from linen?"

Almost all the inks in common use are solutions of tanno-gallate of iron. Spots from this variety of ink are removed by moistening them with a solution of oxalic acid. The iron of the ink is changed to an oxalate, which is colorless.

B. L., *Albany, N.Y.*—"The question was recently asked in our club, 'Who invented *lucifer matches*?' No one could answer. Can you?"

The name of the great benefactor who invented this most useful little contrivance, is *entirely unknown*. Considerable pains have been taken to ascertain the name of the inventor, but without success. He has conferred so much happiness upon mankind, and saved so much time and temper, if he could be discovered, a monument should be erected to his memory.

D. L. M., *Taunton, Mass.*—"My daughter had a very narrow escape, a few days since, from her dress taking fire from burning sealing-wax. Is there any substance which can be used with the water in washing, which will render cotton and linen fabrics incombustible?"

Children should not be allowed to play with fire in any way. Sealing-wax ignites readily, and the flame is often very persistent—difficult to extinguish. Mrs. Longfellow, the wife of the poet, lost her life by her dress taking fire from ignited sealing-wax. There are only three salts which may be employed in preparing ladies' dresses, to prevent them from taking fire. These are the phosphate and sulphate of ammonia, and the tungstate of soda. The most economical salt is the sulphate of ammonia. Cotton garments rinsed in water holding seven per cent of this, will not readily take fire when they are dry. The best of the three is tungstate of soda, which should be used in the proportion of twenty per cent. It is best to starch and dry the clothing, and then sprinkle on the solution so that the fabrics will be fairly moistened. They are then ready for the hot flat-iron. Muslins thus prepared will not burn, although placed in contact with a blazing match.

Tanner, *St. Paul, Minn.*—You can get along very well without understanding the "chemistry of tanning." The skins of animals are constituted mainly of glue or gluten. This is soluble, and the principle derived from the bark, tannin, or tannic acid, is also to a considerable extent soluble. When the latter is allowed to act upon the former, chemical combination takes place, and leather is produced, which is wholly insoluble. This is the chemistry of tanning.

M. D., *Flushing, L.I.*—You are probably in error in supposing that *dry* air in your room is the cause of your illness. All experiments prove that pure, dry air, in-doors or out of doors, is not only most agreeable but most conducive to health. Throw away your water-evaporator in your furnace (so unreasonable in size), regulate your fire properly, secure good ventilation, and you will be far more comfortable and recuperate sooner.

M. E. N., *Oswego, N.Y.*—Water would have been equally as serviceable for bathing purposes, as the spirit. Rum, or diluted alcohol, is undoubtedly beneficial in some cases, when applied to inflamed surfaces; but it does not "strike in," as you suppose. It volatilizes more easily than water, and, consequently, from the quick evaporation, the heat of the parts is more rapidly carried away. The value of spirit for external or internal use is greatly overestimated.

Treatment of Round-Worms and Pin-Worms in Children.—For the round-worm, a very efficacious proceeding, and one which has the advantage of not distressing the child, consists in giving a small dose of santonine—as two or three grains for a patient six years old—over night, and a full dose of castor oil in the morning, and repeating this two or three times in succession.

For the pin-worm, enemata of lime-water usually answer extremely well; or, if the worms are very numerous, or have been frequently reproduced, the remedy may be made more efficacious by the addition to six ounces of lime-water, of two drachms of the tincture of the sesquichloride of iron.

Spontaneous Combustion Again.—Another instance of the spontaneous ignition of oily rags has come to our knowledge. It occurred in the town of Rockingham, Vt. Fire was discovered in a newly-erected building, and, upon entering the room, a pile of rags saturated with linseed oil, used in rubbing the new wood-work, was found to be completely in a blaze. In a few moments, the fire would have been beyond control, and an expensive structure destroyed. This is the third instance of the kind, reported in the *Journal* within a few months. We have taken pains to investigate all the facts thoroughly, and the statements are reliable. How important it is that they should be disseminated far and wide, and remembered by builders and housekeepers!

Glycerine in Albumenuria and Diabetes.—One of the most important objects in the treatment of albumenuria and diabetes, is the continuance of the functions of the skin. For this purpose, Dr. David Nelson, of Edinburgh, strongly recommends the application of glycerine.

Dissolving Bones.—When coarse ground bone is acted upon by sulphuric acid, a coating of insoluble sulphate of lime speedily forms upon each fragment, and stops further action. Therefore our readers must use only the finest flour of bone in making superphosphate, as all attempts to dissolve crushed or unground bone will be attended with failure and loss.

Medicine and Pharmacy.

MINNESOTA A RESORT FOR INVALIDS.

A young lady of our acquaintance, troubled with what appeared to be incipient phthisis, sought advice regarding a visit to or residence in Minnesota. With the view of learning some facts regarding the climate, etc., we wrote to a friend, a distinguished physician, who had spent some months in that State, and received a letter, from which we make a few interesting extracts:—

Dear Doctor:—Your letter, asking my opinion of Minnesota, came to hand yesterday. For myself, I must confess, that my impressions of Minnesota were most pleasant in every way, especially, perhaps, from the improvement in health which my wife and myself there obtained. But whether to recommend it for every one is a question. Certainly the climate, even when quite changeful, possesses certain tonic qualities of which our own at the East is destitute. I found myself able to undergo fatigue and exposure which, in our own climate or in Central Illinois, has been far too great for me. I was there from the first of June to the middle of November. Of course, I cannot, from experience, speak of the winters; but I am satisfied with the summer, and *more than satisfied* with the autumn. I judge the winters, although affording a like tolerance of cold that the summer does of heat, are very trying, perhaps too severe for one much enfeebled by the continued progress of the disease.

After all, so much depends upon the temperament of the invalid for whom one is to prescribe. Would the young lady be lonely among strangers? Would she be likely to find out-door occupation? A young man may fish and hunt, as I did; what *can* a young lady do?

I spent the fall on Lake Minnetonk, twenty miles or so west of Minneapolis, with my wife and a young lady from this place. I would row off in the morning; set my wife and this young lady on the beach to pick up agates and cornelians (in the search after which one becomes wonderfully enthusiastic) while I went in search of ducks; returning, would take them farther on, etc.; eat our lunch at noon, and, staying out all day, return at evening; and thus day after day. Of course, we improved—all three. Glorious air, scenery, diet (cracked wheat and cream and game), and plenty of little nothings in great variety to do.

If I were to select a season to spend in Minnesota, I presume I should choose the warmer weather for its out-door occupation. However, I think we may get somewhat of the Minnesota air even in New England, in the higher altitudes north of the latitude of the White Mountains, the northern counties and elevated locations of Vermont, New Hampshire, or Maine, if one can find a spot to suit. There's no game here at the East compared with the West, except it be in the way of trout in the Umbagog Lakes. My health requiring a vacation in the summer, I start off for that region each year, last year camping out for four weeks,—eight of us, four ladies and four gentlemen, besides our guide. The drawback to this region is, that the winters are sadly inferior to the Minnesota winters,—more changeable. If one chooses Minnesota, where shall he go? I made Minneapolis my headquarters while there; very much more of interest in natural scenery—the falls, etc.—than about St. Paul.

But wherever one goes, he must live *out-doors* if tending to phthisis, and that is the best climate which best enables one so to do. So, if patient be very feeble, Florida is preferable to Minnesota.

M. Dybkowsky, in a recent memoir, states that the poisonous action of phosphorus is entirely due to the formation of phosphuretted hydrogen gas, which, in passing into the blood, rapidly combines with the oxygen present. Hence, he concludes that death from phosphorus is nearly equivalent to death by asphyxia.

Antidote for Strychnia.—Dr. J. Bartlett strongly recommends common salt as a curative of strychnia poisoning. He reports as many as twenty experiments on dogs, in which violent symptoms following large doses of strychnia ceased after emetics, induced after drenching the animal with water holding in solution several handfuls of salt.—*Chicago Medical Times.*

TREATMENT OF CONSTIPATION.

No affection is more common and troublesome than constipation, and medical men are eager to obtain information regarding the best methods of treatment. We find reported in the Philadelphia *Medical and Surgical Reporter*, a discussion upon this subject by the East River Medical Association of New York, which contains some points of interest:—

The indications for treatment in cases of torpid function of the colon, consists:

First.—In removing the retained matters.

Second.—In restoring to the bowels their natural energy, and obviating (if possible), a recurrence of the cause.

The first can be accomplished by cathartics, which tend either by their eliminative action or local irritation, or both, to increase the secretion from the inner surface of the bowels, excite peristaltic contractions, and thus cause the ejection of the contents. The second indication will usually be fulfilled by the administration of tonics, attention to general hygienic means, and occasionally the use of cold water enemata.

In cases of habitual constipation, I always endeavor to impress upon my patients the paramount importance of this advice—that as they accustom themselves to stated hours for their meals—so should they with equal regularity, habituate themselves to having evacuations every day at a particular hour; and although they may at first have no inclination, nature will, if at all encouraged, perform her functions with perfect regularity.

It is important in this, as in other forms of constipation, to regulate the diet, which should be of easy digestion, not likely to yield a large amount of residual matter; not of an astringent, but rather of a relaxing nature.

The frequent recourse to cathartics is to be deprecated, for the reason that the bowels soon become accustomed to this artificial stimulus, and will not act without it; yet, a judicious employment of laxatives in the beginning of treatment is not infrequently indispensable. They should always be taken upon an empty stomach; either at night when going to bed, or in the morning, a half an hour or an hour before breakfast. They will thus act more readily, and with less unpleasantness to the patient; a glass of cold water, or some ripe fruit, taken before breakfast, will often act in a salutary manner upon the bowels. Belladonna is undoubtedly a remedy of very great value in constipation. I have been so pleased with its effects in many instances, that it has become almost a routine with me to prescribe it in this affection. Its action is always gentle and constant, which is a great desideratum, especially in the treatment of habitual constipation.

Dr. Alexander Fleming, of Queen's Hospital, Birmingham, in an article upon "The use of Atropia and of Galvanism in Constipation," very plausably explains the modus operandi of atropia—which, I think, applies as well to belladonna—as follows: He believes that the drying qualities of atropia deprive the intestinal mucous membrane of its natural coating of mucus, and the irritation caused by the contents of the canal, when its surface is thus unprotected, provokes more prompt and vigorous contractile action.

"Secondly, atropia constricts the smaller arteries; and we can understand that a gut dormant and paralyzed by distention, is the subject of passive congestion, the continuance of which will continue to maintain its state of inertia. Atropia, acting on the arteries, checks the supply of blood to the bowel, relieves the congested muscle, and thus facilitates its return to healthy action."

Galvanism is highly extolled by Dr. Fleming and others. I am not prepared to report at present upon its effects. It is true, however, that galvanism applied in the manner usually directed, will, through the medium of the sympathetic system of nerves supplying the intestinal canal, excite vermicular movement; and in that way, if in no other, prove a valuable agent in many cases.

These means, when properly carried out, will, in most idiopathic cases, effect a permanent cure. In inveterate cases, however, where the lower bowel is obstructed with impacted feces, it will often become necessary to remove them by mechanical means, before attempting other measures. The diagnosis of constipation, especially

when of long continuance, is sometimes very difficult, and liable to completely deceive both patient and physician. I was consulted some time ago by a gentleman, who told me that for a period over twenty years he had suffered from pain in the lumber region, of more or less intensity. At times his sufferings became so severe as to be almost unendurable; his general health otherwise seemed good. I recommended counter-irritation, liniments, etc., but without any effect. I was completely puzzled. At last I determined to try the effects of a powerful cathartic, and the consequence was the evacuation of an almost incredible quantity of hardened fecal matter, and complete and permanent relief from pain.

Dr. Morse said, where all other means had failed to overcome obstinate constipation, he found charcoal of benefit; and in reference to the constipation of infants, which always causes so much trouble, he is in the habit of giving corn-starch twice a day, with decided success, when medicine failed.

Dr. Burke said, he always gives belladonna in habitual obstinate constipation, believing the muscular coat of the intestines to be contracted by spasm; he judged also that congestion formed one of the concomitants of obstinate constipation, both of which are relieved by the action of the atropia.

He attended a man suffering from constipation, who, at the time he saw him, had been three weeks without a movement in the bowels, and during that time had been dosing himself with various cathartic remedies without effect. Administered belladonna, one third of a grain, every two hours, until the pupils were affected. Copious evacuations were induced, and the patient recovered.

In sciatica he always commenced the treatment by giving cathartics, croton-oil, etc., before giving the potass. iod.

Dr. Newman said he has been in the habit of using belladonna in obstinate constipation for many years past. He found it of especial benefit in the constipation of peritonitis, etc. Gives it combined with opium.

Dr. Montross L. Smith said he found women who suffered much from constipation were in habit of dosing themselves with large quantities of cathartic remedies. In such cases he found great benefit from combining from one sixteenth to one twentieth of a grain of strychnia with a little blue mass or rhubarb, or aloe pill.

Dr. Acheson found, in a large dispensary practice, constipation to prevail among certain classes; for instance, Americans; and among the foreign population, the Irish generally required a good cleaning out before treatment, owing probably to the amount of solid food indulged in; while, on the contrary, the Germans are constipated, from the sloppy nature of their food.

A person may have an evacuation every day, and still have the bowels loaded with feces. He had been called to see two persons with bilious fever, who had been under homœopathic treatment, with no effect. Gave calomel and opium and castor-oil. The patients recovered, without any trouble, after copious evacuation.

Effects of Dilution on Vaccine Virus. — The *Union Médicale* gives the following as the results of experiments made by M. Chauveau, of Lyons, and presented to the French Academy of Sciences by Claude Bernard: —

"If this virus is diluted in fifteen times its weight of water, its properties are not at all altered; in fifteen to fifty times its weight of water, the virus, inoculated with the lancet, still gives constant results; on greater dilutions the inoculations may succeed, but rarely. Still, the virus thus diluted, when it is injected into the veins, causes artificial cow-pox. M. Chauveau has injected in this way, in a horse, vaccine virus diluted with four hundred times its weight of water, and has seen all the symptoms of horse-pox produced."

M. Pasteur considered that this difference between the results of inoculation and injection was owing to the fact, that the oxygen of the water destroyed the activity of the fermentable elements; but when they were injected into the veins, the red globules removed again the oxygen, and restored their vitality. M. Bernard offered a similar explanation; viz., that when the dilution was great, the elements of the virus, widely separated by the water, were not taken up on the point of the lancet. — *Boston Medical and Surgical Journal.*

Gleanings.

How to apply a Hop Poultice. — Dr. E. O. Newton furnishes to the readers of the *Eclectic Review* the following directions for applying this poultice: —

"When the physician calls again, the patient is wet over a large portion of the body, including his own and the bed clothing. The poultice has done more harm than good; the fault being in the nurse or patient not knowing and not having been informed how to make it. If a hop poultice is to be applied, inquiry should be made if they are familiar with the manner of making it. If they reply they are, learn from them their mode of doing it; and, if not correct, give them full instructions. My way is to place a sufficient quantity of hops (the very freshest should be had) to make two poultices, into a deep vessel, as a saucepan or large-sized skillet; add sufficient quantity of vinegar and water, equal parts, to keep from burning while heating; so that, when sufficiently hot for use, the hops will be only moist, and thereby preventing subsequent wetting of everything that comes in contact with the poultices. A large-sized flannel bag, made with one end left partly opened, can be pinned up ready for use when the hops are in. While one poultice is cooling, have a duplicate one ready with which to replace the first when the first requires removing. The temperature of the poultice should be made warmer than the parts to which it is applied. When ready to be put into the bags, sprinkle a little corn-meal, to render them more adhesive and more easily handled. The poultice being placed to the part on which it is to be used, around it place a piece of old flannel to keep it on. In this manner, hop poultices can be kept on for hours without even soiling the clothing."

Pin-money. — Towards the close of the fifteenth century, an epoch that marks a transition style in the dress of ladies, pins were looked upon with great favor as New Year's gifts. They displaced the old wooden skewer, which no effort of skill, no burnishing or embellishment, could convert into a sightly appendage. Pins, in that simple age of the world, were luxuries of a high price, and the gift was frequently compounded for in money — an allowance that became so necessary to the wants of ladies of quality, that it resolved itself at last into a regular stipend, very properly called "pin-money."

A New Source of Naphtha. — In the *Athenæum*, February 15, 1868, we read: "The belief expressed by some geologists that naphtha would be found in the Caucasus has been realized. A boring two hundred and seventy-six feet deep, near Kuaaco, has struck a source of this liquid which yielded fifteen hundred barrels daily for one month; more recently, a second source has been discovered near the former, from which the naphtha jets to a height of forty feet above the ground, and flows out at the daily rate of six thousand barrels.

Formulae

Means of Fastening Leather upon Metal. — The metal is washed with a hot solution of gelatine, and the leather previously steeped in a hot infusion of gall nuts pressed upon the surface and allowed to cool. It then adheres so firmly that it cannot be separated without tearing. — *Algemeine Polytechnic Zeitung.*

To Render Paper and Paper-hangings Waterproof. — Rischer recommends to size with a thin paste of glycerine and starch (equal parts), with which for colored paper at the same time the paint is applied, and afterwards with a solution of Japanese wax in five to six times its bulk of alcohol. About a scruple of wax is said to be sufficient to give a waterproof coating to a sheet of paper.

Bay Rum. — This is a spirit distilled over the leaves of Myrcia acris, and perhaps, also, some other species of the same genus. The trees grow in the West-India Islands, and the genuine bay rum is imported from there into this country. It is made elsewhere, sometimes, by taking the

Tincture of bay leaves	5 ounces
Oil of bay	1 drachm
Bicarb. of ammonia	1 ounce
Borax	1 ounce
Rose water	2 pints

Mix and filter. — *Druggists' Circular.*

Remedy for Barber's Itch. — Dauvergne.

℞ Crystallized sulphate of iron	ʒiiss.
Wood charcoal	℥i.

M. Make a fine powder and mix carefully. The powder to be applied in the evening to the chin. — *Union Medicale.*

Treatment of Obstinate Intermittent Fevers. — Perrin.

℞ Sulphate of quinine	℈i.
Extract of belladonna	gr. iss to iii.

M. Make twenty pills, and give one three times a day. In quotidian fevers, they must be given between the attacks. — *L' Union Medicale.*

Iodided Opodeldoc. — This preparation, though known for a number of years, has not received the attention it merits, and with a view of bringing it more to the notice of the profession, I give the formula.

Take of iodide of potassium, eight troyounces; alcohol, 30° Baumé, two pints. Mix the above, and form a perfect solution. Animal soap, finely shaved, fourteen troyounces; alcohol, 30° Baumé, two pints. Dissolve the soap in the alcohol in a flask over a sand-bath; when dissolved, mix the two solutions, and add oil of garden lavender, two drachms.

This is usually dispensed in one or two-ounce, wide-mouth vials, which should be filled while the opodeldoc is warm and in a fluid condition; when cold, it forms a translucent mass, melting at the temperature of the body and, as an external application, possessing many advantages over the ointment of iodide of potassium. — *Wm C. Bakes.*

Testing Flour. — M. Rakowitsch proposes a method of examining flour by means of chloroform. The following are the results which he says may be gathered from an experiment capable of being made in a few minutes: The amounts of bran, the moisture between ten and twenty-five per cent, the damaged flour, the mineral matters, the ergot of rye, and other impurities. The whole of these are determined by the relative specific gravities of the different substances in chloroform. The flour is simply placed in a tube and mixed with chloroform; the chloroform is enabled to hold, in very thorough suspension, the pure flour, while the other materials are not thus suspended. By adding spirits of wine of ninety-five degrees, the flour is precipitated to the bottom of the tube. The more humid the flour, the more spirits of wine must be added, and thus the amount of humidity in the flour is arrived at. — *Chemical News.*

Pulverized Borax for Cockroaches and Water-bugs. — Sprinkle it, the last thing at night, on places infested, stuffing it into cracks and crannies where they secrete themselves. Repeat two or three nights in succession. In several instances we have found it a *sovereign remedy.* In cities, these pests go from house to house, and, of course, any remedy must be repeated from time to time.

Removing Tan. — Tan can be removed from the face by dissolving magnesia in soft water, beat it to a thick mass, spread on the face, and let it remain a minute or two. Then wash off with Castile soap-suds, and rinse with soft water.

Blue-Black Writing-Ink. — A correspondent has sent us the following recipe for a blue-black writing-ink, which, he says, answers very well for a copying-ink:

Take of	Aleppo galls, bruised	5½ ountes.
	Cloves, bruised	¼ ounce.
	Sulphate of iron	1½ ounce.
	Sulphate of indigo, in the form of a slightly-acid paste (Sulphyndylate of potash?)	1½ ounce.
	Sulphuric acid	35 minims.
	Rain-water, cold	40 ounces.

Macerate the galls and cloves in twenty ounces of the water for a week; decant the liquor, and add to the residue of the solid ingredients ten ounces of the water, with which continue the maceration for four days; then decant as before, and repeat the maceration with the remaining ten ounces of water for another period of four days. Mix now the whole of the liquors, recovering from the galls all that can be obtained by squeezing them in a cloth, and afterwards filter. To this add first the sulphate of iron, then the sulphuric acid, and lastly the indigo paste. Care must be taken that the indigo does not contain much free acid. — *London Pharm. Journal.*

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. III.—No. 1.] BOSTON, JULY 1, 1868. { ISSUED MONTHLY, AT FIFTY CENTS PER ANNUM.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Science.

CHEMISTRY OF A CIGAR.

BY THE EDITOR.

When Columbus, three hundred and seventy-five years ago, landed upon that verdant island of the tropics which proved the gateway to a new world, he was struck with the strange habits and customs of the people who flocked about him. Probably no one of these habits excited his pity or disgust more than that, which was seen to prevail among both sexes, of rolling together the dried leaves of a plant offensive in taste and odor, placing them in their mouths, and inhaling the smoke. If he had been told that, within two or three centuries, not only the descendants of those who comprised the Christian and polished court under whose auspices his bold enterprise was undertaken, but the whole civilized world would be imitating the savages in the seemingly filthy practice, he would have ridiculed the idea, as one most improbable and preposterous. The prediction would have proved a true one. The taste of the poor Indians for tobacco was certainly not peculiar to them; and wonderful is the fact, that, the more advanced, Christianized, and enlightened mankind have become, the larger the increase in the consumption of this pungent narcotic Indian weed. In the time of the great navigator, the plant was found growing wild upon the heights of the island; and not until a full century had elapsed, did it become the object of care and cultivation. It was introduced into Europe, and, in spite of the edicts and anathemas thundered against it by popes and kings, its use rapidly increased, until it became well-nigh universal. King James, in his celebrated "*Counterblast to Tobacco*," denounced the smoking of cigars, as "a custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs, and, in the black, stinking fume thereof, nearest resembling the horrible Stygian smoake of the pit that is bottomless." Pope Urban the VIII. issued a bull against it. The Russian government threatened with death all found puffing a second cigar. The Sultan of Turkey declared smoking a sin against the religion of the Prophet. In fact, tobacco came under the ban of the powers, temporal and spiritual, of the whole world; and yet, all together, they utterly failed to suppress its use.

What is the nature of the plant whose history is so extraordinary? What strange elements enter into its composition? What is the *chemistry* of those leaves which, when rolled into cylindrical form, constitute the cigar, so highly cherished by millions of smokers in all parts of the habitable globe?

Tobacco belongs to a suspicious and exceedingly dangerous order of plants—the *solanacæ*, or *nightshades*. The deadly nightshade, henbane, thorn apple, belong to this order, and are all powerful narcotic poisons. It is true that to its *genera* belong the edible potato and tomato; but we must remember that even the potato is possessed of poisonous narcotic properties, which are only rendered harmless by cooking. To the farmer who cultivates the plant, it proves a robber of the first magnitude. It possesses a capacity for plundering the soil, greater than that of any other tree, shrub, or plant known. The amount of mineral constituents which it carries off, can be judged of by carefully examining the ash, as it accumulates upon the end of the ignited cigar. It often remains after the organic portion is removed, showing the full size and outline of the rolled leaves, and to the eye apparently nothing is lost by combustion. If the wood burned in our stoves and upon our hearths was as rich in soil constituents, we should need the services of extra servants to carry away the ashes. Every one hundred pounds of the dried leaves which the soil produces, robs it of at least twenty pounds of its most valuable mineral atoms. In the exportation of tobacco, immense quantities of the richest soil of Cuba and other tobacco-producing countries are transported to distant lands, and scattered to the wind and the storm. The impoverishment thus produced must be met, on the part of the cultivator, by heavy expenditures for fertilizers; else, a few years only suffice to reduce lands, through its agency, to barren wastes. The plant is hungry for potash, and of this it consumes large quantities. In every one hundred pounds of the dried leaves, there is contained nearly five of this alkali. A bushel of ashes, such as form upon the end of the smoker's cigar, would, if leached, and the ley formed into soap, make enough to serve the purposes of a small family for a year.

It is a common belief that cigar ashes constitute an excellent and safe detergent or dentifrice for the teeth; and many smokers are in the habit of saving and applying them to this purpose. The strong alkaline nature of the ash, acting in conjunction with the silica in its finely subdivided condition, would certainly afford cleansing properties of a high order; and, unless the alkali is too caustic for frequent use, its employment in this direction can hardly be condemned.

The comparative exhaustive effects of tobacco upon soils may be judged of from the fact that fourteen tons of wheat, fifteen tons of corn, twelve tons of oats, remove no more of the principles of fertility than a single ton of tobacco. The activity of chemical forces, therefore, necessary in the growth of the plant, must be exceedingly great; and the curious and complex character of the vitalized structure, stamps it as among the most extraordinary pertaining to the vegetable kingdom. Aside from the ash constituents, the chemistry of a cigar, in respect to agents directly influencing the animal economy, is the same as the chemistry of tobacco in any form. The chemical agents contained in tobacco are brought in contact with the same tissues and mucous surfaces, whether the form be that of smoke, as in smoking, or aqueous extract, as in chewing, or of substance finely divided, as in snuff-taking.

Tobacco and tobacco smoke contain three important and distinguishing chemical agents, which confer upon them peculiar properties. If we take a common glass retort and affix to it a condenser, and place in the retort a pound of fresh tobacco leaves with a pint of water, upon applying heat, and distilling, a minute quantity of volatile oil comes over and floats on the water in the receiver. This has a pungent odor, and appears to be the aroma, or condensed essence of the plant. When held to the nose, it causes violent sneezing; and, if placed on the tongue, the whole of the mouth and fauces seems to be instantly pervaded with the strong taste of tobacco. To the smoker, this principle is most important, as it is the one upon which the peculiar and gratifying taste of the smoke depends. It is changed or ripened by age, or modified, in the growth of the plant, by soil and climate. The amount of this wonderful principle in a cigar is truly homœopathic. In one of ordinary size, there is not more than the twentieth part of a grain; and yet it pervades every fibre and every atom of every leaf. Extract or remove it from the cigar, and instantly it becomes worthless and repulsive to the smoker. This illustrates how marvellously minute are the ingredients upon which the sensible properties or peculiar action of many medicinal agents depend.

If we repeat the experiment with the pound of tobacco leaves in the retort, modifying or changing the action by pouring in a few drops of sulphuric acid and half an ounce of caustic soda, previous to distilling, there will come over a colorless, oily liquid, which sinks to the bottom of the receiver. This is essentially the *nicotin*, or the acrid, burning, poisonous principle of tobacco. By further manipulation, it can be formed into crystals; but they cannot long be retained in that state. This is the *prussic acid* of tobacco—the agent so terribly destructive to animal life, that a single drop placed upon the tongue of a dog, instantly produces asphyxia and death. A few grains placed upon a stove and volatilized, in a church or theatre, will produce distressing cough and asthma simultaneously upon thousands of people. The one hundredth part of a grain, pricked into the skin with a pin, will produce giddiness, nausea, and fainting. This poison exists in tobacco in the proportion of from *two* to *nine* pounds in one hundred of the dried leaves, the quantity varying in tobacco grown upon different soils.

A consideration of these facts regarding nicotin is well calculated to surprise and alarm every smoker. There is no exaggeration in the statement; but we must remember that nicotin does not exist in tobacco in a free state. It is called by chemists an *alkaloidal principle*, and found in tobacco in chemical combination with an acid. The acid is identical with the malic, found in fruits; but in tobacco, it is called *nicotic* acid. The virulence of nicotine is considerably modified by its association not only with the acid which it holds, but probably by the presence of the other substances. Modified, however, as it is, it confers upon tobacco poisonous properties of a most extraordinary character.

The third distinguishing chemical agent which tobacco contains, is an *empyreumatic oil*, which is obtained when the cured leaves are distilled in connection with high-pressure steam. Foxglove (*digitalis purpurea*), another of the poisonous plants, affords an oil by distillation, which strongly resembles that from tobacco. The oil is acrid, pungent, disagreeable, and poisonous, and contains much nicotin. If the reader wishes to try an experiment to learn the nature of this oil, let him procure the bowl of an old tobacco-pipe, or cigar-tube, and scrape off a small portion of the moist "soot," or pound up a bit of the pipe no larger than a kernel of corn, inclose in meat, and throw it to a cat. Death will probably occur in less than five minutes. There are thousands of pipes in constant use among laborers, which contain oil enough to kill a dozen cats, and which are so "strong" that a person unused to tobacco could not fill the mouth once with the smoke passed through them, without experiencing the most unpleasant effects.

No matter in what form tobacco is used, whether it be in smoking, snuff-taking, or chewing, this volatile oil must come in intimate and constant contact with the mucous surfaces of the mouth and air-passages, and therefore, by absorption, a portion passes into the system. To what extent this absorptive process is carried, it is impossible to know with certainty. Probably it is very small in the case of those who use tobacco in moderation. The smoker usually entertains the idea that, in simply inhaling the smoke, contact with the active principles of tobacco is almost entirely obviated; but this is manifestly a mistake. The smoke holds these principles in a volatilized or minutely subdivided form, and they impinge upon all the absorbent vessels of the mouth.

If any one doubts the nature of the smoke, let him take a fine, clean, linen handkerchief, and, holding it to the mouth, force the smoke from a cigar through it several times. The palpable yellow hue imparted, is due to the oil and volatile principles of tobacco held in the smoke. A good cigar, chemically considered, should contain a large portion of *nicotianine*, or the true aromatic essence, and a small portion of the poisonous *nicotin*. Different soils impart to the tobacco-leaf these principles in varying proportions. That of Cuba and some other of the West-India Islands, supplies the rich aroma in abundance, and but comparatively little nicotin. The tobacco from these sources is much sought after by smokers in all parts of the world, and the prices paid for it are enormous.

Probably one of the most extraordinary smokers of the present age is the distinguished general commanding our armies. Those intimate with him in public and private life assert, that at least ten cigars are converted into smoke and ashes by the General every day in the year. Let us see how much of the poisonous principle of tobacco, *nicotin*, is imbibed in the smoke of these cigars. The finest Cuba tobacco contains at least two per cent of the alkaloid; and assuming that each cigar weighs sixty grains, ten would weigh six hundred grains. In this amount of tobacco there would be twelve grains of pure crystallizable nicotin. This is volatilized by heat, drawn into the mouth along with the other organized principles, and a considerable portion mingles with the saliva, and impinges upon the exposed mucous surfaces. The twelve grains isolated, made into aqueous solution, and taken into the stomachs, or injected into the subcutaneous vessels of three strong men, would probably, in three or five minutes, deprive them of life. A crystal, weighing two grains, placed under the tongue of a healthy adult person, and allowed to dissolve and become absorbed, would also produce fatal consequences. It will be easy for our readers, those who smoke two, three, or more cigars a day, to estimate from the above calculation how much nicotin they convert into smoke in the twenty-four hours.

We are considering the cigar strictly from a chemical point of view, and therefore do not intend to be betrayed into the expression of extended or dogmatic opinions regarding the hygienic influence of tobacco upon the human system. There are plenty of sensational preachers and reformers who think themselves wise enough to enlighten smokers and chewers upon this point.

It must be confessed that chemists, as well as many others, are puzzled to know how a plant so utterly repulsive to the natural sense came to possess the power of playing the tyrant with human appetites. It is a still greater puzzle, however, to understand how tens of thousands of people, of all classes, ages, and conditions, are able to masticate, smoke, and snuff the substance of the plant, and not suffer the most serious inroads upon the health. It is obvious that all cannot use tobacco without much physical disturbance. Upon the writer, its use, in any form, even in small quantities, is followed by the usual alarming effects of the narcotic poisons.

There is evidently design in the marvellous adjustment of the chemical atoms which give to the tobacco leaf its singular properties. It is unlike any thing else which the vegetable kingdom is capable of producing. Mankind cannot be persuaded to roll up the leaves o any other plant and smoke them, as they do tobacco. Neither chemists nor physicians are able to point out any very useful purpose to which the plant can be applied. The former may go to it for a supply of the peculiar alkaloidal principle, *nicotin*, but this substance is only useful in destroying troublesome insects and animals. A cheaper and equally potent poison is found in the *nux vomica*, strychnine. In medicine, it serves no useful end not obtainable through other agents. It must be admitted, that there are many vegetable productions which, so far as our knowledge extends, are valueless, or which neither contribute to the sustentation of life, or ward off disease, or add, in any way, to our well-being or happiness. Tobacco, perhaps, should not be ranked with them; for, while it in no respect is essential to existence, it does seem to add to the *happiness* of a large portion of mankind. Fight against it as we may, brand it as a poison as we certainly *must*, still the smoke of a million cigars will curl upward every day, and the expectorating crowd of chewers will continue to soil our carpets, and render our railway cars and hotels almost unendurable.

MANUFACTURE OF CHAMPAGNE WINE.

We left the freshly expressed juice of the grape, the must, in the *cellier* of the manufactory where it had been carried in the barrels into which it was poured from the reservoir of the vine-press. Five or six, perhaps seven, different wine-growing districts have each contributed a supply of their best product. There are probably barrels of the juice of the red grapes of Verzenay, Bouzy, Ay, and Epernay, and certainly some of the white of Cramant, or its neighborhood; for the last, having a particularly strong disposition to effervesce, is deemed an essential ingredient in the composition of what is known by us as champagne wine, the *vin mousseux* of the French.

We shall now accompany the must of the various vintages, which we have tasted and found of a sickish taste, throughout its various natural transformations, and the manifold artificial processes to which it is subjected, until it is finally converted into the pleasing and cheering bêverage which flows so sparklingly and promptly from the champagne bottle.

After a repose of some weeks, the juices of the various vintages are mixed together in a great vat. The fluid has already purged itself *il s'est débourbé* (it has cleansed itself of mud), as the manufacturer says, and flows out limpid and almost colorless. That, however, coming from the red grape may still have a slight pink hue, like the dying reflection of the setting sun in a pure stream; while the juice of the white grape retains but the slightest lunar tinge of its yellow color.

This mixing, or *marriage* of the different wines, as it is called, but which is technically known as a *cuvee*, is the

most important of all the various operations. It was the great discovery of the jovial Benedictine monk, Don Perignon, to whom, as has already been recorded, we are indebted for the existence of champagne wine. There is no manufacturer who ever dispenses with making a *cuvee*, or who even thinks it possible that veritable champagne can be made without it.

The juice of the white grape has not only qualities distinct from that of the red; but each variety of the latter has its own peculiar properties. The former gives a wine which effervesces more strongly, and the red grape generally one that has more body, greater fineness, an intenser spirit, and a more vigorous constitution. These qualities, moreover, vary in degree in the separate products of each vineyard, and of different vintages.

Though the manufacturer, with his little instrument called a *glucometer* (from the Greek *γλυκύς*, sweet, and *μετρον*, measure), which he is always using, has a means, together with the ordinary methods of analysis of the chemist, of testing the quantity of sugar and of other tangible constituents, he has to rely solely upon his sense of taste and smell for the detection of the not less important but more immaterial properties of his wine. What he terms *bouquet*, or perfume and fineness, are only to be discerned by the nose, tongue, and palate. And how acute must such organs be in the expert taster, who, with a sip and a scent, will distinguish the gunflint flavor of the wine of Pierry, in which I, with the best will in the world, and with no slight experience, could detect nothing but the usual indications of Bacchus, without the faintest suspicion of the presence of Mars.

The manufacturer, having thoroughly made his tests by sense and instrument, knows, or thinks he knows, the distinctive qualities of each kind of juice, and makes his mixture or *cuvee* accordingly. He thus gets, or tries to get, the proper equilibrium of fineness, effervescence, body, and spirit, which he believes to be essential to the desired result — good champagne.

The composition of the *cuvees* varies each year, according to the character of the vintages of the different places. If that of Cramant fails, for example, and that of Vizy should succeed, the latter is substituted for the former, or *vice versa*.

The products of the different vineyards having been poured into the great vat are thoroughly mixed with a long pole armed with cross-pieces of wood. This operation completed, the fluid is drawn off into hogsheads containing each about forty-four gallons, called *tonneaux de tirage*. These are left in the *cellier* for a fortnight or so, until the combined juices they contain have fermented under the influence of the ordinary temperature of the air, which is generally warm, the usual period of the operation being toward the close of October.

When, at the end of about fifteen days, the fermentation is supposed to have changed nearly one half of the sugar which the liquid naturally contains into alcohol and carbonic acid, the *tonneaux de tirage* are sent into the *caves* or cellars under ground. The cooler temperature below arrests the activity of the fermentation. The liquid — or the wine we may call it, for it has now much of its vitality and spirit — is then left undisturbed until January.

In this month, the wine is tested with the glucometer, and the quantity of natural sugar it contains carefully ascertained. If it has too much, which seldom or never occurs, a less saccharine wine must be mixed with it. If it has not enough, which is generally the case, a proper quantity of the candied sugar of the cane, and never any other, is put into it. All other kinds, even the purest white, whether made from cane-juice or beetroot, are said to *poison* the wine, giving it an easily-detected nauseous flavor. The sugar being the sole source of the carbonic acid gas, as well as of the alcohol of champagne wine, if there should be too little, there will be no effervscence; if there should be too much, the strongest bottles would not be strong enough to withstand the enormous pressure of the excess of gas it would generate.

A champagne wine properly constituted should contain at least twenty grammes (310 grs.) of sugar in each litre (about two pints), and twelve per cent of alcohol. It is rare, however, that wine comes into the world so favorably proportioned. Champagne is one of the most delicate offsprings of Bacchus, and requires careful nursing, the most gingerly handling, frequent change of air, skilful doctoring, and not a little dosing.

The quantity of natural sugar having been ascertained (*peser* is the technical term applied to the process), and if deficient, as is usually the case, the want supplied by due proportions of the *sucre candi* of the cane, the wine still contained in the hogsheads, or *tonneaux de tirage*, is left in the *cave* or first cellar under ground. Here it is kept, while fermenting gently, until the period of bottling (*tirage en bouteilles*).

This operation commences in April and continues until June. The bottles now used are the same from which the wine is drunk when finally prepared for drinking. The liquid, as it flows from the hogsheads, is of an uniform amber color, and has somewhat the taste, as well as look, of an unripe hock wine. If of superior quality, though still green from youth, it will not be unpalatable; if, however, of an inferior grade, it will be found rough, bitter, and astringent; and the taster will be satisfied with the slightest sip from the little shallow basin of silver, holding about a thimbleful, in which it is submitted to his judgment.

The bottles are filled to within an inch or so of their mouths, and then corked. The corks are fastened down with a narrow piece of iron, bent at either end into a hook, which catches under the rim which borders the mouth of each bottle. This fastening, or *agrafe*, has the advantage over iron wire in being more rapidly applied and removed, and in its capability of serving its purpose time and again. The corks used are employed for this purpose only, and are, though sound, of an inferior quality to those contained in the champagne bottles of commerce; for, as we shall see, notwithstanding that the bottles into which the wine has been originally poured are never changed, the corks are.

The bottles thus filled and corked are laid carefully on their sides, and arranged in order in successive lines and layers, supported by thin and narrow pieces of oaken wood placed horizontally. They thus form, according to the number, more or less long, broad, and high heaps of the utmost regularity and squareness of angle. In the great manufactories their length may extend many hundred feet. Their width is ordinarily from ten to twelve feet, and their height always within reach of a man's arm.

When the wine has been properly made and bottled, its fermentation goes on vigorously, and generally reaches its height in about three weeks. This is a period of great anxiety to the manufacturer, and he watches the development of the effervescence with the utmost solicitude. The power of the gas is sometimes so great, that it has been known to break bottles capable of resisting from twenty-eight to thirty-eight atmospheres, thus overcoming an immense force, equal to the pressure of five hundred and seventy pounds on each square inch.

The loss from breakage in consequence of the inordinate development of gas is sometimes enormous. In the years 1857 and 1858, it amounted to twenty-five per cent of the whole wine drawn off. Ten per cent is the average; and if the manufacturer finds that it falls much below this, he becomes fearful that his wine may be deficient in effervescence, and prove "stale and unprofitable." The general consumer, who is not discriminating in his taste, demands from his bottle of champagne a great deal of noise and froth; and, as he is the chief and most remunerative customer, the manufacturer takes care that he shall have all the explosive force possible. The problem, then, with the caterer to the popular taste, is to produce the greatest possible quantity of gas with the smallest proportion of loss to himself by breakage. The gas is easily produced by an abundant supply of sugar and the application of heat; but the breakage is avoided only by the most vigilant nursing.

When, in the warmer seasons, the manufacturer begins to find, in the course of his constant visits, the floors of his cellars strewn with unusually numerous fragments of glass and wet with wine, he carefully inspects his bottles, and, finding many of them broken and all seething with excessive ferment, he removes them at once to a cooler atmosphere. This he finds in his lower and deeper cellar, where his wine is promptly placed, and its fermentation moderated by the cold. The temperature of the lower or second *cave*, in which the bottles now lie, varies from 40° to 45°; while that of the higher or first *cave*, from which they have been removed, generally ranges between 50° and 55°.

During the cold seasons, on the other hand, the wine may be chilled, and become too torpid to generate the quantity of gas required. The bottles, then, are brought up from the lower to the higher *cave*, and frequently to the *cellier* on the ground floor, or even raised to the *grenier*, or highest story of the establishment. In a frosty autumn and in the winter, the relative temperature of the higher and lower compartments is reversed from what it is in a warm spring and in the summer. In the former seasons, it is higher above than below; while in the latter it is lower.

The wine is thus carefully nursed for two, three, four years, and even more, and during the whole time is more or less in perpetual motion. Now it is shifted from *cave* to *cave*, again to *cellier* and *grenier*, and thence back again from the highest compartment of the manufactory to its lowest depths, only to renew its periodical journeying. Thus it passes its restless existence of movement until ready for the final transformation which is necessary to fit it for its destiny.

This offspring of Bacchus is like some feeble child of humanity who, from his birth, requires the most tender care. He is closely watched by nurse and doctor. The influence of the vicissitudes of the seasons upon his tender constitution, more sensible than the thermometer, is minutely observed; and each blush of heat or ripple of cold is no sooner noticed than the cause is removed. Thus fostered, he may attain his full growth, but is still so weak and sensible to the changes of temperature, that he is forced to travel from one place to another, here seeking heat to warm his torpid blood into motion, and there cold to check its fevered agitation. He is thus kept in constant movement season after season, and finds no rest until the present is changed for another existence.

The wine which is used to make the ordinary champagne of commerce is seldom kept more than two years after being bottled. The more choice wines of the great vintages, only appreciated by connoisseurs, are kept for a much longer time. The wine of 1858, now ten years old, which is considered the finest ever made, has but just reached perfection. Its age, which involves a great loss of interest upon the original cost, which was exceedingly high, renders it necessarily very expensive, and it therefore can only be obtained by those willing to pay largely.

Let us suppose that the wine, whose course of change, both natural and artificial, we have followed to its bottling, is of the average quality of that out of which is made most of the champagne sent to our market. Two years have now elapsed; and the manufacturer, knowing that his wine, being of ordinary quality, will not improve by age, and unwilling to incur any further loss by interest, prepares it for consumption. The wine, before it has undergone the various processes of preparation, is called *brut*, or raw. It is highly effervescing, but has a bitter, astringent taste, and is not drinkable. — *Tomes's Champagne Country*.

Rouge: Its Composition and Uses. — In the mechanical arts, rouge is used for polishing purposes. It is entirely different from the cosmetic known by the same name, which is a vegetable preparation, and used only for the complexion. But the rouge used by machinists, watchmakers, and jewellers, is wholly a mineral substance. In its preparation, crystals of sulphate of iron, commonly known as copperas, are heated in iron pots, by which the sulphuric acid is expelled, and the oxide of iron remains. Those portions least calcined, when ground, are used for polishing gold and silver. These are of a bright crimson color. The darker and more calcined portions are known as crocus, and are used for polishing brass and steel. For the finishing process of the specula of telescopes — usually made of iron for large instruments, although lately cast of steel — crocus is invaluable; it gives a splendid polish. Lord Rosse prefers, for the production of rouge, the peroxide of iron precipitated by ammonia from a dilute solution of sulphate of iron, which is washed and then compressed until dry. It is then exposed to a low red heat, and ground to powder. — *Scientific American*.

Oiling Harness Leather. — Oils, when applied to dry leather, invariably injure it; and if to leather containing too much water, the oil cannot enter. Wet the harness over night, cover it with a blanket, and in the morning it will be damp and supple; then apply neatsfoot oil in small quantities, and with so much elbow grease as will insure its disseminating itself throughout the leather. A soft, pliant harness is easy to handle, and lasts longer than a neglected one. Never use vegetable oils on leather; and among the animal oils, neatsfoot is the best.

Agriculture.

CHEMISTRY OF HAYMAKING.

The succulent grasses that clothe our fields with verdure are very insignificant vegetable growths in contrast with the forest-trees whose huge trunks rise up from the hillside and the plain, and darken, with their dense foliage, unnumbered acres of our fertile lands. However small and fragile may be the blades of grass which shoot up in countless thousands from the rich meadows, their value to human beings is vastly greater than the more imposing and pretentious vegetable structures. How prodigious is the money value of our hay crop! How essential to the very existence and growth of the country is it!

In the tiny stalk and leaves of the timothy, clover, red-top, etc., there are rich juices circulating, which have been drawn from the breast of mother earth. These juices are the very pabulum of life, and from them, indirectly, we draw our sustenance. If we subject to chemical analysis these grasses, we shall find them to contain all the essential elements of animal growth. It would seemingly require but the slightest modification of vital chemical action, to transform these elements into different physical forms, and, from the juices of the timothy, elaborate the rich kernels of corn or wheat. We do not possess the power to modify, or in any way successfully interfere with the vital forces of nature; and, undoubtedly, it is best that we do not possess this power. Had we it, how soon should we introduce confusion and disorder into the beautiful laws which govern vegetable organisms, and from man's caprices would spring unnumbered woes!

But it is not our intention to follow this line of thought, however pleasing or attractive it may be. We wish to make a few brief observations upon the chemistry of curing hay. Curing hay is, chemically speaking, a distillatory or evaporative process. It is doing with succulent vegetable substances, what the salt-maker does with his saline waters, or the sugar-maker with his saccharine juices. The object is to drive off surplus waters, which hold the valuable principles in solution; to get rid of worthless and interfering substances, and retain all the desirable ones. The sugar-maker may apply too intense heat or direct flame to his evaporating pans, and burn or spoil his products; so the farmer may heat his hay too much in the blazing rays of the sun, and greatly injure the rich nutrient principles upon which its value depends. Certain it is, we cannot control all the conditions upon which the production of perfectly cured hay depends; but we can control them much more decidedly than we do. A ton of well-cured or properly dried hay is worth more in the mow than two tons of that which is cut at an improper time and cured in an imperfect manner.

Grass is not generally cut and cured early enough in the season. The sugar, the gluten, and starch, are in the best condition for preserving, before the ripening of the seed commences. The great end and aim of plant-life is, to reproduce itself, to perfect its seed. The periods of inflorescence and seed-bearing are attended with a large expenditure of costly material. The development of the flower to a blade of timothy, is a very different affair to that of one of the green leaves. The former contributes nothing to the general maintenance of the plant; the latter is mouth, stomach, and lung. Just previous to flowering, the vegetative power is most active, and large quantities of starch are being stored up ready for use when the pressing occasion arrives to form the seed. A tremendous struggle takes place in the plant, when the nutritive principle is dissolved by the aid of diastase, and transferred to the seed. As soon as it is over, signs of exhaustion appear, and the plant dies. The time to cut grass is before this culminating point is reached, when the nutritive principle pervades every part of the stalk and leaf.

Grass is generally dried too much. The ligneous part becomes hard and tough, and animals do not like it any better than we like overbaked bread. The nutritive portions are not so readily eliminated, and the waste is much greater in passing through the assimilating organs. It is not necessary to dry hay so thoroughly, in order to preserve it from putrefactive change in the mow. If the weather is clear and warm, it may safely be stored the same day it is cut, provided it is not cut in the early morning, while loaded with dew. If grass could be mown after the dew is gone, and spread upon a dry parcel of ground, four or five hours' exposure to sun and air will fit it for the barn. All moisture proceeding from dew or rain must be removed. Hay seldom or never spoils from the fermentation of its own juices, unless the conditions under which it is stored are extremely unfavorable. The process of drying or curing in the mow proceeds slowly and advantageously if but a part of the natural moisture is evaporated in the open air. A pound of hay well dried in the mow, is much better than an equal amount dried in the fierce rays of the sun.

If farmers will observe more carefully, and learn a few simple facts in regard to the important labor of haymaking, they can secure the crop more expeditiously, at less expense, and obtain it of far better quality. Let them *venture* more. Don't be afraid of spoiling hay by storing, if partially cured, and not wet from rain or dew. These suggestions are drawn from experience, and are worthy of regard.

LAKESIDE FARM.

The beautiful scenery and rural attractions about us being now in the height of their loveliness, charm everybody who can be charmed by such things. A walk for observation among the beauties which surround us might more properly be called a ramble, the scenes it opens being so romantic and inspiring. One of the pleasantest locations in the vicinity is Lakeside Farm, bordering on the north-western shore of Kenoza Lake, and owned by Dr. J. R. Nichols. This farm now embraces what were several small estates, and contains about eighty-one acres. Since it has been under its present management, portions of it have been brought into a high state of cultivation, and all parts of it have been subject to a system of trimming, pruning, and general improvement, so that its entire area presents visible signs of renovation, culture, and adornment. Portions of it which were too wet for cultivation have been reclaimed by under-draining and dressing, so that they now constitute the most valuable part of the farm. On different portions of this farm may be seen the effects of the popular fertilizers, which are worthy of observation by those engaged in the cultivation of the soil. The compost which receives the indorsement of the Doctor, as the best in use, is composed of equal parts of bone-dust and wood ashes. On this farm are about five hundred apple-trees, nearly all of which are now fruit-bearing; about three hundred pear-trees, and a vineyard of six hundred Concord grape-vines, from three to five years old; they are looking remarkably thrifty. This vineyard has a south-westerly slope, and is exceedingly promising. On the farm is some very fine full-blooded Jersey stock; two heifers among them, two years old, and a Jersey calf six weeks old, are worth a visit there to see. For one of these heifers, three hundred dollars has been offered and refused.

In the grove, by the side of the lake, is a rustic cottage for summer accommodation; and on the northerly shore, near the Amesbury road, in the midst of an oak grove, such as were once the delight of Druids, is a stone house, with spacious piazza, and finished with ample conveniences for cooking and the enjoyment of a retreat from summer's heat. At this point, the shore of the lake has been much improved, and a wharf built, extending forty feet into the lake. The scenery from this point is very beautiful. While here, one of the most brilliant sunset scenes was witnessed, embracing the mingling of the lingering rays of the setting sun with the approaching shade of evening on hillside and grove, united with the spanning of the arch above with an intensely brilliant rainbow, whose hues were so strongly reflected in the clear waters of the lake below, as to form a perfect illuminated wheel, the whole uniting in a picture which, for beauty and singularity, will scarcely be met with again in a lifetime.—*Haverhill Publisher.*

AGRICULTURAL LABORERS OF PRUSSIA.—M. Emile de Laveleye has just contributed an article to the *Revue des Deux Mondes*, in which an interesting account is given of the progress made by Prussia during fifty years of peace. Writing on agriculture, he points out that nearly all the land-owners cultivate their own estates; except for detached portions, renting is the exception. They are, therefore, retained in the country by the care of their own interests; for nothing more imperiously requires the eye of a master than rural industry. It is true, they are aided by a class of employees who are not found in any other country. They are educated young men belonging to families in a good position, often just leaving an agricultural college, who remain for a certain time on some large estate, to initiate themselves in the practical direction of one of their own. This novitiate is an ancient custom still preserved in many trades. Thus, frequently, the son of a rich hotel-keeper will not hesitate to enter another hotel as butler or waiter (Kellner), to be initiated into all the details of the service over which he will one day have to preside. When any one visits the farms (Rittergutter), he is astonished to see as superintendent the son of a banker, a baron, or a rich land owner. These young people drive a cart or guide the plough. At noon, they return, groom their horses, and then go and dress themselves and dine at the owners' table, to whom they are not inferior, either in instruction, birth, or manners. After the meal, they resume their working dress, and return, without any false shame, to their rustic occupation. Thus we find in feudal Prussia a trait of manners suited to the democratic society of the United States, and which hereafter will become general. In France, in England especially, a young man of the upper class would believe his dignity compromised in performing the work of a farm laborer.—*Paris Correspondent of Land and Water.*

HOW TO PRESERVE FRUIT-TREES FROM THE MICE.—Thousands of young trees are destroyed annually by those little pestiferous scamps. They seldom fail to give me their compliments, and in such a manner, too, as to nettle my temper just a little. I have wrapped my trees with paper and twine, ploughed the ground late in autumn, and cleaned the grass carefully away from around the trees; yet those little thieves steal into my orchard and garden, and very coolly girdle my choicest trees. I put my wits to work, to devise some sure remedy that would be cheap and quickly done. Take equal parts of pine-tar and fish-oil, mix together thoroughly by warming, then take a brush and put on the trees close to the ground and twelve or fifteen inches up around the body. It will not injure the trees, and there will be no more trouble with mice. I tried the experiment on fifty trees last winter, and it worked like a charm. My trees never were more thrifty than during the present season.

TRANSPLANTING IN THE NIGHT.—A gentleman anxious to ascertain the effect of transplanting at night, instead of in the day, made an experiment, with the following result: He transplanted ten cherry-trees while in bloom, commencing at four o'clock in the afternoon, and transplanting one each hour, until one in the morning. Those transplanted during daylight shed their blossoms, producing little or no fruit; while those planted during the darker portions maintained their condition fully. He did the same with ten dwarf pear-trees, after the fruit was one-third grown. Those transplanted during the day shed their fruit; those transplanted during the night perfected their crop, and showed no injury from having been removed. With each of these trees, he removed some earth with the roots. The incident is fully vouched for; and, if a few more similar experiments produce the same result, it will be a strong argument to horticulturists, gardeners, and fruit-growers, to do such work entirely at night.

Arts.

LIGHTING RAILROAD CARS WITH KEROSENE.

We present below an extract from the report of the railroad committee of the Massachusetts Legislature, regarding the testimony taken before them upon the use of kerosene in railroad cars, and also the new law enacted by the Legislature.

"This testimony was very important, as showing that the excitement the past year in regard to the use of kerosene lamps in cars was entirely without foundation. Dr. Nichols, the well known chemist, and editor of the *Boston Journal of Chemistry*, testified, that kerosene oil of the legal standard, viz., such as would not take fire below 110° Fahrenheit, could not explode, and was as safe as candles; that it could be easily tested; and that with such kerosene there was a positive assurance of safety. He further stated, that for many years he had experimented with burning fluids, and did not believe a serious accident ever occurred from kerosene which would stand the fire test of 110°.

It was also proved before the committee, by letters or telegrams from the officers of the roads, that in every instance where life had been lost by the burning of cars, the fire caught from the stoves, and that candles were used for lighting. These were the accidents on the Pennsylvania road, on the Erie road, and at Angola. In all the other instances in which cars were burned, but not attended by loss of life, in some of which kerosene was used for lighting, the fires were believed to have been caught by the stoves, or by sparks from the stove or engine, except in one instance, where a lamp for generating gas from benzine was the cause. In no single instance was a car set on fire, nor was the fire in any way caused or increased by the use of kerosene. These included the cars burned on the Chicago and Northwestern; Chicago, Burlington, and Quincy; Pittsburg, Fort Wayne, and Chicago; and a branch of the Erie road; making, with the others named, seven cases of the burning of cars, five of which were from stoves, one from sparks, and one from a gas-generating lamp; but not one from kerosene.

It was also shown by the roads leading from Boston, most of which were represented before the committee by their officers or by letters, that each road had used from one hundred to two hundred and fifty kerosene lamps in their cars for several years, and had never had the least accident from them. They stated, that they took care to procure the best kerosene oil; and some of them tested every barrel of oil which they purchased. Experiments were made with Tagliabue's pyrometer before the committee, showing that kerosene oil below the legal standard of 110° could at once be detected, and that any person could easily test the oil in a few moments, and ascertain exactly its quality or fire test.

After a full and thorough investigation, the railroad committee reported the following judicious bill, and it was adopted by the Legislature:—

THE LAW OF MASSACHUSETTS CONCERNING THE LIGHTING OF RAILROAD CARS.

Sect. 1.—No passenger cars on any railroad in this Commonwealth shall hereafter be lighted by naphtha or any illuminating oil made from coal or petroleum, or any illuminating oil made in part of naphtha, or coal, or petroleum, or any other illuminating oil which will ignite at a temperature of less than 110° Fahrenheit, to be ascertained by the application of Tagliabue's or some other approved instrument.

Sect. 2.—Any railroad corporation which shall violate the provisions of this act shall be liable to a fine not exceeding five hundred dollars, to be recovered to the use of the Commonwealth by indictment.—*Approved June* 4, 1868.

To Keep off Mosquitoes.—As the mosquito plague is to be upon us soon again, it may be convenient to many persons to know how to conduct a successful defence against their intolerable attacks.

Of the various remedies proposed, none are so efficacious as the use of mosquito netting in the windows and around the beds at night. But, as this is not always practicable or convenient, we must resort to other means for bidding defiance to our enemies. Of these, the best is the smoke produced by burning a small quantity of what is technically called "Persian Insect Powder." This consists of the powdered flowers, and perhaps young stems and leaves, of a plant known to botanists as *Pyrethrum carneum*, a kind of camomile cultivated largely in Germany, resembling the common garden camomile in many of its properties, and of which all the various "insect," "magnetic," and "fly" powders are wholly or entirely composed. For use against mosquitoes, a small quantity—about what could be heaped upon an old-fashioned silver dollar, if any of our readers remember the size of that coin—is placed, at bed-time, on a plate, and the top of the heap touched with a lighted match until it shows a red coal. The mass will then smoulder gradually away, filling the room with a light smoke, which narcotizes the mosquitoes, and keeps them quiet for several hours, after which it may be necessary to repeat the operation. The evolution of the smoke will be facilitated by stirring the burning powder from time to time, so as to secure perfect combustion, although this is not absolutely essential. The powder may be also twisted up in a light cylinder of paper, and burnt in that form. Its use as described, against mosquitoes, gnats, etc., has long been known to the Chinese and Tartars, who mould it into sticks and burn in their tents and dwellings, which would, in many cases, be uninhabitable without it. The same substance, in its powdered state, is also used to great advantage in preventing the attacks of roaches, bedbugs, fleas, ants, etc., and in keeping flies off the dining-tables. It is perfectly harmless to mankind, and may be eaten as freely as camomile, and the smoke is not at all injurious. This latter, it may be mentioned in addition, has much the same effect on flies as on mosquitoes—not destroying them, but merely throwing them into a stupor.—*Druggists' Circular*.

WHOLE-MEAL BREAD.

Sir,—Allow me to add to your article on bread, in last week's *Lancet*, my experience of the use of bran in making it.

I boil the bran first for an hour and a half or two hours. I have used it thus prepared. I have used the bran tea without the bran. I have tried both ways, with brewer's yeast and with home-made baking-powder (a teaspoonful to a pound of flour), with complete success, making most delicious and wholesome bread. I use seconds flour; and for baking-powder, I mix the bran, well strained, with the flour, powder, and salt, before adding the bran tea, all quite cold.

To make Baking-Powder:—Carbonate of soda, six parts; tartaric acid, four parts; fine sugar, two parts; salt, one part.

March 2d, 1868. A Doctor's Wife.

HOME-MADE BREAD.

Sir,—In your impression of the 4th instant, *Paterfamilias* makes inquiry for the best method of making bread without yeast, and the proportion of ingredients used in the process. I submit the following, which gives satisfaction to many: Take of flour three pounds; Howard's bicarbonate of soda, nine drachms; hydrochloric acid (sp. gr. 1.16), eleven drachms and a half; water, about twenty-five fluid ounces. Mix the soda with the flour, and add the acid to the water.

Brown Bread.—White meal, three pounds; Howard's bicarbonate of soda, ten drachms; hydrochloric acid (sp. gr. 1.16), twelve drachms and a half; water, twenty-eight fluid ounces. Mix as above.

Remarks.—The above we find in the *London Lancet* of a recent date. We are surprised that the editors should publish a formula involving the use of hydrochloric acid, and not caution their readers against the use of the *impure commercial articles*. The ordinary acid would be positively *poisonous* to use in bread-making, and must never be employed. No better or more healthful effervescent can be used than this acid associated with bicarb. of soda, if a *chemically pure* article is procured. By the action of the acid on the soda, pure, clean *salt* and carbonic acid result, and these are entirely unobjectionable. If the pure acid could always be found, and if it was not quite so corrosive and unpleasant in its nature, we should strongly recommend this method of bread-making; but these objections can hardly be overcome, and therefore the process is unworthy of attention.

India-Rubber.—India-rubber is soluble in ether, in naphtha, and other liquids. A rubber cement made with turpentine dries with great difficulty, and, like most turpentine varnishes, is very "tacky;" but that made with naphtha dries quickly. India-rubber naphtha cement was first used, we believe, by Charles Mackintosh, of Glasgow, for making waterproof coats, which were called "Mackintoshes," after the inventor. The folds of cloth were cemented double, leaving the natural surface on the outside, and the cement was confined between the duplicate pieces. Such clothes had an unpleasant odor, and were but little used. The discovery of rendering the rubber plastic by kneading it with heated rollers, so as to avoid the use of solvents entirely, was a grand improvement in making india-rubber goods. This discovery, together with the use of sulphur, and the treatment of the goods by high heat, are American inventions which have been the means of greatly benefiting and extending the useful arts throughout the whole world.

How to Make Good Cement Walks.—Having previously graded and rolled the ground, heat your tar very hot, and with a long-handled dipper begin at one end of a pile of quite coarse gravel, pouring on the tar, quickly shovelling over and over so as to mix thoroughly. Cover the ground two and a half or three inches deep with the tarred gravel, and then roll. Clean the roller with a broom as you proceed. Then put on a layer of finer tarred gravel one and a half inches thick, and roll. Then sprinkle the surface with hot tar, spreading the tar with a broom; finally, cover the surface with a light coat of fine sand, and your walk is complete, ready for use. It will improve in hardness by age. Provide portable tar kettles, screens, a roller not very heavy, and tools for systematic work, and you can hardly fail to derive satisfaction.

SODA-WATER SYRUPS.

STRAWBERRY SYRUP.

Strawberry jam .... 1½ pints.
Simple syrup .... 7 pints.
Cochineal coloring .... ½ oz. or Q. S.
Solution citric acid (2 oz. to pint) .... 3¼ oz. or Q S.

VANILLA SYRUP.

Fluid extract vanilla .... 1½ oz.
Simple syrup .... 1 gallon.

GINGER SYRUP.

Simple syrup .... 1 gallon.
Tincture ginger, 4 oz. or fluid extract .... 1 oz.
Tincture capsicum .... 1 dram.

SASSAFRAS SYRUP.

Simple syrup .... 1 gallon.
Tincture of oil sassafras .... 1 oz or Q.S.

ROSE SYRUP.

Simple syrup .... 1 gallon.
Rose water .... 8 oz.

SODA-WATER CREAMS.

NECTAR.

Cream and sweet milk, equal parts .... ½ gallon.
White sugar .... 5 pounds.
Dissolve the sugar, and add
Fluid extract vanilla .... ½ oz. or Q. S.
Cochineal coloring .... 1 oz. or Q. S.

Stir well and strain through flannel. This article, as well as the two succeeding ones, preserve well if kept cold.

ORANGE CREAM.

Cream and milk, equal parts .... ½ gallon.
White sugar .... 5 pounds.
Dissolve as before, and add
Old bitter orange, (dissolved in a little strong alcohol) .... 15 drops.
Tincture curcuma .... Q. S. to color.

LEMON CREAM.

Same as above, except for oil, use oil lemon, and add less coloring.

Boston Journal of Chemistry.

BOSTON, JULY 1, 1868.

☞ Any one sending us the names of three subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For five subscribers we will send the Petite Microscope; for twenty-five we will send, in addition to the microscope, a copy of "Stockhart's Chemistry for Students," the best elementary treatise yet published; for one hundred subscribers we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug-stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. DOWNES is general travelling agent for the *Journal*.

NUMBER ONE OF VOLUME THIRD.

We present to our readers, in this issue, *Number One of Vol III.* of the *Journal of Chemistry*. It is largely made up of original articles, all of which, we hope, will prove of interest to our readers We give up ten pages to reading matter, but we do not promise but eight in future numbers, which is one more than we have hitherto afforded. We need to place several pages at the disposal of our advertising friends, in order to meet increased expense in publication. But slight modifications in the general appearance of the *Journal* have been made, as it has seemed to meet the full approval of its patrons during the past year. The only complaints that have reached us, have been, that it was *not large enough*, and its visits *too infrequent*. If we continue to prosper, there will be time enough in the future to remedy these defects.

☞ The *Journal* has received *large accessions* to its patrons, since the June number was issued, and we print an edition of this, the first number of Vol. III., which will be read by at least *twenty-five thousand* readers. The zeal manifested in our behalf, and the kindness extended to us by hundreds of friends in all sections of the country, deserve our grateful recognition. We hope to make the paper worthy of their continued interest and support.

☞ The long article upon the "Manufacture of Champagne Wine," on the third page, must not be neglected by the reader because it is long. It is written in an exceedingly interesting and racy style, and gives a better and truer account of some of the preliminary steps in wine-making, than we have ever seen.

☞ We are acquainted with the lady advertising in this number of the *Journal*, for situation as teacher; and we take pleasure in saying that she is abundantly qualified to discharge the duties of teacher to those who may require her services.

WATER SUPPLY-PIPES.

Several months ago, in some remarks upon service-pipes for water, we took decided ground against the employment of those constructed of two different metals, one or both of which, through corrosive action, afford poisonous salts soluble in water. The remarks were intended particularly to apply to the *tin-lined lead pipe*, which has been highly commended by scientific gentlemen and the press during the past two or three years. The views expressed regarding this variety o pipe attracted much attention, and provoked some feeling on the part of those interested in the manufacture and sale of the article. At the time, we did not know the name of the inventor, or manufacturer; and we neither entertained nor expressed a doubt of the entire integrity of purpose of these parties, or those engaged in its introduction. The pipe, we believe, has the indorsement of Prof. Silliman and other distinguished chemists in various parts of the country. We are sorry to be compelled to express dissent from the views of these gentlemen regarding the safety and utility of the pipe in question; but duty to our readers and ourselves demands it. The question of the employment of proper water supply-pipes is one of the highest importance to mankind, and is too intimately connected with the health and lives of thousands to allow palpably unsafe or doubtful devices to pass into general use with their defects unchallenged or unexplained. In the conduct of the *Journal*, we think our readers will bear us out in saying, that we have never allowed interest to stand in the way of duty, and we trust we never shall.

We take the ground, in regard to this pipe, that instead of its being *safer*, it may, under certain circumstances very liable to occur, become *much more dangerous* than that constructed entirely of lead. It is a well understood fact among practical, well-informed chemists, that metals differing in crystalline structure, when placed together in acid liquids, or even in common water, are, by peculiar galvanic action, rapidly oxidized, disintegrated, or destroyed. This is a law common to all the oxidizable metals.

It follows, if we place lead and tin in juxtaposition, with access of water, one or both of the metals will suffer from rapid corrosion. In laboratory experiments, we have found the tin, under certain conditions, to suffer most, but invariably the lead decomposition was greatly augmented by the association. The impression prevails, to a considerable extent, that pure tin pipe is practically indestructible when placed in the ground for conveying water. This is certainly an error. We have had a section of tin pipe in our possession which was corroded through and through, and yet it had been in use but six months. This occurred in the city of Manchester, N.H. Lead is not so readily acted upon as tin, under the ordinary conditions of exposure to which service-pipes are subjected. The safety in the use of tin pipes does not consist in any peculiar exemption from corrosive action, but in the harmlessness of the resultant oxides or carbonates. If tin was indestructible in contact with moving water, and the coating placed upon the interior of lead pipes *absolutely perfect* at all points, it would certainly be a most desirable invention. A family using water flowing through a tin-lined lead pipe from a well, or from the main of a city or town aqueduct, is exempt from danger so *long as the lining remains perfect*. But if, from defective soldering, or cracks, or breaks in the lining, or from corrosive action, water contact is made with the lead, then alas for the family! Electrical currents commence to flow between the metals; disintegration goes on rapidly, and lead-poisoning is almost certain to result. A lead pipe, under these circumstances, would be much safer.

A physician, in a town contiguous to the city, recently brought to us a section of tin-lined lead pipe, taken from the well of a patient suffering from lead poisoning, which perfectly illustrates the position here taken. In placing the pipe in position, it had been bent at right angles at a point near the water, and the plumber, in attaching the pump above, had allowed a portion of solder to drop through the pipe, lodging directly at the angle, or bend. Speedy corrosion commenced at this point, promoted by galvanic action. The lining was perforated, and lead-poisoning of a marked character resulted. No such results would probably have followed, if the pipe had been wholly of tin or of lead. Precisely the same evil is met with in the use of the metallic double-lined ice-water pitchers. The lining of these vessels is often made of dissimilar metals, and the parts joined together with solder into which lead enters as a constituent. Very shortly the thin film of deposited silver is worn off upon the interior; by water contact, galvanic action promotes corrosive action, and the water becomes poisonous. *Pure* water acts much more energetically upon lead and other metals than the ordinary kinds, and hence the action is greatly promoted by the ice-water, which is very nearly as pure as that which is distilled.

We think our readers cannot fail to understand the force of our objections to tin-lined lead pipes. They are conclusive to our own mind, although we may stand alone in entertaining them. But we are not alone. One of the most thorough practical chemists and electricians in this city has expressed to us his full agreement in our views and theory; and we think the distinguished scientific gentlemen who have so fully indorsed the invention will, upon further experiment and more mature reflection, coincide with us also.

DR. RICHARDSON AND NITROUS OXIDE.

A recent number of the *London Lancet* contains a report of remarks made by Dr. Richardson at the Medical Society, regarding the employment of nitrous oxide gas as an anæsthetic agent. The Doctor unqualifiedly condemned its use, stating that "it is the most dangerous of all the substances that have been applied for the production of general anæsthesia. It had caused death in the human subject; and on animals it was so fatal, that with the utmost delicacy in its use, it was a critical task thoroughly to narcotize an animal with the gas without actually destroying life." Now this is certainly very important information, *if true.* Nitrous oxide has probably been administered a thousand times in this country where it has once in England, and we have not heard of a well authenticated case of death resulting from its use. It has been in the hands of empirics and charlatan "lecturers" for years, who have perambulated the country exhibiting its exhilarating effects to crowds of people, and but few, if any, cases of serious injury have been reported. One of these "exhibitors," who travelled with it for six years, informed us that he had administered it to *ten thousand people* himself without producing permanent unpleasant effects in a single instance. Our dentists are daily, hourly using it all over the country; and if it were so deadly in its influence, we certainly should have learned of its dangers and condemned it long before Dr. Richardson's dogmatic opinions were presented to the London Medical Society.

There is a jealousy manifested by certain men and cliques which is entirely unworthy of the votaries of true science. It is being continually manifested, more particularly upon the other side of the water, and would be ridiculous, were it not calculated to lead to grave errors and evils, and to the debasement of science. We are not now advocating the claims of nitrous oxide gas as an anæsthetic, but simply calling attention to the absurd statements of Dr. Richardson. But few of our readers will fail to remember that he is the prominent representative of discoveries in the line of new anæsthetic agents. It is evident his researches have not qualified him to speak fairly or correctly of the nitrous oxide, first discovered to possess anæsthetic properties by Dr. Wells, of Hartford, an *American* dentist. If surgeons and medical gentlemen had promptly believed his statements

regarding the tetrachloride of carbon, and extensively used it, what an immense amount of mischief would have resulted. No more dangerous agent to be breathed into human lungs could hardly have been devised; and, from what we know of the bichloride of methyl, we are almost prepared to say the same of that also. Exhibitions of prejudice or jealousy in matters connected with progress in science are, of all human weaknesses, the most to be regretted.

HOW TO TEST THE POWER OF MICROSCOPES.

As satisfactory a way, if it were practicable, as any we can suggest at present for instruments of the highest power, would be to take 1,000 human hairs of average diameter and lay them side by side on a bit of glass, touching one another. They would occupy the space of one inch. Having thus arranged them, very carefully remove ten of the hairs, which will leave ten vacant spaces, each 1-1000 of an inch wide, or in all 1-100 of an inch. Now, with the utmost precision, arrange the remaining 990 hairs so as to occupy the whole space of an inch, and be equidistant from each other. If this part of the experiment be successfully done, no two of the hairs will touch each other; but the whole series will be separated by a very, *very* minute space, each from its neighbor. The space which separates each two hairs will be the 1-990 of the space which was left vacant by removing the ten hairs; that is, the 1-990 of 1-100 of an inch, or 1-99000 of an inch.

Now apply your microscope, and see if you can distinguish the spaces between the hairs. If you can, it proves two things: *first*, that you are a good experimenter; and *second*, that you have one of Tolles's, or Powell and Leland's best instruments, or one that is just as good.

But we dare say the experimenter might find the process of arranging the hairs tedious and difficult; and we would therefore inform him, that F. A. Nobert, of Barth, Pomerania, has, for this purpose, ruled, on glass, a series of parallel lines so fine and close together, that in some of his *bands ninety of these lines occupy the space of a single hair*, though, in his very coarsest bands, the lines have abundance of room, there being *only* fourteen of them in the space of one hair's diameter.

The lines are ruled in little groups called *bands*, several of such bands being on the same plate of glass, and of different scales or degrees of fineness. These bands themselves, composed of the finest imaginable lines, are nearly invisible to most eyes, inasmuch as they occupy the space of half a hair, or 1-2000 of an inch. Such a plate was used by Messrs. Sullivant and Wormly in their experiments, and had upon it thirty groups of different scales, the coarsest being ruled to 1-1000 of a Paris line, and the finest to 1-8000, a Paris line being .088815 of an English inch, or a little less than one tenth. The whole thirty bands occupied a little more than 1-50 of an inch. Such minuteness is almost inconceivable.

But are there any microscopes that can separate these infinitesimal divisions of space, and make them visible?

Mr. Charles Stodder, of Boston, in an exceedingly interesting article in the *American Naturalist* for April, 1868, informs us that Prof. Quecket asserted, "that no achromatic had yet (1855) been made capable of separating lines closer together than 1-75000 of an inch."

Mr. Ross found it "impossible to ascertain the position of a line nearer than 1-80000 of an inch."

Mr. De La Rue was "unable to resolve a line nearer than 1-81000 of an inch."

Dr. Wm. B. Carpenter, in his work on the microscope, published in 1856, said: "At present, the existence of lines finer than this (1-79000 of an inch) is a matter of faith rather than of sight." Three years later, Dr. Carpenter substituted 1-85000; and three years later still, 1-84000. Prof. Bailey, of West Point, claimed to have seen lines as close together as 1-100000 of an inch; while Messrs. Harrison and Solitt, of Hull, England, asserted that they had measured lines on the diatom, *amphipleura pellucida*, as fine as 120,000 to 130,000 to the inch. Messrs. Sullivant and Wormly, after numerous experiments, stated, in 1861, that lines on the Nobert's test plate closer together than 1-78000 of an inch, can not be separated by the modern objective; but in 1865–6, Max Schultz separated the lines as close as 1-90000.

In our own country, in 1863, Messrs. Greenleaf and Stodder, of Boston, saw the lines 90,000 to the inch. In 1867, Dr. Woodward, of Washington, resolved Nobert's band of 90,000 to the inch. He afterwards got 101,000 Recently both Messrs. Greenleaf and Stodder, with a Tolles's 1-6 immersion microscope, *saw satisfactorily Nobert's band of* 112,000 *to the inch*, thereby "establishing the fact of the visibility of such lines, contrary to the theory of the physicists."

Wonderful as the above facts in reality are, what is still more surprising is, that these bands of Nobert's can be *photographed*, and their images can be *counted* to the number of 60,000 to the inch. With what kind of a point does Nobert mark his lines, and how is that point moved?

THE ORIGIN OF FORCE.

In the last issue of the *Journal*, we discussed the question, "What is Force?" Let us now inquire after its *origin*.

If left to itself, *chemical affinity* would soon bring all unlike atoms together, and lock them up in compounds; *cohesion* would bring together all the particles of these compounds, and lock them up in solids; and *gravity* would draw into one great mass all these solids, and hold them in its iron grasp; while the heat developed by all these forces would be radiated into space, and our earth finally become one dreary waste, silent, cold, and dead. What, then, is the source of all the energy which is thus manifesting itself in protean forms?

Let us look, first, at the energy developed by gravity, and seen in the winds, the rain, and the rivers. The atmosphere on each side of the equator is an immense wheel. The side of this wheel next the equator is continually expanded by the heat of the sun, and thus made lighter. The colder and heavier side is in the polar regions, where it is pulled down by gravity; and thus the wheel is made to turn round and round. Were it not for the heat of the sun, it would soon come to rest.

Again: The heat of the sun evaporates the waters of the ocean, and, in the form of vapor, they are swept round by this great wheel till they come to colder regions, where they are condensed and fall as rain, and flow back to the ocean in the rivers.

It is the heat of the sunbeam, then, which gives rise to these unceasing manifestations of the force of gravity.

The energy of chemical affinity which shows itself in heat, light, and muscular force, is, as we have seen, developed by its action between oxygen and carbon. How are these elements separated from their combination in carbonic acid, so that they can be re-united by affinity?

If we place a leafy plant in a glass vessel, and let a current of carbonic acid stream over it in the dark, no change takes place; but let the experiment be tried in the sunshine, and a part of the gas will disappear, and be replaced by oxygen. The sunbeam has enabled the plant to absorb the carbonic acid, to withdraw and retain the carbon, and to give back the oxygen to the air. When the plant is consumed, either by combustion in our furnaces, or by respiration in our bodies, this oxygen combines once more with the carbon, and develops energy, which appears as mechanical force in our engines, and as muscular force in our bodies.

In the summer, when more sunshine than we need is poured upon the earth, a part of it is absorbed by the leaves of plants, and, by the decomposition of carbonic acid, builds up the varied forms of vegetable life. The fields and the forests thus become vast storehouses of force which has been gathered from the sunbeam. And when we burn these vegetable products for fuel, or use them as food, the light, heat, and muscular force developed, are only the re-appearance, in another form, of the sunlight which the plants absorbed while growing. Every golden ray which illumined the leaves through all the summer days during which they were outspread to the sunlight, is given back in this chemical metamorphosis. All the varied life and activity of the animal creation is nothing but transmuted sunshine. The flight of the bird through the air, and the sweet song which he pours from his throat, are alike sunbeams that have undergone this magic change. The steam-engines that do the work of a thousand men in our manufactories, or propel our cars and steamships over land and sea, all derive their giant strength from the sunlight, and from that alone.

And we must bear in mind that this process of gathering force from the sunbeams has been going on for ages. All the anthracite and bituminous coal dug out of the earth is the petrified vegetation of a period so remote that it transcends our finite thoughts to conceive. Millions upon millions of years before the earth became the dwelling-place of man, there flourished strange and luxuriant forms of plant-life, of which these immense beds of coal are the remains. Through countless ages, the sunbeams which shone upon that former creation have been shut up in the dark depths of the earth; and when now we burn the black mass of coal, we are only releasing the rays from their long imprisonment. The light and heat are the very light and heat that were poured upon a pre-Adamite world. What a miracle of Divine power and of Divine providence have we here! The very fire that warms us to-day was kindled at the fountain of the sun, infinite ages before the first man was created. The only form of energy known to us which does *not* come to the earth in the sunbeam, is that developed by the ebb and flow of the tidal wave. This wave is dragged round the earth mainly by the attraction of the moon; and, since it is drawn from east to west, while the earth is turning from west to east, it acts as a brake upon the earth's rotation. This energy, then, is developed at the expense of the earth's motion on its axis, and, of course, tends to retard that motion. This effect is so slight, however, that the observations of thousands of years have not served to make it appreciable.

We have by no means exhausted this interesting subject. We have given but a hurried glance at a few of its aspects and its suggestions, and, at some future day, we may discuss others no less wonderful and striking.

Lancing the Gums in Children. — Dr. F. H. Thomson (*Glasgow Medical Journal*), believing that the irritation of teething is caused by the engorgement of vessels supplying their circulation, advises the practitioner to cut low down at the reflected junction between the lip and the gum, instead of upon the summit of the gum itself.

GREAT AND SMALL.

These are, of course, relative terms. A large building, when compared with a small mountain, is no longer large. A deep river is but a shallow stream when compared with the ocean. A person standing at the foot of the Alps or the Himalayas, is struck with awe at the vast height of the towering mountains, while he speaks of the distance to the moon without any such feeling. The moon is *only* two hundred and forty thousand miles off. The fisher-boy tells marvellous tales about the depth of a certain pond, of which the whole length of his line failed to reach the bottom. The sailor deems himself in deep water when he finds a few hundred fathoms under his keel, while the coast surveyor records the enormous soundings of thirty thousand feet, and more, in the silent deeps of the ocean.

In the first case, Mount Blanc, or Dhawalagiri, is compared with other mountains, and its height is stupendous; in the other, the distance to the moon is compared with that to the sun, or fixed stars, and becomes trifling. The boy associated the pond with the trout brook; the sailor the deep sea with the shelving coast, the Grand Banks, or the George's; while the scientific surveyor thinks only of the far shallower soundings of previous navigators.

Things are great or small, then, only by comparison. One standing upon a lofty mountain peak, itself surrounded by scores of other peaks nearly or quite as high, separated by precipitous valleys, sometimes, to their very bases, as far as the eye can reach a wilderness of mountains, exclaims "What vast heights! What awful depths! How rough and scored is the surface of the earth!"

When, floating upon the bosom of the Atlantic, a few hundred miles south of the Grand Banks, we look down into the dark abyss and call to mind, that nearly in that spot Lieutenant Walsh, of the United States navy, obtained a depth of more than thirty-four thousand feet without touching bottom, we are apt to say, "What an enormous furrow is here cut into the face of our planet!" But compared with the earth, every thing upon it is insignificantly small.

The mountain heights and the ocean beds have been likened to the roughnesses on the rind of an orange. It must be a *large* and *smooth* orange, to make the comparison in any wise a just one.

Let us see: The diameter of the earth is about seven thousand nine hundred miles, or about forty-two million feet. The height of Dhawalagiri is about twenty-eight thousand feet; so that the diameter of the earth is about fifteen hundred times the height of the mountain. Then, preserving the ratio on a globe fifteen hundred inches, or one hundred and twenty-five feet in diameter, the mountain would be one inch high; reduce the globe to twelve and one half feet, and the mountain would be one tenth of an inch high; and on a common school fifteen-inch globe, the mountain has dwindled down to the size of a grain of sand from the sandbox. The bed of the sea in its deepest part would scarcely exceed the thickness of a sheet of ordinary writing paper; while Lieutenant Walsh's huge furrow is only a pin scratch in depth.

O yes! the earth is vast when compared with all things upon it; but how even it shrinks into insignificance by the side of Jupiter; and how small is Jupiter in relation to the grand central luminary of our system. And how do our sun and his system dwarf and lose their importance when we think of the little corner of the universe which they occupy!

They are all the fine dust of the balance in the view of Him who alone is great!

Poisonous Hair-Dyes.—There is a class of hair-dyes of an objectionable character, which are being very extensively used in all parts of the country. The dye is prepared from acetate of lead, lac sulphur, rose-water, and glycerine. The lead salt constitutes the objectionable feature of the compound, and several cases of lead-poisoning have been reported from its employment. A serious case has recently come to our knowledge, in which a lady has become perfectly prostrated from its effects. All the violent and distressing symptoms of lead-poisoning are apparent, and which are directly traceable to the use of this dye. There are thirty or more different makers of the article throughout the country, and as many different names given to it. It may be known by the heavy sediment which is usually present in the bottles, and which requires to be shaken up with the liquid portion before using. A large number of people are so extremely sensitive to the action of lead upon the system, that they suffer whenever it is brought in contact with the person.

The cultivation of the *Ramie* plant has been commenced in Alabama. Its fibre is finer than that of Sea-Island cotton, and stronger than that of flax. After cleaning, it is soft and white, and takes colors as readily as the finest wool or silk. It is a native of Java.

The cotton culture of the South started from very feeble beginnings.

The California *Farmer* predicts, that that State will become the greatest silk-growing country in the world —not excepting China nor Japan.

According to *La Presse*, the use of sulphate of iron as a deodorizer, at Vienna, so effectually destroyed the rats, that Prof. Hurtl was unable to procure a supply of these animals for experimental purposes.

It is suggested, that the practice of connecting rain-water pipes immediately with drains and sewers is injurious, as it enables noxious gases to rise in close proximity to bedroom windows.

Moral ideas are still prevalent in Massachusetts. An earnest Sabbath-school discussion was held a fortnight ago, at Amherst, on the question "Have physicians any right to pray for their daily bread?"—*N. Y. Medical Gazette.*

A poor disciple of Æsculapius at our elbow suggests, that if not allowed to *pray* for their daily bread, they will be compelled to *prey* for it.

Lord Brougham's brain fairly wore itself out. Loss of memory and mental imbecility were indications that the great man *died* some weeks before he expired. "Himself his tomb."

Some itinerant temperance lecturer, in Ohio, having stated that the Binghampton Inebriate Asylum contained 1,300 rich men's *daughters*, who had been sent there to be treated, 150 ministers, 400 doctors, and 600 lawyers, Mr. Albert Day, the superintendent, officially denies it, and says the statement is as far from the truth as possible. There never has been a female patient admitted to that asylum. There have been fifteen or twenty applications for the admission of females during the past year, and most of these were opium cases. There are now sixty-six patients, the largest number ever in the asylum. During the past year one hundred and sixty have been admitted, of whom three were ministers, four doctors, and five lawyers.

Medicine and Pharmacy.

"IODIDE OF LIME."

In answer to many inquiries made by physicians regarding the "iodide of lime," we would state, that the salt is not the iodide of calcium, or the iodate of lime, but a peculiar combination of both.

$$6\,CaO + 6I = 5\,CaI + CaOIO_5.$$

In this combination, it is probable the iodine and oxide of calcium exist chemically in a form similar to that between chlorine and lime in the so-called chloride of lime; and hence the name bestowed upon it, "Iodide of Lime."

Physicians should be cautioned against employing the iodide of calcium, and several other unusual mixtures labelled iodide of lime, which have been quite largely supplied to druggists from some source. Instances of injury from the use of these substances have come to our knowledge. Iodide of lime, as we have furnished it the past *ten years*, is in the form of a dark brown amorphous powder, having the odor of free iodine when exposed. It should not be administered in the powder or dry state, as the action of boiling water is needed to fix the combination and hold the salts in solution.

The following is the method of preparing the solution:—

℞ Iodide of lime........................... ℥i.
Aquæ bullientis.......................... Oii.

Place the powder in any vessel not liable to crack by heat, and pour on the boiling water; as soon as it is cold, a white sediment will form in the bottom, which, after turning off the clear solution (which holds all the medicinal iodides), may be thrown away. A teaspoonful of this clear solution is a dose for adults three times a day. It may be given clear, or in syrup, or water. The physician may direct the druggist how to prepare the solution, and order it in such quantities and forms of combination as are required. It is compatible with most of the vegetable tonics, sarsaparilla, etc.

A form of recipe much used by physicians is as follows:—

℞ Solut. iod. of lime.................... ℥viii.
Syrupus simplex .... ℥ii.
Tinct. cardamom .... ʒi.

Dose to adults, from one to two teaspoonfuls twice a day. A pleasant *syrup of the iodide of lime* has been prepared by the writer, which is convenient for the use of physicians, or for dispensing by druggists. These preparations are so exceedingly agreeable, or devoid of unpleasant taste, that some practitioners are reluctant to believe that iodine is held in them. A spoonful turned into a wineglass, and a drop or two of hydrochloric, acetic, or almost any acid, instantly develops color, and causes the evolution of free iodine. This is an experiment which may easily be tried. From many years' careful observation of the influence of this form of iodine, we have no hesitation in saying, that we are led to regard it as the *most* efficient and useful of any yet proposed.

It presents one of the most powerful alterative agents in a form capable of exerting full action upon the system, and this in minute and pleasant doses. It is conceded, that the alterative, resolvent, or tonic effects of iodine are exerted only when associated with other elements in combination. Binary compounds, like iodide of potassium, although given in large doses, often produce but slight remedial effects, as the great bulk passes off and is wasted through the excretory organs. No fact in medicine is more distinctly understood, than that the urine of

patients under the influence of full doses of the iodides of potassium, sodium, or ammonium, is loaded with these unchanged salts in solution. Observation and experiment lead to the conclusion, that the specific effects of iodine, even when most marked, are due to very minute quantities; and, like iron, when administered in unscientific or improper forms, the energies of the system are wasted in efforts to reject it.

How imperfect is our knowledge of *doses!* Who can tell us what a right dose of any medicine may be? If we are groping in the dark in this regard, an enlightened judgment should lead us to prefer the smaller rather than the larger dose, when we observe that the former is all economized, or employed, while the latter is in great bulk rejected. A fractional part of a grain of iodine in the form of iodide of lime, produces, to say the least, as marked effects as ten grains of the same element when associated with potassium. A fractional part of a grain of iron produces more decided results in the form of a protosalt, than twenty-five of the old sequioxide or carbonate. Why, then, should we not employ iodine and iron in the new and improved forms, and reject the old? Chemistry, the handmaid of medical science, ought to teach us new truths; and does it not? It certainly does; and among those new truths none are more important than the different degrees of assimilability conferred on agents by different combinations.

The first advantage which iodide of lime has over the other iodides is in the smallness of the dose, and the minute state of its atomic division.

2. In its ready combination with the blood and tissues, manifested by its alterative effects.

3. In not passing off rapidly through the kidneys.

4. In not producing gastro-enteritic and vesical irritation.

5. In being cheaper than the other iodides.

6. In being compatible with most remedies, and admitting of a variety of combinations in extemporaneous prescriptions.

Large doses of iodide of potassium are often given with the view of obtaining sorbofacient effects. The iodide of lime should not be employed for such ends. Iodine is certainly not a reconstructive element, like iron; but it must remain in the system to produce alterative effects.

The first effect usually observed when iodide of lime is taken, is an increase of the appetite, showing that it has tonic properties of a marked character. Pale, scrofulous children improve rapidly under its use, and the vital functions assume a normal or healthy condition.

It is admirably adapted to a large number of chronic or acute affections peculiar to children. It is suited to them both by the mildness and efficiency of medicinal effect, and the pleasant, attractive form of the remedy. It may be given for a long period, where constitutional influences are desired, and no repugnance or disinclination to take the syrup encountered. In white swellings, hip-joint disease, and distortions of the spine, it should be given persistently in moderate doses until relief is obtained.

Glandular tubercles, ophthalmia, ozæna, lupus, fistulous and carious ulcers, yield to treatment with iodide of lime more readily than with other agents.

Scrofulous ulcers and abscesses of the cervical and submaxillary glands are affections successfully treated by it. It may be used externally as a wash to ill-conditioned ulcers, abscesses, and scaly eruptions, by diluting the solution with three or four parts of water, and applying twice a day, morning and night.

Cases of incipient phthisis, and even confirmed tuberculosis, are reported as having been greatly benefited by it.

It is hardly necessary to specify further the affections for the relief of which it has proved efficient.

It unquestionably possesses an alterative power which belongs to few other remedies; and every physician will readily understand the affections in which its use is indicated.

It should be observed, that the above statements as regards its therapeutic val e are based upon the experience of a large number of physicians resident in various States; and the time of trial, ten years, is regarded as fully sufficient to test its worth.

Sarsaparilla compounds, iron, and bismuth preparations, rhubarb, columbo, and most other tonics and cathartics, are perfectly compatible with it, and may be combined in prescriptions in any form desired.

EFFICACIOUS PRESCRIPTIONS.

℞. Acid hydrocyan. dilut., gtt.xx; codeine, gr.ij; syrup tolutan., ℥ss; aq. pur., ℥iss. M. A teaspoonful every two or three hours as a palliative for troublesome cough.

℞. Oxal. cerii, gr.vj; bismuthi sub-nitratis, ʒj. Divide in six powders. A powder to be given two or three times a day for nausea and vomiting of pregnant women.

℞. Bismuthi sub-carb., ʒij; ext. nucis vomicæ, gr.iij. Make twenty-four pills. One before and after each meal, for dyspepsia, acidity, loss of appetite, etc.

℞. Gum. ammoniac, ʒj; ext. aloes, ℈j; ext. nucis vomicæ, gr.x. Divide in twenty pills, of which give one every night. An admirable remedy for chronic constipation. The aloes induces flow of bile; the ammoniac increases intestinal mucus, and the nux vomicæ gives tone to the muscular coat.

℞. Quiniæ sulph., ℈j; ferri sulph., gr.xv; ext. nucis vom., gr.v. Divide in twenty pills; one pill two or three times a day. As a powerful tonic, or to prevent relapse in intermittent fever.

℞. Potass. bicarb., ʒiij; acid benzoic, ʒj; syrup. cort. aurant., ʒvj; aquæ, ℥v, *et* ʒij. M. A half or whole tablespoonful, two or three times a day, in chronic bronchitis, biliousness, and lithic acid diathesis.—*N. Y. Medical Journal.*

HOW TO REMOVE THE HUMAN HAIR.

The hirsute appendage has become so popular among men, that there is no longer the inquiry, "How shall I get rid of superfluous hair?" In fact, the great study seems to be with them how to perpetuate its growth, and many a gallant young man, as well as gay old gentlemen (who are not Absaloms in this particular), would pay liberally for a head-wash capable of increasing the quantity and quality of the hair. Not so, however, with the fair sex; they consider the growth of hair on the upper lip, upon the arms, and on the back of the neck, detrimental to beauty. Sometimes nature is a little too lavish in this respect; and many an otherwise fair one, fearing to be classed with the sterner sex, is anxious to avail herself of the most recent discoveries in science for the eradication of a useless and somewhat unseemly growth of fine hair. Our friend, Septimus Piesse, anxious at all times to aid the ladies towards perfection in their personal attractions, says those who are troubled with such physical indications of good health and vital stamina, have long had recourse to *rusma* or depilatory for removing it. This and analogous preparations for the toilet of beauty were introduced to us from the East, *rusma* having been in use in the Persian and Turkish harems for many ages. Burnett, the botanist, says that the juice of the leaves of the *hernandia sonora* is found to be an advantageous and effectual depilatory, as it destroys the hair wherever it is employed, without pain to the skin. Knowing well how much many of our readers would value such an article, we regret our inability to test the merits of this assertion, in consequence of the *hernandia* growing only in the marshy swamps of tropical America. We can therefore only suggest the mode of destroying hair by adopting the plan in use by the fellmongers for removing the hair from peltry—that is, by lime. Caustic, or quicklime, will certainly destroy hair; but when the hair is growing upon the human skin, it requires both patience and careful application, in consequence of its action upon the skin. Take a piece of the best lime about two ounces weight, put it into a saucer, and pour on it boiling water till it slakes; spread the paste thickly over the hair to be removed, and let it remain till no longer bearable. Then take an ivory or bone paper-knife, and imitate the process of shaving; finally, wash the part, and apply a little rose cold-cream, to allay any irritation of the skin. If this be not effectual by one operation, the process must be repeated next day, even to a third operation if the hair be strong or black. A more effectual depilatory consists of lime slaked to powder, three ounces; orpiment (sulphuret of arsenic), half an ounce; well mixed and made into a paste with water, and applied as the above. This preparation must, of course, never be used but with extreme caution. However, if there be any irritation of the skin, the application of cold cream will remove it in a few hours.—*Scientific American.*

Sting of Insects Curative.—Dr. Telephe Desmartis, of Bordeaux, France, has for some months past been making use of a most extraordinary medical remedy for the cure of certain diseases, which cannot fail to excite astonishment among those who hear it for the first time. That one disease may be cured or prevented by inoculation with the virus of another, is, as thousands of persons know, not a new idea; but there is novelty in the suggestion, that painful maladies may be cured by causing insects to sting the part affected. This is the practice which Dr. Desmartis has been applying, and which he desires to extend; and as his experiments on venemous inoculation have been carried on for fifteen years, he does not speak without experience. They have been tried on plants as well as animals, and with similar results. He observed that plants inoculated with the virus of syphilis produced small cryptogamia on different parts of their surface, and that a second inoculation, with another animal poison, cleared the plants of these parasite growths, and of the insects or *animalculæ* which they had attracted. It has long been a medical tradition that leprosy is curable by the poison of certain serpents; and it is well known that poisonous drugs are administered in medicine, as powerful alteratives in certain diseases. Dr. Humboldt, nephew of the late illustrious German, in his practice at Havana, has ascertained that the poison of the scorpion tribe is a remedy for yellow fever. He inoculated two thousand four hundred and seventy-eight men of the military and naval garrison; six hundred and seventy-six afterward caught the fever, of whom not more than sixteen died. A distinguished Frenchman, M. de Gasparin, having heard of the facts cited by Dr. Desmartis, communicated to him a fact in his own experience. He had long been afflicted with rheumatism, which kept him almost constantly infirm. One day, in picking up a handful of weeds in his garden, he was stung by a wasp on the wrist. The arm swelled; but the rheumatic pain disappeared. Seeing this result, he caused himself to be stung the next day along the seat of pain in his leg, and was again delivered from suffering, and was able to walk with ease. This happened three years ago, and every subsequent re-appearance of the malady has been cured by similar means; and by a wasp-sting on his neck an attack of bronchitis was overcome. Among other instances mentioned by Dr. Desmartis, we noticed a hopeless case of cholera in a man, and epileptiform disease in a child, both cured by the sting of a scorpion; and it appears that lachryma fistula, and some other diseases of the eye, are curable by the sting of a wasp or bee. These are curious facts. Their value will, perhaps, appear on further discussion. Dead insects and live leeches have long figured in pharmacy; but it will be something new to have to buy living hymenoptera, hemiptera, or aptera, in which orders stinging insects are found, to use as medicinal remedies. Yet, after all, there may be nothing new in it; for, as M. de Gasparin remarks, are we not told that Mucianus, an important commander under Vespasian, used to carry about with him, enveloped in a white cloth, a certain insect to cure him of the eye disease, to which he was subject?

Bdellatomy.—Taking Advantage of a Leech.—A curious practice lately introduced in Germany, is the cutting of the leech, so that the blood will flow out of his body as fast as he sucks it from the patient. An ounce, or even two ounces, may be drawn in this way by a single leech. The spring lancet is preferred, though a thumb lancet will answer. The incision is made in the side, the left side being preferable, and at the time when the leech has nearly filled himself, and just before he is ready to stop sucking. The wound is kept free from coagulated blood by a warm sponge, or even by injecting warm water into the wound. If, from rough handling, the leech falls off, it takes hold again without difficulty. The process has been named Bdellatomy (*bdella*, a leech). At first sight, it looks like taking an unfair advantage of the animal, if not treating him cruelly. But it is probably just the reverse, as it affords him an opportunity to feast longer on his rich beverage, without giving any noticeable pain. If carefully kept in clean water, the same leech may be repeatedly applied, and incised at intervals of days or weeks.—*Pacific Med. and Surg. Jour.*

Bromide of Potassium in Asthma.—Dr. J. D. Palmer, of Monticello, Florida, writes as follows to the editor of the Richmond *Medical Journal*:—

"A case of distressing asthma, of seventeen years' standing, in which the paroxysms occurred nearly every night, with occasional intervals of a week, came under my notice about four months ago. The patient had suffered many things of many physicians, and was nothing bettered, but rather grew worse. I prescribed the bromide of potassium, in twenty-grain doses, twice a day (as suggested by Dr. Begbie), and found it capable of exerting the most satisfactory influence over the disease.

"Only two paroxysms have occurred since; and they were produced by unusual exposure, together with the neglect of the remedy. I therefore cordially recommend it."

Scranton, Pa., June 9, 1868.

Dr. Nichols.—Dear Sir: Dr. Garland's article in the last *Journal*, on "The External Use of Iodine," expresses a want which has probably been felt by every member of the profession; viz., that of combining an irritating agent with iodine. I know of no irritant which can be directly combined with iodine, but respectfully submit a method of using the remedy which I have found very useful. I apply the saturated solution of iodine, and paint, while still moist, with

Argenti nitras.................................ʒi.
Aqua dis......... ....℥i.

Very respectfully yours,

C. H. Fisher, M.D.

Wonderful Perfection in Embalming.—M. Mazzini, an Italian, has discovered a new method of embalming, which far surpasses even that of Prof. Brunetti. By it, all parts of the body, solid or fluid, can be effectually preserved. In 1865, he had so completely preserved a body, that, after four months,—thanks to the extraordinary action of the "liquid reviver"!—all their suppleness was restored to the limbs, and a photograph taken, exactly resembling one taken from a living person. Even the arm of an Egyptian mummy has been restored to the appearance of a living arm. The embalmer has constructed an art eccentricity, in the form of a table composed of an extraordinary mosaic of blood, brain, bile, etc., in which are embedded four human ears and a young woman's foot. The process is soon to be made public.—*Med. Times and Gazette.*

Abuse of Atropine in Eye-Washes.—M. Siehel has an article in the *Gazette Medicale*, upon the improper and excessive use of atropine, and the illogical methods of applying. He finds a solution of 1 centigramme (.1543 of a grain) to 10 grammes (2 drachms, 34½ grains) sufficiently powerful in the immense majority of cases. Occasionally, a solution of double the strength may be required. The application should be made with a soft, camel's-hair pencil, at the *external* angle of the eye, and the lids should be kept closed for a few minutes. In this manner, the collyrium is diffused over the globe of the eye, and but very little passes into the lachrymal duct.

The Croup.—This malady so dangerous to young children, has attracted much attention of late among medical men. Dr. J. Cloquet, at a recent sitting of the Academy of Sciences, presented some interesting observations lately made by Dr. Bouchat on this subject. From these, it appears that the third period of the croup is accompanied with a general insensibility or anæsthesia of the skin, which increases as the fibrinous concretions of the larynx extend or thicken, and is not complete except when the obstacle to the entrance of air into the lungs is very considerable, and has existed for some hours. This symptom denotes the imminent approach of asphyxia, and calls for immediate recourse to the operation of trachæotomy. The anæsthesia of the skin ceases as soon as the trachæa has been opened. Dr. Jodin has also sent in a paper on the croup, in which he advocates a new treatment. Starting from the argument that the croup and all membranaceous anginæ are but parasitical affections, he contends that they require neither general remedies nor cauterizations; and that of all simple remedies, capable of removing these parasitical growths, the perchloride of iron is by far the best. It penetrates through the fungus; modifies the hemorrhagic state which always exists in the affected parts and in their neighborhood; and lastly, obliges the patient to expectorate, by which means the false membrane is expelled, and an immediate cure effected.

Physiology.—Prof. Acland, of the University of Oxford, says that every person, "whether he knows it or not—the statesman who has to consider the sustentation of the people; the religious man, that is, every one who believes in a moral government of the world, or hopes for a future state, and who has opinions on the history or origin of the human race; the animal man, who prides himself on his strength, or whose strength is to him for a fortune; the mother, rich or poor, who yearns by night and by day for the health and growth of her tender offspring; the physician or philanthropist, who desires to arrest or relieve diseases among communities or individuals of men,—each and all of them are alike interested in the steady progress of the most abstruse philosophical speculation of the physiologist, as certainly as the common rules of a healthy life which are to be safely deduced from them."

Narceine.—Dr. Da Costa, in the first volume of the *Penn. Hosp. Reports*, has an article upon this alkaloid, and, from a series of very carefully conducted experiments, concludes that its action is very uncertain, and often palpably inert.

Gum Arabic.—Gum arabic is perhaps the oldest and best known gum. It is obtained from the Arabian acacia, and many persons suppose that the *shittah* tree mentioned in the Bible in connection with the building of the temple was the acacia. The gum of this tree exudes in a liquid state from the trunk and branches, and hardens by exposure to the air. The largest quantities are obtained from the trees in the hot and parching months of July and August; and the more sickly the tree, the more gum it yields; and the hotter the weather, the more prolific it is. It is stated that pearls are formed in oysters by the secretion of crystalline matter caused by wounds; hence, these gems have been called "the tears of the oyster." Upon the same classic basis, gum arabic may be truly called "the tears of the acacia." Many persons suppose that this substance is found exclusively in Arabia; but this is not the case. It is also obtained in Egypt and various other parts of the Turkish empire. It occurs in globular pieces or tears; its color is generally a pale amber, and it is inodorous and brittle.

Gum arabic dissolves in both hot and cold water. Leibeg holds this gum to be a hydrate of carbon, and expresses its composition by the formula, C^{12}, 11HO. When boiled with very dilute sulphuric acid, it is converted into grape sugar; borax coagulates it, and alcohol precipitates its *arabin* in a white mass from its solutions. It is much used in medicine as a demulcent, and usually forms a component part of cough lozenges. A small piece of it, if allowed to dissolve slowly in the mouth, tends to allay a troublesome cough, by diminishing the irritation of the fauces, as it sheathes the affected part from the atmosphere and dilutes the acid secretions. It is, therefore, a very excellent and mild substance to use by persons who have throat affections. It is also an excellent sustainer of life, as a food. The native Kaffirs sometimes live upon gum for many days during long journeys in the desert. Formerly, gum arabic was much used as a vehicle of colors in printing; but it has been superseded by dextrin.

Compound Almond Lotion.—Hermann.

Blanched bitter almonds...................... ℥i.
Orange-flower water .... ℥ii.
Rose-water .... ℥viii.

Make an emulsion, filter, and add

Muriate of ammonia .... ʒi.
Tincture of benzoin .... ʒii.

An excellent lotion for softening the skin, preventing chapped hands, etc.—*L' Union Medicale.*

Lime Inhalation in Croup.—Learning the favorable results, through the *Reporter*, of Dr. Wilson's treatment of pseudo-membranous croup by lime inhalation, I concluded to make a trial of this therapia, the first opportunity given. On the 18th of last month, I was called to see a little girl four years old, suffering for thirty-six hours from fully developed membranous croup.

The ringing cough and stridulous breathing (two pathognomonic symptoms of croup) had existed twenty-four hours before my first visit. Free and frequent emesis had taken place from the administration of ipecac., but gave no relief.

The condition of the child was truly alarming when the lime inhalations were commenced. Pulse frequent and feeble; respirations hurried, and dyspnœa intense; voice whispering, and disinclination to speak; deglutition quickly performed, and much eagerness to drink. We at once made a room for our purpose, by placing chairs into a circle, and covering them with quilts, under which we placed the mother, with the child in her arms.

Lime—unslaked—was put into a pitcher, and it placed at the side of the mother, when free vaporation was kept up for twenty minutes, and, to our great satisfaction, the patient was relieved—yes, I may say, cured; for she continued to improve rapidly, and in a few days was well. Other means were used; but the vapor of lime, I believe, saved the patient.—*J. R. Holloway, M.D., in Med. and Surg. Reporter.*

Miasmatic Emanations.—Dr. Jules Lemair, who, for many years past, has been examining the theory of miasma, ferments, virus, mirosine, etc., according to which they are considered to be albuminoid substances modified by oxygen, has arrived at the conclusion that this is an erroneous view of the question, and that its author, Baron Liebig, confounds, under the generic name of ferment, agents of an essentially different nature; that his doctrine contains some contradictions, and is insufficient to explain various known facts, as well as certain new ones due to Dr. Lemair. We cannot, of course, enter here upon a minute inquiry, but will simply describe one of our author's experiments, which will be found of general interest. In one of the rooms in the barracks of Forts de l'Est, near St. Denis, and inhabited by voltigeurs of the Garde Imperiale, all young and vigorous men, he placed a frigoriferous apparatus of his on a table a meter in height, all the windows and doors being closed as soon as the soldiers were in bed—that is, 9 P.M. A similar apparatus was placed in the open air, at the same altitude, for the sake of comparison. This was for the purpose of condensing the aqueous vapor of the air, and examining it through the microscope. At four o'clock in the morning, this operation commenced. The water collected in the open air had the taste of the pure element, and presented nothing extraordinary. The case was different with that collected in the room. It had the smell of confined air, and the microscope revealed in it a considerable number of transparent spherical, ovoid, and cylindrical bodies, their dimensions in length and breadth varying between two and three thousandths of a millimetre. They were microphytes and microzoaria in a state of incipient development. Six hours after condensation, their number was found to have increased; there were thousands of them in a single drop of liquid. There were various bacteria of the termo and punctum species, and numerous vibrios were moving about in every direction. There was also a monad described by Ehrenberg, and which Dr. Lemair thinks might be the cause of the typhus fever. Enough has been said, we believe, to show the importance of ventilation in a hygienic point of view; since, in the opinion of the author, which appears to be satisfactorily confirmed by experiment, these minute creatures, which are so easily generated, are the cause of many diseases, the origin of which remains otherwise unexplained.—*Gulignani.*

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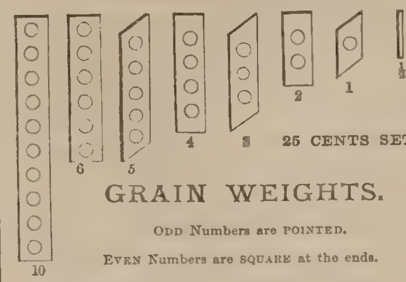

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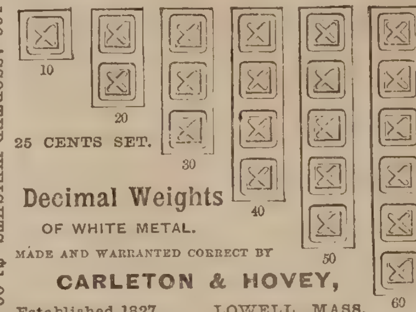

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DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. III.—No. 2.] BOSTON, AUGUST 1, 1868. ISSUED MONTHLY, AT FIFTY CENTS PER ANNUM.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

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Contents.

Familiar Science.

CHEMISTRY OF THE DWELLING.

BY THE EDITOR.

The chemistry of the dwelling is a subject which should interest every person living in a civilized country, and surrounded with the household blessings and comforts which science and art confer. And yet how few there are, comparatively, who have studied or inquired respecting the chemical processes going forward, and the devices and appliances of modern science, which contribute so directly to our well-being and comfort within the walls of our own dwellings. Let us, while perchance the storm howls fitfully without, draw closer around the parlor fire, and consider, for a little time, the wonderful and beautiful chemical processes which we witness upon either hand, and which, if suspended for a single day, would be productive of so much discomfort and danger. Without the intense diffusive light proceeding from the burning of the oil, or wax, or spirituous liquid upon the table, or of the invisible gas from the suspended jet, we should be unable to gaze upon each other's happy faces, or read the pages of a book, or pursue, after nightfall, the usual avocations of the family. Without the blazing coals within the grate, or the wood upon the hearth, or the warm air or steam passing into the room through the proper channels, we should become chilled and benumbed with cold, and disease and death would supervene.

We are all constant chemical experimenters, although we may be unconscious of the fact. The lecturer, surrounded with his strange compounds and curious apparatus, delights us with his attractive and brilliant experiments; and yet, there are but few more interesting or wonderful than we perform in lighting our parlor fires, preceded, as the act usually is, by the ignition of a common match.

Fifty years ago the lighting of a match by the slight friction necessary, would have been regarded with amazement, and any public exhibitor of the experiment might have been punished as a necromancer. There are thousands living, whose knuckles have been torn with the old flint and steel, who remember the progressive introduction of quicker and better methods of producing fire. Our grandfathers, when the tinder in the horn was damp and obstinately determined not to "catch," were accustomed to take down the old "King's-arm" from its dusty resting-place upon the wall, and flash gunpowder by the aid of its massive, rusty lock, thereby procuring fire to warm their breakfast of porridge or johnny-cake. It was no unusual occurrence to hear a report, and see the big powder-horn fly up the chimney simultaneously with the click of the lock, as our grand-parents, with all their virtues, were *careless*, like other men.

In this advanced age (thanks to chemical science), we have a more excellent way; and now let us, as a matter pertaining to the chemistry of the dwelling, describe briefly the history and chemistry of the friction match. The invention of the phosphorus match was preceded by others less convenient and more uncertain in their character, but all a vast improvement upon the flint and steel. The history of the match forms no exception to the rule, that all discoveries are progressive in their nature; that all products of the inventive faculty must pass through the chrysalis state before reaching entire perfection.

While people in affluent circumstances in cities were indulging in the use of the *fire syringe* and the *acid bottle*, to produce fire, contrivances which were regarded as marvels in science, there appeared, about thirty years ago, in the market, a little square paper box, containing two dozen strips of wood with a mass of black, ugly-looking composition upon the end of each.

A piece of sand-paper was found carefully folded in the top of the box. One of these matches, drawn rapidly through the sand-paper, ignited with a slight report. The price per box, upon their first appearance, was one shilling, and the manufacturers were busy for a time in supplying them at this exorbitant price. The sensation created by their appearance was about equal to that produced by Franklin, at the time of his discovery of the electricity of the clouds, nearly a century since. These were the famous Lucifer Matches, the worthy predecessors of the friction match of the present time. Perhaps it would have been better that invention had gone no further; certainly, this method of producing combustion was rapid and easy enough; but some considerable pressure was required to produce the necessary friction, and sometimes the top was pulled off without being ignited, the sulphurous antimonial vapor was regarded as pernicious to persons with weak lungs; and so, upon the appearance of its great rival, in a few months it fell into entire neglect.

In obtaining fire, or causing combustion, the most ready method is by the use of friction. The spark following the stroke of the flint upon the steel is produced by friction. A minute portion of the steel is clipped off by contact of the flint, and it is rendered incandescent, or heated to a white heat, by the concussion; this, falling upon tinder, or a thin film of carbon, sets it on fire.

Friction raises the temperature of bodies, and some bodies burn at so low temperatures, that the slightest movement across a rough surface is all that is requisite to cause them to burst into a flame. Sulphur and phosphorus are bodies that inflame at low temperatures, and these are consequently employed in the manufacture of matches.

The latter is a most remarkable element; its greediness for oxygen is so great that it attracts it, and burns spontaneously in contact with air. In the manufacture of a phosphorus match, a splint of light wood is dipped in melted sulphur, after drying, it is again dipped in

softened phosphorus. If left in this condition, it would be vastly more dangerous than in its finished state, and would be entirely unsafe to harbor in our dwellings. To prevent spontaneous combustion, and protect the phosphorus from contact with air, the match is again dipped in gelatine or glue, which is the third and last coating it receives. In igniting it, the friction disrupts the film of glue, raises the temperature of the phosphorus so that it burns—this in turn ignites the sulphur, that the wood, and thus the beautiful experiment of producing instantaneous flame is complete.

The discovery of phosphorus, and of easy and rapid methods for its manufacture or isolation from the bones of animals, is among the most striking and important of the triumphs of chemical science. How apparent the wisdom and goodness of the Creator, in calling into existence an element of such singular properties, so inflammable that the warmth of the hand is sufficient to cause it to burst into flame! As if fearful that so dangerous as well as useful a substance might prove an enemy rather than a friend to the race, before progress had been made in the arts of civilized life, He diffused it very sparsely in the ancient rocks in such condition as to be entirely unobtainable without the aid of science. The conditions upon which we, with all our skill, are enabled to procure it in quantities, are peculiar. We do not go to the rocks for it, but are compelled to wait until, by the operations of nature, it is dislodged from them, and fitted for plant aliment or food. Transferred from ancient lavas and plutonic masses, to plants, it is consumed by animals, and, passing through the circulation, it finds a resting-place in the bones, from which, by calcination and other processes, the chemist obtains it in large quantities. How circuitous is the path it travels before it finds lodgment upon the end of a match! Truly, we cannot but regard a thing so common with interest, when we remember its origin and chemical history.

In the ignition of a match, we have set in motion a series of changes which have resulted in the *burning* or destruction of its substance. In its employment to ignite the combustibles in the grate, or to light the jet of gas, or the candle, or lamp, we have thereby caused an activity of slumbering chemical forces, which are slowly producing in those bodies similar changes. We notice that they continually waste away—we see the ashes cleave off from the mass of coals or wood, the falling of the line of oil in the lamp, and the candle's flame burns lower and lower until it reaches its socket—and expires. These changes we notice, and, untaught by science, should be left to suppose that we had destroyed or annihilated a small portion of the materials of God's universe. Science teaches that this is entirely beyond our power. However strong and mighty man may be in modifying or controlling the elements created by Omnipotence, he can never create or destroy a single atom.

Since that auspicious moment when sunlight burst through the chaotic darkness which enveloped our planet, we have reason to believe that nothing has been added to or taken from its mass.

If our sense of sight was competent to observe the invisible operations of nature, we should see in our parlor fires not only the flame, and the smoke, and the ashes, but those subtle exhalations, the products of the burning, which pass up the chimney and become dissipated in the ocean of air without.

How apparently desirable would be an acuteness of the visual organs, so that we could see the little infinitesimal atoms of matter grouped and compacted together, forming coal, and oil, and wax, and tallow, all ready for the warm embrace of the oxygen of the air, which, by uniting, rends them ruthlessly asunder. Seated in our parlors, we could watch at our ease the elemental changes, the dissolution, and the new birth of bodies during the process of combustion.

From an enumeration of the different kinds of little atoms or elements in the wood, coal, gas, oil, tallow, and wax, we learn that out of the sixty, which the Creator employed in constructing the world and all things therein, he has made use mainly of but *three* in forming these substances. Therefore, in all that concerns the chemistry of light and warmth, we have to study the changes and modifications of but three different kinds of materials—a field apparently circumscribed and easily explored.

The gas, oil, tallow, etc., differ in composition from wood and coal in being formed from carbon and hydrogen only, without any ash-forming elements. These two are grouped together in slightly varying proportions, by the burning of which we obtain light and heat. The burning of these two elements is produced by a third body rushing in whenever the temperature is raised to a certain point, and, violently uniting itself with them, producing, by the union, extraordinary warmth; which, diffusing itself, is very agreeable to our cold, benumbed bodies in winter.

This third powerful combatant or element is *oxygen*, the most important and essential of all the material creations of the Great Architect. It is gaseous in its nature, and, although unseen by human eyes, it plays a most conspicuous part in the great operations of Nature. Its importance may be understood by a contemplation of the fact, that, in connection with nitrogen, it forms the vast volume of the atmosphere, and, in combination with hydrogen, water, which, in the shape of oceans of unknown depths, lakes, and rivers, occupies three fourths of the surface of our planet. The solid earth we dwell upon is chiefly made up of oxygen, in union with silicon, aluminum, and calcium, the metallic base of lime.

The carbon and hydrogen materials burned in the parlor are seized and consumed by the oxygen ever present in the air. It exists there in a free, æriform condition, and seems to be ever upon the watch for heat-producing agencies, so that it may be enabled to fix its corrosive teeth upon the wood or coal to rend them asunder.

We wish to observe the changes attendant upon the process of burning, from the beginning to the end. We have learned from experience that wood takes fire and burns more readily than coal, and chemistry affords the reason. It is because it contains a greater number of inflammable atoms of hydrogen than coal, and the softer the wood the easier it ignites; hence we place splints of wood or shavings at the bottom of the grate, and upon this the coal. The hot hydrogen flame of the wood soon ignites the hard carbon of the coal, and the whole is in an active state of combustion. The invisible oxygen around the pile rushes in, drawn by an irresistible affinity; the infinitesimal atoms of hydrogen yield first to his embrace, then the carbon, and both, by the union, are instantly metamorphosed or changed into new and very different bodies.

These new bodies that are produced are called the *products of combustion.* In this hot contest for new combinations, we notice that it requires eight atoms of the oxygen to master one of the hydrogen; seven, six, or five cannot appropriate the single hydrogen atom to form the desired union; the eight join themselves to the one, and the nine, with the rapidity of the lightning flash, are changed into an atom of *water.*

The carbon of the coal and wood unites with the oxygen of the air in two proportions. When atom joins atom, a new substance, called *carbonic oxide*, is produced; but when two atoms of oxygen join one of carbon, a sour, poisonous body results, called *carbonic acid.* These three *new* bodies, the water, the carbonic oxide, and carbonic acid, become heated and ascend the chimney-flue, and diffuse themselves through the air without.

In the escape of these bodies, we lose no substance that can be more completely burned or changed, with the exception of the carbonic oxide. This gaseous body can and should be burned again before it is allowed to escape, for it is capable of affording us a further supply of heat. If we can compel the carbon, by increasing the heat, and opposing barriers to its escape, to take up two atoms of oxygen instead of one, we thereby burn or oxidize it completely, and we obtain all the heat possible. If the wood or coal were burned *completely*, there would be but *two* products of combustion besides the ashes; viz., water and carbonic acid. This important matter of the proper method of burning coal will be alluded to again.

The ashes we observe cleaving off from the fuel contains the earthy matter which the tree obtained from the earth during growth. Besides silex, or sand, the ashes of wood contains potash, so important in the manufacture of soap. In coal there is usually found a trace of sulphur, which, in burning, unites with oxygen, forming sulphurous acid.

Let us look at the coal and the wood upon the hearth with our vision quickened and perfected, so that not only will the composition of these substances be apparent, but the whole process of burning also. In the coal we observe black *carbon* predominating in the aggregation of atoms. In the hard anthracite there are ninety-one little atoms of carbon in the hundred to nine of other elements. The nine are seen to be hydrogen, and those that form the ashes. We notice a difference in a soft bituminous coal, there being a less number of carbon atoms and more hydrogen.

Wood, although entirely different in color, is seen to be made up of the same elements. Hard wood, like oak and hickory, have the larger; while soft pine and maple have the smaller number of atoms of carbon. All varieties of wood, however, have a much larger amount of inflammable hydrogen than the hard varieties of coal.

A beautiful experiment, indeed, do we perform in instituting the process of combustion. Interesting and attractive as it is in itself, how seldom should we indulge in it, did not the necessities of our existence demand its constant repetition! The production of *heat* is the great end we have in view in kindling and maintaining our parlor fires. Man, in a savage state in tropical climates, is quite independent of the uses of fire; but such is not the case with civilized man. He finds it necessary in the preparation of his food, although the body is heated by the intense solar rays of the tropics.

Heat is a constant attendant upon the burning process. Whenever and wherever the element oxygen joins itself to hydrogen or carbon, or any of the inorganic elements, as iron or zinc, the union is attended by the evolution of heat. These elements will always rush together, and burn and destroy each other when circumstances permit. There is a class of compounds denominated oxides or rust. Oxygen, uniting with iron, forms rust of iron. In the union of the one with the other, a fixed amount of heat is evolved, no matter whether the rusting process goes on slowly or rapidly. The

iron implements and vessels found at Pompeii, which have been slowly burning or rusting for eighteen centuries, have evolved as much heat in the process as would have resulted, had they been burned simultaneously in an atmosphere of pure oxygen. The process of decay in vegetable substances is an oxidizing process, and heat is evolved. Water, properly speaking, is the rust of hydrogen, and in its formation, by uniting with oxygen, an enormous amount of heat is developed. The union of the oxygen of the air with the coal in the grate, or the wood upon the hearth, produces the same phenomenon. It would be gratifying to know more of the nature of heat, and also of light and electricity; but, since it is denied us, we may indeed be grateful that the beautiful principles and changes involved in combustion are so clearly unfolded by science.

The fallacies of past ages, as it respects correct knowledge of natural phenomena, are in no way more forcibly illustrated than in the prevalent theories respecting combustion. Before the discovery of oxygen gas, it was explained by supposing that all bodies contained a principle called *phlogiston*, the presence of which enabled them to burn. When the body burned, it was supposed phlogiston was liberated, and that when it lost phlogiston, it ceased to be combustible; it was then said to be *dephlogisticated*. The heat and light which accompany combustion were attributed to the rapidity with which the principle was evolved.

If such an hypothesis were correct, the coal or other burned body ought to weigh less after the process; whereas it was found that the results of combustion were *heavier* than before the combustion took place. As soon as methods were devised by which the three great classes of acids, alkalies, and oxides, the products of combustion, could be secured and examined, the theory was disproved.

There is no known method by which heat can be measured. The heat evolved depends not upon the coal or wood, but upon the quantity of oxygen which enters into combination with them in burning. The oxygen supplied to the coal or wood, is obtained from the room or apartment in which the burning process is going forward. This, of course, would soon fail to furnish the requisite amount to the fire, were there no sources of supply Through some avenue, the air from without must find its way into the parlor to feed the fire, and furnish oxygen to the lungs of the occupants. The usual places of ingress are the cracks and crevices of the doors and windows. A window, with the usual accuracy of fittings, will allow about eight cubic feet of air to pass into the room each minute; an ordinary door will admit rather more if it open directly into the air. When we reflect that each individual in a room ought to have at least four cubic feet of air per minute for respiration, and that during the evening every source of flame as large as one candle vitiates one cubic foot more, we see how important a good supply of air is for other purposes than to afford oxygen to the fire. I would not wish to be understood to say that each individual's respiration converts the oxygen of four cubic feet of air into carbonic acid each minute, but that that amount is rendered unfit for further respiratory use; every pound of hard anthracite coal burning in the grate absorbs from the air in the room about two and one half pounds of oxygen, and at least fifteen pounds of air is deoxygenized to furnish it. A parlor of common size, twenty feet by thirteen, and ten feet high, contains about two hundred pounds of air; it is evident, since three and one half pounds of carbonic acid are produced from each pound of coal, that, if it were permitted to permeate the room, it would render one fourth part of the air, at least, poisonous. This, diffused throughout, would cause death to the inmates in a short period of time.

How impressive the fact, that by the marvellous chemical processes which we are obliged to institute to render our climate habitable, we call into existence an agency which is potent to destroy almost instantaneously! If, upon a cold winter's day, we consume, in our parlor grates or stoves, twenty pounds of coal, there has been poured out upon the air seventy pounds of poisonous carbonic acid, which would render irrespirable, if not diffused beyond a point contaminating and destructive, about two hundred and eighty pounds of air. When we contemplate this fact, and reflect upon the thousands and tens of thousands of open ducts, which are pouring out the poisonous exhalation in enormous quantities in large cities, a momentary feeling of apprehension pervades the mind, and the knowledge that the specific gravity or weight of the deadly gas is greater than the air, does not diminish that apprehension. But chemistry dissipates our fears, and points to the wonderful provisions of the Divine Author to avert the apparent evil.

If the heavy carbonic acid so copiously evolved, were simply to obey the natural laws of gravitation, and descend into the streets of cities and large towns, a most dreadful asphyxia would instantly seize upon every man, woman, and child, and in the short space of a few moments, not a breathing inhabitant would remain. But the law of gaseous diffusion comes in here, and shows us that there is a "higher law" than that of gravitation, which is intended for our preservation. By its irresistible agency, the heavy poisonous gas is not permitted to fall, but, at the moment of its production, it is blended and diffused through the mass of air, upwards as well as downwards, and is wafted by the winds in all directions. The wonderful nature of this law of gaseous diffusion is forcibly illustrated by experiment. If we take two gases of most opposite qualities, as it respects weight, carbonic acid gas and hydrogen, and place them in two vessels communicating with each other by a narrow tube, we shall find in a very short time that perfect mixture has occurred. This will take place if we reverse the order of their specific gravities, by placing the hydrogen in a higher vessel, and the carbonic acid in the lower; a wet membrane may divide them, and we shall prove that there is a strange tendency to unite. Carbonic acid is more than twenty times heavier than hydrogen, and it would seem that while the tendency of the former must be downwards, the latter would be upwards. But such is not the case; they shortly become thoroughly blended together. This law holds good in the mingling of all gases of different densities which have no chemical action on each other.

Thus is carbonic acid equally diffused through the whole atmosphere. There is enough constantly present in all parts of it to form a stratum or bed, thirteen feet thick, over the entire earth, should it descend and occupy that position. It is not necessary for the mind to revert to fire, as an agency more potent than others for the destruction of the race. The terrible nature of such a layer of heavy irrespirable gas was most forcibly illustrated to the mind of the author by an examination of the great vats filled with it to the brim in the immense brewery establishment of Messrs. Barclay & Co., in London. A plank was displaced by the attendant, and it was allowed to flow over the side, like water over a fall; and a single inspiration produced vertigo and other unpleasant consequences. At the celebrated *Grotto del Carni*, near Naples, a dog is often thrown into a cave filled with the gas. After a few painful respirations the poor animal is apparently devoid of life, but subsequently recovers, upon being dragged to the pure air without. The experiment is a cruel one.

Whilst the carbonic acid, resulting from the chemical changes of the coal and wood of our parlor fires, is so fatal to man, it is absolutely indispensable to the existence of vegetable life; and if it were withdrawn from the atmosphere by being absorbed by water, or in any other unusual way, the latter must cease from the earth altogether, and with it all animal life. Plants depend in a great measure for their sustenance upon the atmosphere; and the carbon of the wood and coal which we have watched through the changes attendant upon combustion, and which resulted in the production of a poison, is obtained by the plants from the air by decomposing the same deleterious body.

Paradoxical as it may seem, it is quite evident that we are dependent for *life* upon the very poison which is so pregnant with *death*. The production of carbonic acid from the various sources upon our planet, is so marvellously balanced by the demand for the same for plant aliment, that there is no perceptible change in amount in the air from year to year, there being unformly about one two-thousandth part by measure present.

It is evident, from the foregoing facts, that while the products of fire may be safely discharged into the air, it would be productive of the most fatal results to allow them to escape into the rooms of our dwellings, to be breathed into the organs of respiration. The ingenuity of man has devised an arrangement of flues which subserve the double purpose of conveying away the noxious gases and creating an upward current of air, which, passing through the ignited materials, draw oxygen towards them, and increase the intensity of the flame.*

The Nutriment of Beer.—People who drink their ale and beer are very fond of telling how much nutriment they derive from them. Because they are manufactured from grain, many have the idea that the concentrated virtues of the grain are in the drinks. This is an entire fallacy. Professor Liebig, one of the most eminent chemists in the world, assures us that 1,460 quarts of the best Bavaria beer contain exactly the nourishment of a two-and-a-half-pound loaf of bread; This beer is very similar to the famous English Allsopp's, and our more popular American beer. The fact is, the nutritious portion of the grain is rooted out before beer can be made; and if the fermentation of the beer has been complete, Professor Lyon Playfair declares that no nourishment whatever remains in the fermented liquor; and, as the English *Alliance News* says, "No chemist now disputes this assertion; for, except in flavor and amount of alcohol, the chemical composition of all kinds of beer is alike, and brewers must laugh to hear doctors advising porter as more nourishing than beer, when porter is nothing but beer colored by burnt malt; and often when beer goes wrong in the making, and is unsalable as beer, it is converted into fine porter, the mere color covering many defects.

Castile Soap—It appears that but few persons are aware of the radical difference between genuine Castile soap and the imitations of it. The basis of Castile soap is olive oil. But if you buy your oil, it will cost more than the soap will sell for. So the manufacturer takes the marc (the "cheese," cider makers call it) from which all the oil has been pressed that profitably can be, and washes out the remainder with a solution of soda. Thus he utilizes a waste product. American Castile soap is a palm oil soap that resembles the real article in color only. At the present price of gold the importer can put Castile soap on the market at about seventeen cents per pound.

* From "Chemistry of the Farm and Sea," by J. R. Nichols, M.D.

Agriculture.

FUNGI, OR SMUT.

The farmer, in passing through his fields of corn or wheat, has his attention often arrested by ears of the grain which have undergone a most singular metamorphosis or change. In place of the sound kernels, he finds a huge black excrescence, composed of what seems to be an impalpable, sooty dust, which soils the fingers and clothing when brought in contact with it. This smut, or fungoid growth, is a very remarkable production, and, regarded from every point of view, seems to be devoid of all use — a thing to be hated — an abomination. The mass of sooty dust is a regular plant, of most singular and complex structure, and possessing a reproductive power hardly excelled by any vegetable or animal organism. As though the chances of the hateful thing for multiplying itself were not great enough with ordinary organs, it has conferred upon it three or four different modifications of the function. They may multiply themselves by means of the spawn, or mycelium, by self-division or lamination, which may be regarded as a species of germination, or they may be propagated by seeds or their equivalents, produced in special receptacles. Every cell or tissue may contain its germs, and each germ springs up into new forms, equally fitted for propagation, in a few hours or minutes. While examining some of the cells under the microscope, they are observed to pass through the course of their existence, and give birth to thousands of new organisms.

The number of germs or other reproductive bodies which parasitic fungi produce, is incalculable — almost infinite. One grain in weight of the black matter found in place of the ear of corn, contains upwards of *four millions* of spores, or seed-vessels, which are again filled with sporules so minute that the highest powers of the microscope fail to distinguish them.

Doubtless the reader, if familiar with farm-work, and a keen-sighted observer, has often seen a kind of ethereal smoke or evaporation proceeding from the diseased heads of grain, when moved by a gentle breeze. This apparent vapor is formed of the millions upon millions of the seeds of the fungi, which, proceeding from the ruptured vessels, float like an airy cloud or gossamer veil, whither the winds may drive them. The atmosphere is loaded with these germs in the latter days of summer; and, if it were not for a wise provision connected with their fructification and growth, fungus, or mildew, would spread over the vegetable world like a pall of death. Nothing but fire or strong acids seems competent to destroy the seeds, so tenacious are they of vitality. Summer's heat nor winter's frost cannot kill, nor water drown them.

Fortunate indeed is it, that they require peculiar atmospheric and other conditions for their *growth*. If these are not favorable, they will not spread or develop themselves. Some seasons are peculiarly suited to the awakening of the dormant seeds which rest upon every thing, although entirely invisible to the naked eye. Last year, the fungus peculiar to the grape, called mildew, manifested itself to a fearful extent in many sections of the country, causing great loss. Sometimes the wheat crop is cut off by fungoid growths called rust; and, occasionally, all vegetable substances suffer from the rapid fructification of these strange parasitic plants.

Sulphurous acid destroys the germs; and this we secure by the application of sulphur to leaves and fruits before the pest fairly manifests itself. Under cover, in glass structures, it can be completely mastered by proper care; but, out of doors, the ruin can hardly be averted.

OBSERVATIONS UPON THE FARM.

Corn is looking badly at the farm. The seed was not under the soil until the first of June. It came up feeble, and then the cut-worms took it; and what the worms left, the cowardly crows pulled up. This necessitated a second planting, and so it has struggled along. If any society awards a premium for a poor show of corn, we shall certainly get it. Corn in Massachusetts and New Hampshire is generally looking well, and is nearly as forward as in former seasons. Never, within the memory of any one, was there a season so wet and cold as the present up to the middle of June. It is wonderful how rapidly vegetation comes forward when the heat of summer commences.

Wheat is looking finely. No rust nor insect has attacked it; and the heads are fully formed, and bending under the accumulation of rich nutriment rapidly passing into the kernels. We expect more than thirty bushels to the acre. Why do not farmers sow more wheat? The apple crop promises well. The russet, baldwin, and nonesuch trees show a fine burden of fruit, for which, after our long apple famine, we are duly grateful. Grapes are very promising. The vines are vigorous, and loaded with fruit; and if the season is long and warm enough to mature it, the yield will be a valuable one. We have the Concord, Delaware, and Hartford Prolific, growing in the same vineyard, under the same treatment; and all have been so successful, we are not yet fully prepared to say which we prefer for vineyard culture. It is certain no other varieties are worthy of the slightest regard for general planting in this climate. The Concord is a hardy and good grape, and gives us prodigious crops. It has ripened fairly with us the past four years, and we incline to give it the preference. We doubt if any cultivator can show a more thrifty or productive vineyard; and yet our method of treatment is peculiar. Not a spoonful of animal excrement or barnyard manure has been applied to the soil. The elements which the grape requires, and they alone, in mineral form, have been supplied. We reserve this topic for further remarks at another time.

As regards grapes under glass, they are in fine condition. A new variety which we are cultivating has proved very satisfactory — the *Decandole*. The vine is thrifty, the fruit excellent, the bunches large and well-shouldered; and it is a constant bearer. We advise our readers to try this grape under glass.

Haying is now (July 15th) well advanced, and the crop will prove a heavy one. The meadow, where two years ago frogs and turtles found shelter under bulrushes and giant hassocks, is now ladened with timothy and redtop, which will turn out certainly two and a half tons to the acre. A coating of sand, after grub-hoeing the bog, has worked the striking metamorphosis. What more profitable work can farmers engage in after haying, than reclaiming worthless meadows?

Potatoes, we fear, are going into a rapid decline. The tuber consumption, called "rot," is manifestly making its appearance, and the early varieties are losing their foliage. If the ingenious French chemist and agriculturist, M. De Ville, has discovered a remedy for this disease, as alleged, let us have it at once. From present indications, we fear the crop in this section will be a sad failure. The root crop does not appear well, the carrot and turnip suffering from some disease (probably of a fungoid nature) which arrests growth in the early stages. The crops later sowed may possibly do better. From a general survey of the crop burdens mother-earth is carrying forward to maturity, we feel that husbandmen have reason to be thankful and take courage.

Potash in Agriculture. — It is well known that plants need potash, which is, indeed, found in their ashes. Although it appears that most soils are richly charged with it, yet but little of it exists in such a form as to be readily assimilated by the plant. It exists generally in the soil as feldspar (silicate of alumina and potash), which is with difficulty attacked by the strongest mineral acids. By the action of the weather the potassa is, of course, extracted from it, but by a slow process. Formerly, when the land was left to lie fallow, this answered the purpose; but with the present increased population and more exhausting cultivation, this will do no longer. Hitherto attention has been mainly given to the addition of nitrogen and phosphoric acid; but it will soon be necessary to restore to the soil the potassa also, which has been removed from it.

A soil which has grown clover for some years soon yields a poor harvest. The ashes of clover, then, show but about one tenth of their former proportion of potash; and a soil which had contained 13.4 parts potassa in 10,000, then has but 3 parts. In the cultivation of the sugar beet, it has been often observed, that notwithstanding the liberal addition of phosphoric acid, the amount of sugar in the beet suddenly falls off, because the soil had lost so much potassa. It is now not essential to put carbonate of potassa upon the land, although this occurs chiefly in the ashes of plants. A soil containing alumina and lime has the wonderful property of taking up sulphate of potash and chloride of potassium and rendering them insoluble in water, while the acids combine with the lime or magnesia in the soil. But since chloride of calcium and chloride of magnesium pass into the juice of the beet, and obstruct the clarifying of the sugar, it is better to apply the sulphate of potassa instead of the chloride of potassium, since the sulphate of lime thus produced does not have an injurious influence, but, on the contrary, is of advantage, since it affords to the plant the necessary sulphur, retains the ammonia, and changes the silicate of potassa in the soil into soluble sulphate of potassa. It is, therefore, to be desired that the application of sulphate of potassa may be encouraged, since the business at Stassfurth may thus be helped, and the deposit in that place become a blessing to agriculture.

The Trades of Animals. — The following observations, which we copy *verbatim* from an "Old Curiosity Shop," have reference to animals, and exhibit their at least apparent knowledge of the sciences; also their professions, occupations, and enjoyments: Bees are geometricians; their cells are so constructed as, with the least quantity of material, to have the largest-sized spaces and least possible loss of interstice. So, also, is the ant lion; his funnel-shaped trap is exactly correct in its conformation, as if it had been made by the most skilful artist of our species, with the aid of the best instruments. The mole is a meteorologist. The bird called the nine-killer is an arithmetician; so, also, is the crow, the wild turkey, and some other birds. The torpedo, the ray, and the electric eel are electricians. The nautilus is a navigator; he raises and lowers his sail, casts and weighs his anchor, and performs other nautical evolutions. Whole tribes of birds are musicians. The beaver is an architect, builder, and woodcutter; he cuts down trees, and erects houses and dams. The marmot is a civil engineer; he not only builds houses, but constructs aqueducts, and drains to keep them dry. The white ants maintain a regular army of soldiers. The East India ants are horticulturists; they make mushrooms, upon which they feed their young. Wasps are paper manufacturers. Caterpillars are silk spinners. The bird ploceus textor is a weaver; he weaves a web to make his nest. The primia is a tailor; he sews the leaves together to make his nest. The squirrel is a ferryman; with a chip or piece of bark for a boat, and his tail for a sail, he crosses a stream. Dogs, wolves, jackals, and many others, are hunters. The black bear and heron are fishermen. The ants have regular day laborers. The monkey is a rope dancer. The association of beavers presents us with a model of republicanism. The bees live under a monarchy. The Indian antelopes furnish an example of patriarchal government. Elephants exhibit an aristocracy of elders. Wild horses are said to select their leaders. Sheep, in a wild state, are under the control of a military chief ram. — *Once a Week.*

Beet-Root Sugar. — During the last twenty-eight years, the production of the cultivation in France of the sugar beet-root has advanced from 22,000 tons to 222,000 tons. The total annual product in European countries amounts to 638,500 tons, and now produces more than one fourth of all the sugar known to be consumed in the world. Indeed, the success now uniformly achieved on all sides shows that, though the same causes which long retarded the progress of the beet industry in France will more or less obstruct it elsewhere, nevertheless its ultimate triumph is certain in every country where it is introduced with care and cultivated with reasonable patience and skill.

Arts.

CURIOSITIES IN NATURAL HISTORY.

The stranger in Boston, by going down Boylston Street, past the Public Garden, and continuing on two blocks further, to the corner of Berkeley Street, will come to an elegant building, in classic style of architecture, adorned with Corinthian pilasters and capitals, the basement walls of granite, the main floor walls of freestone, and the two upper stories of brick. This is the building erected by the Boston Society of Natural History, on ground given by the State of Massachusetts. The edifice has cost one hundred and twelve thousand dollars, and its plan includes the future addition on the rear of a slightly smaller structure. It is ninety-five feet wide by one hundred and five long, and rises to a height of eighty feet at the top of the pediment.

Without this building is decorated with heads of animals, carved in stone on the keystones of the window arches, — heads of the lion, the bear, the boar, the zebra, and others; and on the broad buttresses on each side of the grand steps at the centre of the front, it is intended eventually to put an elephant and a rhinoceros of stone, of life size. Above the lofty doorway is a massive eagle in stone, and on the friezes of the second story stand forth the busts of three great naturalists — Aristotle, Linnæus, and Cuvier. So it is that the outside of the building is itself a gallery of art, typical of the specimens of divine art within.

When a man enters the main door, he finds himself in a broad vestibule. Glimpses up the grand staircase will tempt him, where he sees the skeleton of a mighty elephant thirty feet above, looking ready to dispute the passage to the immense hall in which the creature stands. But the visitor will turn aside, first, to look at the broad slabs of rock of various descriptions, on which are the footprints of former times — footprints of aquatic and peripatetic birds, that ages ago wandered over soft beds of mud and marsh; fossil footprints that became stereotyped forever when the mud hardened into rock, to be preserved tens of thousands of years, for the study of seekers after revealed truth in the latter days.

Out of this vestibule, too, are the doors, on the one hand, into the splendid and invaluable library, filling two spacious rooms and their galleries, to which none are admitted but members. There are rooms on the same floor also opening out of the vestibule, where are not only fossils, microscopiæ, and other articles, but the magnificent herbarium — thousands upon thousands of specimens of plants, in drawers and out of drawers, including a suite of the plants collected in Franklin's arctic expeditions.

All these are less attractive to most visitors than the grand hall which fills the two upper stories of the building, which rises sixty feet in height to the arched and panelled roof, and is ninety feet in length and forty in width. To reach it, the visitor ascends the main staircase, passing first between two life-sized bears carved in walnut, which form the posts of the balustrade. Far up above frowns down the skeleton elephant in threatening attitude; but once reached, he is found to be harmless, and the visitor looks with admiration upon the Doric arcade lining the lower walls, and on the galleries that rise, tier after tier, up to the dim recesses of the ceiling. Out of this hall, and out of its galleries, are passages into eight subordinate rooms, each devoted to some branch of inquiry and illustrative specimens. Each of these eight rooms is a hall in itself; each has its own galleries; and each, like the grand hall, is bordered with cases crowded with specimens of natural history. These eight rooms include the departments of ornithology, ichthyology, conchology, crustacea, radiata, oölogy, entomology, and herpetology.

We will not attempt minutely to describe the treasures these halls contain. Hundreds of thousands of specimens of beasts, birds, shells, fishes, etc., are in the building, and each has its wonders and its beauties; but in the grand hall no eye will fail to note the skeleton of the megatherium, or mammoth sloth, or rather a cast taken from the skeleton in the British Museum. Its hind quarters rest on the ground, but its fore feet are on the limb of a tree, and its ponderous jaws are stretched up a score of feet above the visitor's head, filling him with surprise at the creature's gigantic size, and leading him to wonder and speculate on what the earth must have been when such brutes as the mastodon and the megatherium shook its immense forests with their solid tread.

On the floor of the hall and in its cases are many objects of equal interest, though less imposing in appearance, — skeletons of men and monkeys, of whales and swordfish, a fossil armadillo, six or seven feet long, objects small and objects large, each of which has its points of interest.

Of the four rooms opening from the hall floor, one is filled with ores and crystals, earths and gems, and minerals of many kinds. The hues of some of the specimens are gorgeous, particularly the malachites, the colored crystals and ores. Another contains Indian and oriental weapons, arms, and dresses, remnants taken from tombs of the mound-builders, bottled dogs, cats, rats, and other eatables, corned in alcohol, etc. But the main interest will centre in the osteological room, where are the skeletons of bisons, elk, deer, llamas, snakes, rats, etc. — beasts and reptiles large and small. And here are eighty skulls of men, and a hundred and fifty of animals, the former grinning in ghastly rows from several shelves, with nothing to tell who they were, or where they lived, — African, American, European, and Asiatic, present and past, each labelled with the donor's name and the supposed race of the deceased. Two of these are copies of the famed skulls over which antiquarians have battled with brain and pen, — one of the Enjis, in France, the other the Neanderthal skull, found in Germany, and the formation of which has led to the assertion that they were in no way connected with the present race of man, but were pre-Adamites, and existed on earth long prior to the creation of the pair mentioned in the Mosaic account as Adam and Eve; while the opponents of the theory claim that they were *lusus naturæ*, or exaggerations from accident or design. These specimens are on the second shelf from the bottom, at the left hand.

It is needless to speak of the room devoted to fishes; of that where the magnificent collection of shells, bequeathed by Miss Pratt, is to be arranged; of the cases that are to be found on the balustrade of the upper gallery containing insects; of wasps' nests and birds' nests; of eggs and star fishes, and a thousand other things. They must be seen to be appreciated.

The glory of the exhibition is that which comes last, in the upper galleries, and in rooms opening out of them, the one department in which this collection excels every other on this continent, and even that at Cambridge. The display of stuffed birds is absolutely magnificent, including over twelve thousand specimens, gathered from every empire and kingdom and province under the sun; of all sizes, from the huge condor of the Alps to the minutest and loveliest humming birds that gem the gardens of the East; of all colors, from the dun hues of the vultures and the raven to the brilliant ones of paroquets, and other tropical beauties; of all shapes and of all qualities, scores and scores of each species. No tongue or pen can describe the beauty and brilliancy of tint of many of these specimens. Hours and hours can be passed in studying them, and not half be more than casually glanced at.

We have not mentioned in this article, for want of room, many minor points of interest — the elegant lecture-hall, the dozen work-rooms, the printing-room in the basement, the store-hall, the collections of specimens packed away, which it will take years to develop and arrange. All we can say on these points or in conclusion is, that on every Wednesday and every Saturday the edifice is warmed throughout, and is open to visitors from 10 o'clock in the morning till 5 in the afternoon; and we invite all to go and witness the wonders and splendors of the creation of divine wisdom which are there displayed. — *Congregationalist and Recorder.*

IODINE AND CARBOLIC ACID.

BY CHARLES BULLOCK.

A solution containing iodine, carbolic acid, and glycerine, has been introduced to the medical profession by Dr. Percy Boulton, who claims for it therapeutic virtues of superior efficiency.

Dr. Boulton's solution is prepared as follows:

℞ Tinct. iodini comp. .... ♏ xlv.
Acid carbolic cryst. (fusa) .... ♏ vi.
Glycerinæ .... ʒ viii.
Aq. destillat. .... ℥ v

The iodine color gradually disappears, and the solution eventually becomes colorless. The time necessary to complete this change depends on the temperature. At sixty degrees Fahrenheit, eight to ten days are required; if the cork of the bottle is secured, and the mixture exposed in a water-bath to a temperature of from ninety degrees to one hundred degrees Fahrenheit, the change will be effected in eight or ten hours. The change takes place as quickly in diffused light as in direct sunshine, provided the temperatures are equal The solution exposed to sunshine becomes somewhat turbid, and deposits a muddy precipitate.

The change is due entirely to the carbolic acid, glycerine alone, under similar conditions, effecting no change in the iodine solution, while carbolic acid acts equally well with or without the presence of glycerine.

The *character* of the change is probably the transformation of the iodine into iodide of formyle (iodoform) at the expense of the carbon atoms of the carbolic acid.

The solution possesses antiseptic and stimulant properties in a marked degree, and has met with favor as an application in the form of injections, gargles, and lotions in cases of sore throat, ozœna, abscesses in the ear, and foul or indolent ulcers.

It has also been recommended as an *injection* in cases of internal hemorrhoids, and by inhalation for throat and bronchial affections. When used for inhalation, the glycerine can be omitted. — *American Journal of Pharmacy.*

Tonic Mixture for Neuralgic Pain in the Side. — Dr. Eade.

℞ Tinct. ferri sesquichloridi acidi nitrici diluti, aa. . ♏ xv.
Magnesiæ sulphatis .... ʒ ss.
Tinct. aurantii .... ♏ xv.
Aquæ, ad. .... ℥ i.

M. To be taken two or three times a day. Local treatment may be advantageously combined with the general treatment.

Indelible Anilin Ink.

I. *Mordant.*

34 grains of chloride of copper,
43 " of chlorate of soda,
21 " of chloride of ammonium, are dissolved in ½ ounce of water.

II. *Dye.*

80 grains of muriate of anilin, dissolved in
2 drachms of water, mixed with
3 drachms of mucilage of gum arabic (1 to 2), and
40 grains of glycerine.

These liquids are kept in separate vials, and only mixed in small quantities at a time, for immediate use, in the proportion of four parts of the dye (II) to one of the mordant (I), to be applied either with quill, pen, or brush. If too thick, the mixture may be somewhat diluted with water.

The writing appears at first a pale green, but turns black slowly on exposure to the air; the latter occurs at once upon applying a hot plating iron to the back of the fabric, or holding it in a safe distance to a smokeless flame, or, better still, over boiling water. When the black color has been produced, the lettering should be washed carefully in warm soapsuds, which will give it a fine bluish-black tint. This ink is said to withstand the action of lyes and acids, and to be fast in washing, if it has really been imbibed by the fibre, and is visible on the back.

SENSIBLE VIEWS.

We recently took up a newspaper containing one of those peculiar essays read Sunday mornings in a Brooklyn church, and called "sermons," by Rev. Henry Ward Beecher. It contained some rather sensible views upon a variety of topics. The following extract is worth reading and remembering:—

I do not object to mirth or gayety; but I do object to any man's making an animal of himself by living for the gratification of his own animal passions. People frequently think, that to require in the conduct of youth that which we expect in later life, has something of Puritanism in it. Men have an impression that youth is very much like wine—crude and insipid until it has fermented; and when it has fermented, and thrown down the lees, and the scum has been drawn off, the great body between is sound and wholesome and beautiful. I am not one that thinks so. I think that youth is like the beginning of the plant life, and that every wart or excrescence is so much an enfeeblement of its fruit-bearing power. I do not believe that any man is any the better for having learned what is the whole career of drunkenness, or of lust, or what are the dallyings or indulgences that belong to a morbid life. A young man that has gone through these things may be saved at last; but, in after life, he has not the sensibility, he has not the purity, he has not the moral stamina that he ought to have. He has gone through an experience but for which his manhood would have been both stronger and nobler. I am one of those that thoroughly disbelieve that a man is any better for having, in his youth, passed through an experience that developed his animal nature and his lustful appetites. Excess in youth, in regard to animal indulgences, is bankruptcy in old age. For this reason I deprecate late hours, irregular hours, or irregular sleep, as intemperance. People ask me frequently, "Do you think that there is any harm in dancing?" No, I do not; there is much good in it. "Do you then object to dancing parties?" No; in themselves I do not; but where unknit youth, where unripe muscle, where unsettled and unhardened nerves are put through an excess of excitement, treated with stimulants, fed irregularly and with unwholesome food, surrounded with gayety that is excessive, and which is protracted through nights, when they should be asleep, I object; not because of the dancing, but because of the dissipation. It is taking the time that unquestionably was intended for sleep, and spending it in the highest state of exhilaration and excitement. The harm is not in the dancing itself; for if they danced as do the peasants—in the open air, upon the grass under the trees, and in the day, it might be commended, not as virtuous, but still as belonging to those negative things that are beautiful. But the wassail in the night, the wastefulness,—I will not say of precious hours, for hours are not half so precious as nerves are,—the dissipation, continued night after night and week after week,—it is this that I deprecate as eating out the very life.

Irregularity of diet also has its ill effects. It is not the mere question of digestion or of indigestion, of good spirits or of bad spirits, to-day; but irregular habits in regard to eating and drinking reach forward and take hold of old age. Children ought to be taught, and parents ought to know enough to teach them these things. Ignorance of the structure of our bodies may not have been culpable fifty years ago; but in the light of advancing knowledge, I hold, that no Christian parent can but be accountable to God, if he be ignorant of the fundamental laws of health. When I am king, nobody shall be married until they have passed through the catechism of natural health, and have shown that they understand the fundamental principles of it. The appetites of youth, which either in social or in solitary life drain down the vitality and impair the constitution, are so many insidious assaults on old age. I would that the young knew how clearly these things are written. God's handwriting is very plain and very legible to those who have eyes that see. There is not an intelligent physician that does not observe and read, as he walks through the street, the secret history of the lives of those whom he meets, and that, too, without following them in their midnight career.

The use of stimulants in youth is another detraction from happiness in old age. Men usually take what they least need. In other words, we follow our strongest faculties, and not our weaker ones; and therefore, if men are excessively nervous, almost invariably they seek to make themselves more so. Men that need the most soothing, the most quiet, drive themselves by the use of the most excessive stimulants. There will come a time, however, when men will be very proud of being wholesome, of being clean, of being natural. I am proud—I am vain, perhaps, I had better say—that I was brought up from my youth to abstain from tobacco. It is unhealthy; it is filthy, from beginning to end. In rare cases, where there is already some unhealthy or morbid tendency in the system, it is possible that it may be used with some benefit; but ordinarily it is unhealthy. I believe that the day will come, when a young man will be proud of not being addicted to the use of stimulants of any kind. I believe that the day will come, when not to drink, not to use tobacco, not to waste one's strength in the secret indulgence of passion, but to be true to one's nature, true to God's law, and to be round, robust, cheerful, and to be conscious that these elements of health and strength are derived from the reverent obedience of the commandments of God, will be a matter of ambition and endeavor among men.

MICA SPECTACLES.—A device simply for the protection of the eyes of persons engaged in working metals, is one of the results of an investigation by Dr. H. Cohn, an oculist of Breslau. His inquiries extended to six manufacturing establishments, embracing 599 fitters, 386 blacksmiths, 129 turners, 35 drillers, 13 planers, 27 enginewrights, 5 screwers, 15 boiler-makers, 69 foundery-men, 8 cleaners of castings; total, 1,283. He found that 90 per cent of the workmen had often been injured on the eye by minute pieces of metal, and that 49 per cent had been under medical treatment for serious accidents to their eyes. Of the whole number, 59 were found to be permanently injured, and 21 of those had each lost the use of one eye. The whole time lost by the workmen, from accidents to the eye, amounted to 4,726 working days. No protection to the eye had been provided. Ordinary glass spectacles were objected to, on account of their liability to be broken. At the suggestion of Dr. Cohn, mica spectacles were tried, and found to fulfil all the requirements. The mica used is of the purest kind, about half a millimeter in thickness, and is curved somewhat like a watch-glass. It is held in a frame which fits close to the side of the eye, so as to prevent the entrance of particles on either side. Mica imparts a pale-gray tint to objects, but does not impair the eye. Its toughness, elasticity, and transparency, admirably adapt it to the protection of the eyes of metal-workers. The price of a pair of mica spectacles at Breslau is about 15 cents.—*Med. and Surg. Reporter.*

OIL PAINT ON CEMENT WALLS.—According to a communication made to the Berlin Polytechnic Society, cement-plastered walls can be coated with a durable oil paint, after the surface has previously been gone over three or four times with acetic acid.

LEUWENHOCK has computed that 100 single threads of a full-grown spider do not equal the diameter of the hair of the beard; and when the young spiders begin to spin, 400 of them are not larger than one of a full growth; consequently, 4,000,000 of a young spider's threads are about the size of a single hair of a man's beard.

REDUCTION OF CHLORIDE OF SILVER.—Dr. Græger recommends for this purpose to dissolve the silver in ammonia, and add, from time to time, some pieces of zinc; the gray powder is washed and digested with concentrated muriatic acid until it becomes whitish, when it is washed with distilled water and a little ammonia, whereby it becomes perfectly pure. Nitrate of silver in ammoniacal solution is reduced by the same process; if it contains copper, it is advisable to leave a little silver solution, so as to avoid the precipitation of copper.

☞ We have received a great number of questions from correspondents, some of which will be answered in the next number.

Boston Journal of Chemistry.

BOSTON, AUGUST 1, 1868.

☞ Any one sending us the names of three subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For five subscribers we will send the Petite Microscope; for twenty-five we will send, in addition to the microscope, a copy of "Stockhart's Chemistry for Students," the best elementary treatise yet published; for one hundred subscribers we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug-stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. DOWNES is general travelling agent for the *Journal*.

FIRE ANNIHILATORS.

A method of extinguishing fires by the employment of carbonic acid water, is attracting much attention in various parts of the country, and many inquiries have reached us regarding its efficiency, usefulness, safety, etc.

We were probably the first in any part of the world to make practical demonstration of the value of aerated waters in the instantaneous extinguishment of fire. Our experiments commenced in 1855, and were continued over a period of many months. We not only extinguished bonfires in the open air, by the aid of carbonic acid water, but we had constructed, of iron, a small model of a house, which was filled with combustible materials, placed upon the lecture-table before popular audiences, ignited, and the flame quenched by a stream of the charged water from small portable apparatus. This apparatus was essentially like that about which so much is said at the present time, and which is regarded as a very recent invention. The simple little affair is claimed, we believe, by a Frenchman, as his patented device, and it has been brought all the way from France to astonish the great Yankee nation.

We regard the use of carbonic acid water as of great service in the extinguishment of fire in buildings, in its early stages. A gallon of the charged liquid has the potency of several gallons of ordinary water; and, therefore, a reservoir of considerable magnitude may be stored in a building, not only in a very compact, but exceedingly convenient form. Beside the effects of the direct contact of the liquid with the burning substance, the gaseous constituent is liberated by the heat, and, flowing freely in all directions, aids very materially in subduing flame.

The fire-extinguisher should be manufactured extensively by workers in metals, in all parts of the country. The price for one holding ten gallons ought not to exceed twenty or twenty-five dollars; and this would bring them within the reach of a very large class of householders. Of course, no individual or company can claim a monopoly in the use of the charged water. No patents have been granted in this country; and, if any had been, they could not possibly be valid.

Whatever changes or improvements are made in apparatus, those who engage in the manufacture of these useful devices should remember that the workmanship must be of the very best kind. The machine must be strong, the screws, stopcocks, etc., *gas-tight*, and every part thoroughly finished. Thousands of them will find ready purchasers when the price is brought down to a competitive standard, and this ought at once to occur.

STELLAR CHEMISTRY.

A considerable number of our readers have become much interested in the spectroscope, and its revelations regarding the heavenly bodies. Inquiries in respect to the physical constitution of the stars have been answered in former numbers of the *Journal*. We would briefly remark, that the light of stars, of nebulæ, and even of meteors, has lately been examined in the same way as that of the sun. It is found, that the spectra of the stars show dark lines, and that these are, for the most part, different from the solar lines, and from those of one another. Many of the substances familiar to us on the earth have been detected in the atmosphere of the stars. The bright-red star known as Aldabaran, or "the Bull's Eye," has in its atmosphere hydrogen, sodium, magnesium, calcium, iron, antimony, bismuth, and mercury. The Dog-star, or Sirius, the brightest of the fixed stars, shines with a pure white light (though to some eyes it appears slightly greenish), the spectrum of which shows with certainty only hydrogen, sodium, and magnesium. Already enough has been done in this analysis of stellar light to serve as the basis of a classification of the stars into groups, according as their atmospheres are characterized by the presence of one set of elements or another. In the same way important discoveries have been made in regard to the nature of the nebulæ. The question which the most powerful telescopes had failed to settle, whether all these patches of misty light are made up of countless stars, so inconceivably distant that they can not be separated to the eye even with the best optical aid, or whether some of them may be their clouds of luminous gases, — this question, the subject of so much investigation and discussion for so many years, may be said to have been finally answered by the spectroscope, which shows that not a few of these "irresolvable nebulæ" are gaseous in their nature.

SCHEMES.

The world is full of schemes. The object of a few of them is to gain notoriety; but, for the most part, *money-making* is the great end in view. People love schemes, speculation, games of chance, whether they are connected with mining, oil-pumping, new inventions, new discoveries, or anything else which promises great money returns.

The tenacity with which some really able business men cling to speculative schemes, mining operations, inventions, etc., after their utter fallacy and worthlessness have been shown, is surprising. In consultations regarding the practicability or value of alleged new chemical discoveries, or art processes, with those solicited to invest money in the purchase of the patent rights, it has often been noticed, after showing the absurdity and worthless character of the claims, that the speculation was abandoned with the greatest reluctance. The prospective gains resulting from a share in the monopoly of a new water-burning stove, improved gas-machine, or some wonderful chemical process, are so alluring, that often the solicited professional advice is entirely unheeded, and the victim plunges into his ruin.

The desire to rapidly acquire wealth is an overmastering passion, and leads to the most deplorable evils. It would seem as if men would learn wisdom from experience, but they do not. The man deceived by representations regarding an oil well last year, is ready to purchase a peat-bog, and worthless patented machinery to work it into "valuable fuel" this year. If his investments in the great spiral double-action flying-machine proved a dead loss last month, he is willing to listen to a statement of the prospective advantages of owning stock in a new electro-magnetic locomotive this month. It has been said, that life is a delusion, or made up of a series of delusions, and there is much truth in the statement. The better cultivation of the mind, the more careful training of the intellect, the general diffusion of accurate scientific information, ought to do something to remove man's weaknesses, and lead him to regard more healthfully "chances and probabilities" in life.

HOW NEW IS IT?

The *Boston Traveller*, a few weeks since, contained a long article describing a "Pneumatic Gas Machine," which was claimed as *new* and *very wonderful*. From reading the article, we were led to hunt over some old files of the same paper, and we came across the following communication, published by us in 1849, *nineteen years ago*, in which precisely the same principle is described, and essentially the same apparatus. Our air-vessel and hydro-carbon mixer was placed in a cool cellar instead of being buried in the ground.

From the description of our experiments and apparatus which follows, published nearly a quarter of a century ago, the numerous devices and patented contrivances for burning naphtha vapors, in connection with atmospheric air, have originated. The improvements in apparatus have been considerable; the principle is *precisely the same:* —

(From the *Boston Traveller*.)

ATMOSPHERIC LIGHT.

Editors Traveller, — I wish to communicate to your readers through your columns the results of some experiments in producing artificial light, at a small expense and by simple apparatus. Availing myself of the fact that atmospheric air takes up and retains with great facility the vapors of certain liquid hydro-carbons, I have constructed apparatus in which common air is used as the vehicle, and which affords a beautiful and convenient light.

My apparatus consists of a large tin gasometer holding one hundred and fifty gallons, which is placed in a cellar and filled with air by raising the inside cylinder, at the same time opening a stop-cock on the top. When filled, this is pressed upon by weights in the usual manner, affording a constant current of air, which ascends by a half-inch pipe to the apparatus in which is placed the hydro-carbon. This apparatus consists of two tin vessels, three inches in diameter, and about six inches in length. These are partially filled with the liquid, and the pipe from the gasometer is so arranged that a stream of air is forced through it in very minute bubbles. It is then conveyed to the gas burners by pipes, and there lighted with a taper in the same manner as coal-gas.

The light procured in this way is exceedingly beautiful, far brighter and more acceptable to the eye than the ordinary gas of our cities. The apparatus described above, I have had in operation in my laboratory and place of business, for nearly three months, and from experiment and thorough testing, feel certain that as soon as it is known, and a few mechanical difficulties are removed, it will come into general use. My apparatus supplies four burners, two of which are batwings; the others are of a peculiar form, somewhat like the argand burners. The jets used for coal-gas will not answer for the atmospheric light, as the orifices are too small. They can, however, by the exercise of some skill, be altered and adapted to this light. A jet made of movable pieces of metal, and adjusted by a screw so as to regulate the flame by the amount of gas which escapes, is the most proper kind of burner. The highly volatile hydro-carbon through which the air is forced, may be procured in several ways, but is best obtained from coal tar by distillation.

This liquid will part with its vapor at a temperature of 46 degrees Fahrenheit, and afford light; below this it burns with a blue lightless flame for a short time, and finally goes out entirely. It is evident, then, that it will burn at the ordinary temperature of our rooms at all seasons; but as the process goes on the liquid is cooled rapidly by its own evaporation, and, therefore, an artificial supply of heat is necessary to continue the combustion. This I obtain in a very convenient way by passing a jet of gas from a main pipe on to a disc of metal below the vessel containing the liquid, and regulating the supply of heat by the expansion and contraction of a bar of iron connected with the second pipe. Thus arranged it is self-regulating, and continues to afford an excellent light so long as the supply of air and hydro-carbon continues.

A fluid ounce of the liquid will afford as much light one hour as four wax candles, the fluid costing, when made upon a large scale, not over four mills. This estimate, which is correct or nearly so, shows that this method of artificial illumination is cheaper than any other known method, and, in point of cleanliness and beauty, far preferable.

Haverhill, Mass., 1849. J. R. Nichols.

THEN AND NOW.

It is impossible not to reflect sometimes upon the immense changes and improvements which have taken place within a half-century in respect to modes of conveyance, methods of warming, cooking, communicating, treatment of the sick, modes of preparing and administering medicine, preserving the teeth, and a thousand other things directly relating to our personal comfort and happiness. What untold blessings have been conferred upon us by the practical application of the discoveries in science and art to the conveniences of life! Chemistry has accomplished more for us than any of the sciences. Silently, unobtrusively, in obscure places, the chemist has worked out the great problems which have revolutionized the world. Hardly an advance step has been taken in any department of knowledge without the aid of this noble science — the science which is the basis of all the sciences. The change from the old to the new is as strikingly manifested in little things as in the great. The pen with which we write this paragraph is made of metal: who heard of a metallic pen fifty or thirty years ago? It is claimed to have in its composition the metal aluminum: who heard of such a metal being employed in the arts *ten* years ago? How convenient is this little writing implement! The ink flows from it with perfect freedom; it is not easily corroded. Pages can be written with it, and yet all the hair-lines are uniform, and would be perfect if our chirography was perfect, which, unfortunately, it is not, as our printer can testify. No penknife is needed, as in the times of goose-quills, to whittle out new points; and thus our time and temper is saved. It costs but a small fraction of a cent. Fifty years ago, all paper was made by slow hand process, and was very costly; now huge machines turn it out in broad ribbons as fast as a man can walk; and to feed their capacious maws, tons and tons of rags are required each working day. For one dollar, as much good paper can be bought as ten dollars would buy half a century since.

When the wise and witty Sidney Smith was in his seventy-third year, he amused himself in writing out a list of eighteen important improvements and changes which had taken place in England.

In the first place, when he was a middle-aged man, gas was unknown; and he says he has "groped about in the all but utter darkness of a twinkling oil lamp, under the protection of watchmen in their grand climacteric, and exposed to every species of degradation and insult." He was nine hours sailing from Dover to Calais; nine hours riding from Taunton to Bath, in which he says, with an exaggerative wit, "he suffered from ten thou-

sand to twelve thousand severe contusions, before stone-breaking Macadam was born." He had no umbrella when it rained; and poor Jonas Hanway, who first introduced umbrellas, was finely persecuted and mocked for his courage. There were no quick and excellent cabs running; if he wanted to go beyond walking distance, he must fain get into "one of those cottages on wheels—a hackney-coach," of which there is now only one existing in London. But those hackney-coaches were themselves a modern improvement. If, in the days of the youth of the witty writer we have quoted, he travelled to certain parts of the kingdom, he went in a slow wagon, as he was poor; he must otherwise go in the basket of a stage-coach, where his clothes were rubbed all to pieces. In even the very best of society, he says, "one third of the gentlemen were always drunk." There was, besides, hardly an easy chair or a well-made sofa in the kingdom. Huge bedsteads harbored vermin; badly-made windows excluded light; and ventilation was an undiscovered science. "Positively," writes the canon of St. Paul's, "I could not keep my small clothes in their proper place, for braces were unknown." If a man had the gout, there was no colchicum; when small-pox was about, there was no vaccination; and people who had lost their sight and their beauty from that scourge were met at every step. The doctors were ignorant; and, to make matters worse, there was no proper examination or restriction; consequently quacks abounded. There was no penny-post, and no bank to receive the savings of the poor. "In spite of all these privations," wrote Sidney, "I lived on quietly, and am now utterly ashamed that I was not more discontented, and utterly surprised that all these changes and inventions did not occur two centuries before."

Medicine and Pharmacy.

CITRATE OF IRON, AND STRYCHNINE.

The first ounce of this valuable medicinal agent made in the United States, was prepared in our laboratory, in 1858. After consultation with some of our best physicians, we adopted as a *standard*, *one per cent* of strychnine, with the citrate of iron. This was regarded by them and us, the most proper and convenient combination, as it would enable the prescriber to give the usual dose of the iron salt, with the medium one of strychnia. Six grains of citrate of iron would hold 1-16th grain of the alkaloid, and this would be a very proper dose for adults. The dose could be varied to suit the views of physicians, or meet exigencies, and a proper balance of the medicinal agents maintained. Besides, we regarded it important that an active agent like strychnia, should be, if possible, combined in proportions from which ready and accurate calculations could be made by physicians; and the proportion of *one per cent*, or one grain in a hundred of citrate of iron, met this desirable point.

We allude to this matter now, because our attention has been called to an article of citrate of iron, and strychnine, made in Philadelphia, which is stated to contain *two per cent* of the alkaloid. It is not only improper, but positively wrong, for a manufacturer to thus alter the standard of an article, and introduce confusion among prescribers. How can physicians know, when a prescription is sent to the apothecary, whether it is filled with the article prepared by the Philadelphia makers, containing *two* per cent, or the amount of one per cent, established by us as a standard, *ten years ago?* We wish to have the matter fully understood, that, in event of any serious results flowing from the change, physicians may understand our position. The combination is a very valuable one, and doubtless will be made officinal at the next revision of the Pharmacopœia. This should have been done at the last revision, in 1860, as we had introduced it two years before, and hundreds of physicians had used it, with the best of results. The article furnished from our laboratory will contain *one per cent*, as heretofore; and no change will be made, unless directed by the revisers of the Pharmacopœia.

Prices Current.—We have yielded to the solicitation of many physicians and druggists in the Northern and Western States, and present in this number a catalogue of chemical and medicinal agents prepared in our laboratory, with prices of the same in quantities such as are required by them. In large packages or quantities such as are furnished wholesale dealers, the prices are necessarily somewhat less. Any one desiring medicine or chemicals, can, from the list, ascertain the cost; and, upon enclosing to us the cash, or a money-order for the required amount, they will receive the articles by return express. We shall correct the list each month, as prices rise or fall.

AN ETHER MONUMENT.

What is called the "Ether Monument," erected in the Public Garden in this city, was publicly dedicated a few weeks since. The vexed question as respects who discovered the anæsthetic properties of ether, being regarded as still unsettled, and in view of the vast benefits conferred on humanity by the discovery, the late Thomas Lee, Esq., determined to erect a monument commemorative of the event, without placing the name of any one of the claimants upon it. It is a noble work of art; and eminently proper is it that it should be erected in Boston, as it was here the great discovery was made. Dr. Henry J. Bigelow made the following interesting address at the dedication:—

It was the wish of the late venerable gentleman who caused this monument to be erected, to rear an enduring memorial of the discovery in Boston from which dates the era of painless surgery, and also that, on some fitting occasion, it should be offered for the acceptance of his fellow-citizens.

In no act of a long life, characterized by many deeds of liberality, by the exercise of a refined and cultivated taste for nature and for art, and by a discriminating judgment of men and of passing events, did he show greater discernment than when he organized this work; and, although he did not live to see it executed, he had so far supervised its plans, and so intrusted them to skilful hands, that no difficulty was met with in completing its beautiful design in detailed conformity to his wishes.

This monument is intended, in the words of the tablet, which were written since his death, "To commemorate the discovery that the inhaling of ether causes insensibility to pain; first proved to the world at the Massachusetts General Hospital, in Boston, October, A.D. 1846," by its appliance during a protracted dissection, which, when followed by one of the severest operations known to surgery, was a final and conclusive test in a close and connected series of successful experiments, which proved that pain could be annulled, first, with certainty, no matter who the individual; secondly, with completeness, no matter how great might be its degree; and, thirdly, with safety. These three points were all absolutely involved in the discovery, and these alone. Before the consecutive experiments which culminated in those here recorded, neither of these points had been established by conclusive proof. The world was ignorant of the great truths they asserted; the discovery had not been made.

The philanthropist had indeed yearned to relieve suffering humanity; the poet had prophetically announced a world freed from physical pain; the philosopher had made fruitless efforts to unveil the hidden secret. Instances of accidental insensibility had been observed. Here and there, an ingenious man had devised and tried some single experiment, with greater or less success, and then abandoned the pursuit; or, tantalized by a possibility at one moment in his grasp, and in the next eluding it, stimulated by a flattering promise of achieving something at once practical and useful, had followed up his experiments hopefully, until some great public failure disheartened him, made his proselytes incredulous, and left the world still to suffer pain.

Men had been made insensible to pain through mental excitement, or by the agency of mesmerism or hypnotism, by the dead drunkenness of alcohol, the narcotism of opium, the inhalation of nitrous oxide and other gases, and even by the vapor of ether. For years, all this had been known to be possible, but it attracted little attention. These previous experiments, instituted by different persons, were inconclusive, because they led to no constant result; the anæsthesia could not be relied on, or it was not demonstrated that it could be relied on, either as sure to occur, or as proof against the severer forms of pain. The question of danger from this extraordinary trance was also unsettled. No consulting board of surgeons would have dared to sanction the production of prolonged unconsciousness during an operation, before the series of consecutive experiments were made here in Tremont Street and at the hospital. There had been a lack of perseverance or of good fortune in the experimenters, or an imperfection in their materials or method, and the future discovery which was soon to burst upon the world, halted for an interval of years at this imperfect stage. The whole progress of all invention and discovery had been a monotonous catalogue of such imperfect efforts and such failures. But, when these consecutive experiments had been made in Boston, the discovery had been made; and in grateful and unhesitating recognition of it, the entire civilized world simultaneously rose up to hail it with acclamatory welcome.

Thus was made the discovery, and thus was begun the career of anæsthetic inhalation. Modifications, imitations, and substitutes have sprung up in all civilized countries. New processes and new materials will yet be furnished by science, or demanded by convenience or economy; but, after more than twenty years of its successful trial, nothing has been found to surpass, in its efficiency or unqualified safety, the original ether then used.

To commemorate the triple and demonstrated discovery, not of a probable, an uncertain, or untrustworthy, but of an inevitable, complete, and safe anæsthesia, this monument has been erected in a city which was the humble instrument of Divine Providence in diffusing to the nations this incalculable blessing.

I well remember when the eloquent and gifted man whose brazen effigy on yonder pedestal so powerfully recalls his living presence, in an address delivered at the Medical College, on the 4th of November, 1846, said, with an unconscious foreshadowing of what was soon to happen:—"I cannot suppress the remark that the great principle of analogy seems to authorize the hope that . . . . further discoveries may be expected scarcely less brilliant than that of vaccination." How far even this prophetic inspiration fell short of the reality! How little did he dream that the lapse of a few brief days would herald to the earth the greatest boon ever accorded to the physical welfare of mankind; days of discovery that forever silenced the dreadful shriek of agony which many of us can yet recall in the surgical amphitheatre of the institution which is now immortalized; that stilled the moan of the soldier stricken down upon the battle-field, assuaged the pangs of disease, softened the approach of death, and lent a sweet obliviousness in what was once its hour of anguish, to all animal existence, from the poor, suffering brute up to humanity, to man born of woman, and to woman of whom man is born!

Phosphoric Acid in Pulmonary Hemorrhage.—Dr Hoffman, in the *Journal des Connaissances Medicales*, recommends the use of phosphoric acid in hæmoptysis, menorrhagia, and other hemorrhages.

IMPORTANCE OF REGULAR HABITS.

A person visiting New York for the first time, and curious to observe the peculiarities of the metropolis, would probably immediately notice the great number of restaurants, eating-houses, and stands, in the markets and streets, loaded with eatables. Go where he would, by day or night, he would find accommodations for eating, and people availing themselves of them. The facilities thus afforded for obtaining meals at all hours are, without doubt, leading to great irregularities in eating, and thus exciting a deleterious influence upon the public health. It may, therefore, not be amiss to devote a brief space to the consideration of the effect of all irregularities in habits of living upon the animal economy.

It is a fact well recognized by physiologists, that the constitution of living beings possesses a recuperative power that is capable of resisting attacks from external agencies, or, rather, is able to restore the damage caused by such attacks. The lower in the scale of existence an animal is found, the stronger is the power of its organism to restore parts removed by mechanical means, and the less is its susceptibility to the influences which cause disease. If, from individuals of the lower orders of animals, a limb, or even a portion of the body be removed, a new one will grow in its place; and, in many cases, the part removed will supply the necessary parts which are absent, and become a complete organism. In vegetables this is almost universally the case; and the propagation of plants by slips cut from the parent stem is a process of daily occurrence in horticulture. The recuperative power is indeed so great in many plants, that they can, by the most extreme efforts, be scarcely removed from a soil where they have once obtained a foothold. The plant known to farmers as quackgrass is a good example.

The power to restore parts which have been lost extends to the highest orders of the animal creation. Teeth which have been removed by mechanical means have often grown again in the human jaw years after the second set, which take the place of the first in the regular course of nature, had been supplied. This is, however, probably the only organ that the human recuperative energy has power to restore.

As age advances, this power becomes less, so that repair takes place slowly, and in very advanced age ceases altogether. Broken bones refuse to unite, and abrasions of the skin become chronic ulcers.

There is, however, a striking characteristic of the power of recuperation, which has a most important bearing upon the health, both of men and animals. It is this: The power to restore increases with the regularity of the power and periods of attack. It is as if the constitution were a citadel, upon the reduction of which two kinds of tactics were employed. So long as the attacks are made at regular intervals, the garrison may sleep while the besieging forces are withdrawn, and rise refreshed to increased resistance; but attack it at unexpected times, and with irregular force, and unremitting vigilance must at last wear out the strength of the besieged.

Many phenomena which cannot be accounted for in any other way at once find an explanation by the application of this truth. A man who is addicted to the use of alcoholic liquors, may often drink very freely for years without any apparent serious detriment to health, if he is regular in the times and quantities of his potations; while another, who only takes an occasional "spree," will suffer from the consequences of his indulgence.

The taking of proper exercise, pure air, sustenance, sleep, and recreation, may be compared to the withdrawal of the attacking forces. If the withdrawals are regular, the attacks will also be regular, and the resisting power of the vital structure will in the meantime have accumulated.

We believe that six hours of sleep per diem, begun and ended at uniform times, are as good as eight taken at irregular periods. It follows, then, that regular sleep gives two hours, at least, more time per day available for business, pleasure, or study, than can be otherwise obtained.

In short, nothing is so economical as regular habits. Less food, less sleep, less clothing, less medicine is required to sustain nature; and better health, more happiness, more wealth, more knowledge, and longer life are obtained in their exercise. — *Sci. American.*

CARBOLIC ACID.

BY DR. GRACE CALVERT.

The disinfectant, or rather antiseptic properties of carbolic acid, are very remarkable. The beautiful researches and discoveries of M. Pasteur have shown that all fermentation and putrefaction is due to the presence of microscopical vegetables or animals, which, during their vitality, decompose or change the organic substances, so as to produce the effects which we witness, and carbolic acid exercises a most powerful destructive action upon these microscopic and primitive sources of life. Carbolic acid, therefore, is an antiseptic and disinfectant much more active and much more rational than those generally in use.

And allow me further to add that disinfectants, such as chlorine, permanganate of potash, or Condy's fluid, operate by oxidizing not only the gaseous products given off by putrefaction, but all organic matters with which they may come in contact; whilst carbolic acid, on the contrary, merely destroys the causes of putrefaction, without acting on the organic substances. The great difference which therefore distinguishes them is, that the former deals with the effects, the latter with the causes. Again, these small microscopic beings, these ferments, are always in small quantities as compared to the substances on which they act; consequently a very small quantity of carbolic acid is necessary to prevent the decomposition of substances; therefore, its employment is both efficacious and economical. Moreover, carbolic acid is volatile; it meets with and destroys, as Dr. Jules Lemaire says, the germs or sporules which float in the atmosphere, and vitiate it, and this cannot be the case with Condy's fluid, chloride of zinc or iron, which act only by contact, and are mere deodorizers. This is why carbolic acid was used with such marked success, and therefore so largely, in England, Belgium, and Holland during the prevalence of cholera and of the cattle plague. The antiseptic properties of carbolic acid are so powerful that 1-1000th, even 1-5000th will prevent the decomposition, fermentation, or putrefaction for months of urine, blood, glue solution, flour paste, feces, etc., etc.; in fact, its vapor alone is sufficient to preserve meat in confined spaces for weeks; a little vapor of this useful substance will preserve meat for several days in the ordinary atmosphere, and prevent it being fly-blown; lastly, 1-1000th has been found sufficient to keep sewage sweet; and I am proud to say that the British Government have decided to use exclusively our carbolic acid (as a disinfectant), not only on board her Majesty's Navy, but in other Government departments. Although questions of public health are the province of medicine, still permit me to say a few words on the medicinal properties of carbolic acid. This question deserves to be treated thoroughly, for carbolic acid is susceptible of so many applications in this direction, its properties are so marked, so evident, and so remarkable, that they cannot be too much published; and it is rendering a service to mankind to make known the employment of so valuable a therapeutic agent.

I wish all who are listening to me were medical men, for I could show, by numerous and undeniable facts the advantage they might derive from carbolic acid; and if my testimony was not sufficient to convince you, I would invoke the authority of men justly esteemed amongst you. I would recall to you the words of the good and learned Gratiolet and those of Dr. Lemaire, showing that carbolic acid is the most powerful acknowledged means of contending with contagious and pestilential diseases, such as cholera, typhus fever, small-pox, etc. Maladies of this order are very numerous, but in carbolic acid we find one of the most powerful agents for their prevention. Besides its antiseptic action, the caustic properties of carbolic acid are found useful; most beneficial effects are obtained from it in the treatment of very dangerous and sometimes mortal complaints, such as carbuncle, quinsy, diphtheria, etc., as shown by Dr. Turner, of Manchester, and also in less severe affections, such as hæmorrhoids, internal and external fistulas, and other similar complaints. But what must be especially mentioned is the employment of carbolic acid in preserving in a healthy state certain purulent sores, and preventing the repulsive smell which comes from them, — a smell which is the symptom of a change in the tissues of the flesh, and which often presents the geatest danger to the patient. The services which carbolic acid renders to surgery can be judged of by reading several most interesting papers lately published in the *Lancet* by Mr. Lister, F.R.S., on compound fractures, ulcers, etc., etc., and by visiting the two sick-wards of Dr. Maisonneuve, at the Hotel Dieu. Further, I must not overlook the valuable application made of it to gangrene, in hospitals, by the eminent Mr. Paget. Lastly, it has been used by many of the most eminent medical men with marked success in those scourges of humanity, phthisis and and syphilis.

In agriculture our firm has stimulated the employment of the carbolic acid for the cure of certain diseases very common to sheep — scab, for example. The method of treatment customary in similar cases was very imperfect as well as dangerous, whilst with carbolic acid this malady is cured, and without danger to the animal, by dipping it for a minute, often only for some seconds, in water containing a small quantity of carbolic acid. For this purpose pure acid would be too expensive, and is not used, nor concentrated acid, which ignorant men who have the care of sheep would not know how to use; but by the help of soap an emulsion is made. After having shorn the sheep, it is dipped in this mixture; a single immersion in a bath containing 1-60th of it is sufficient to effect a cure. After scab, the foot-rot is one of the worst and most frequent complaints. Carbolic acid is also for that an efficacious remedy. For this a mixture is made of the acid and an adherent and greasy substance, capable of forming a plaster, which can be made to adhere to the animal's foot for two or three days, preventing the contact of the air, allowing time for the application to produce its effect. But if the flock be numerous, it would take a long time to dress the four feet of each animal, one after an another; so, to make it more easy, a shallow tray is made of stone, a sort of trough; this is filled with a medicated mixture, and the sheep are made to pass through it; their feet are thus impregnated with the required substance. Permit me also to state that cattle cease to be annoyed with flies, etc., if washed with this solution, or a weak solution of carbolic acid.

Manufacturers have not yet availed themselves of one tithe of the valuable properties of carbolic acid, and in this direction a new field is open to its use; still I may cite a few instances. The preservation of wood has been already refered to, and thanks to its use, the great trade in skins and bones from Australia, Monte Video, Buenos Ayres, etc., is benefited. Wild animals living there in herds are slaughtered by thousands. Formerly they came to us in a bad state, half putrid, emitting an insupportable odor, and only fit for manure; in this state their price was not more than 150 francs the 1000 kilogrammes; now, thanks to carbolic acid treatment, they arrive perfectly preserved; they can be employed for all the uses to which green or raw bones are usually applied, and the value of bones is raised as much as from 250 to 300 francs. Hides also arrive putrid, unless they have been dried rapidly in the sun or salted, which necessitated a long and costly operation; whilst it is only necessary to immerse them for twenty-four hours in a solution of two per cent of carbolic acid, and dry them in the air, to secure their preservation. It is probable that in a short time the blood, intestines, and other parts of these animals will be, by means of carbolic acid, converted into manure, and imported into this country. In England carbolic acid is used in the preservation of guts at the gut works, for keeping anatomical subjects, and the preservation of all animal matter. Carbolic acid is also utilized in preventing the decomposition of the preparations of gelatine and albumen, used in spinning, dyeing, and calico printing. — *Chemical News.*

POMADE FOR BALDNESS. — CADTELL.

Purified ox-marrow	ʒi.
Castor-oil	ʒss.
Tinct. of cantharides	ʒi.
Essence of bitter almonds	gtt.xii
Essence of lemon	gtt.xii.

Mix, and apply morning and evening — *Union Medicale.*

COUNTRY AIR AS A DISINFECTANT. — M. A. Houzeau has recently demonstrated that the air of the country possesses indisputable disinfectant properties. This is due to the analogy of this air to ozone, which is a disinfectant in the same manner as chlorine. — *Archives Generales de Medicine.*

EFFICACIOUS PRESCRIPTIONS.

℞. Aquæ calcis, ℥iv; mist. amygdal., ʒiiiss; aquæ lauro cerasi, ʒj. Dose, one or two tablespoonfuls several times a day, for acidity, gastrodynia, and cardialgia.

℞. Aquæ magnesiæ carb. *vel* aq. calc., ℥vj; spt. lavand. compos., ʒij. Dose, two or three teaspoonfuls, for heartburn and flatulence.

℞. Magnesiæ carb., ʒvj; pulv. cinnamomi, ʒij; pulv. capsici, ℈j. Dose, one sixth or one fourth teaspoonful, for acidity, flatulence, acid indigestion, cardialgia from acidity, etc.

℞. Liquor potassæ, ℥ss; aquæ, ℥iiiss; ol. anisi, gtt.vj. Dose, one drachm in water, several times a day, to neutralize strong acrid and acid urine in gonorrhœa.

℞. Tinct. iridis versicolor, ℥ss. Dose, five to ten drops, every one, two, or four hours, for sick-headache, or neuralgia of head and eyes, with nausea. The first dose will often arrest the pain.

℞. Solutio caffeinæ et chloroformi, ℥ss. Dose, fifteen to twenty drops frequently, at the commencement of an attack of hemicrania. This solution is made by dissolving ten grains of caffeine, with gentle heat, in two drachms of alcohol previously diluted with half-drachm of water; when cool, add two drachms of chloroform by weight; seventy-five drops contain one grain of caffeine.

℞. Veratriæ, gr.v; sulph. morph., gr.v; amylo-glycerinæ, ℥ss. Mix for an ointment, to be rubbed upon temples in migraine, and on the affected part in neuralgia.

℞. Veratriæ, gr.j; ext. hyoscyami, ʒss. Make twelve pills. Dose, one, every eight hours, in neuralgia and hemicrania.

℞. Oxidi zinci, ʒj; ext. hyoscyami, ʒj. Make twenty pills. Dose, one, every night. Said to be specific for the prevention of those periodical headaches which commence in the morning, increase during the day, and diminish at night.—*N.Y. Medical Journal.*

INTEMPERANCE.—At the last meeting of the Pennsylvania State Medical Society, Dr. Joseph Parrish, of Delaware, Physician-in-chief of the Sanitarium at Media, Pennsylvania, offered the following:—

WHEREAS, The habit of intoxication by alcohol and opium, which prevails so extensively among the people, does not seem to be materially controlled by the system of pledge-taking on the part of the people, or of punitive legislation on the part of their representatives; therefore,

Resolved, That it is the peculiar prerogative of physicians to investigate the causes of this fearful practice, so far as they may exist in the human constitution, in professional usage, or common custom, and to recommend sanitary regulations to the Legislature and the people, on the same principle, with the same acknowledged, that they would suggest preventatives or palliatives for any other public scourge.

Resolved, That a Committee be appointed by this Society, to report to the next meeting, on the medical, social, and civil aspects of intoxication by alcohol and opium, and our duty as physicians in the premises.

The preamble and resolutions were adopted.

BOSTON, June 13, 1868.

H. R. STORER, M.D.—Dear Sir: Before separating for our various homes, we wish briefly to express our sincere thanks for the uniform courtesy we have received at your hands, in your unwearied efforts to impart to us such practical knowledge as you yourself have been enabled to attain in your long-continued investigations, that have tended so much both at home and abroad to the advancement of science and the relief of suffering humanity.

Most truthfully can we assure you, Sir, that we consider these hours passed in listening to your instruction as among the most profitable of our lives; and most sincerely do we wish that others of our profession, whose noble mission it is to follow in the footsteps of the Great Physician, and do good, may be benefited, as we feel we have been. And now, with the additional knowledge we possess for the treatment of that great class of diseases, so much neglected and so little understood, we return to our several fields of labor with a consciousness of an increased ability to perform the duties devolving upon us in administering to the suffering, the sick, and the dying; and, as we separate, we would recognize as the key-note to true success in our profession, the sentiment expressed by yourself; viz., "Whatever criticism we may receive from friends and associates, let us remember that duty demands that we stand firmly by our patient, regardless of self and our own inclinations and desires; that even, if reputation is at stake, it is to be risked for our patient's good."

Most respectfully yours,

WM. G. SMITH, M.D., Chicopee, Mass.
SAMUEL L. DUTTON, M.D., Boston.
O. F. BIGELOW, M.D., Amherst, Mass.
C. WARREN, M.D., Milford, Mass.
G. H. WILSON, M.D., Albion, Me.
F. A. DIETRICH, M.D., Eleroy. Ill.
A. H. BURBANK, M.D., Yarmouth, Me.
R. B. GRANGER, M.D., Boston.
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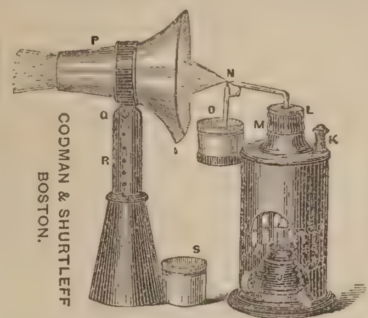

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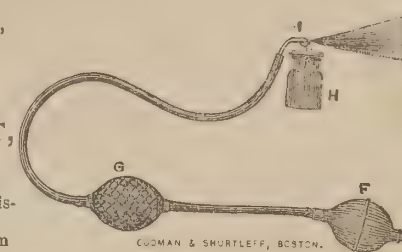

INHALATION OF ATOMIZED LIQUIDS, with formulæ of those successfully employed.

An article by Dr. J. L. W. THUDICHUM, M.R.C.P., on A NEW MODE OF TREATING DISEASES OF THE NASAL CAVITY, with his formulæ.

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"I have thus far found nothing better for freezing with Rhigolene than the tubes made by you after the pattern I gave you, and which I still use with your other apparatus."

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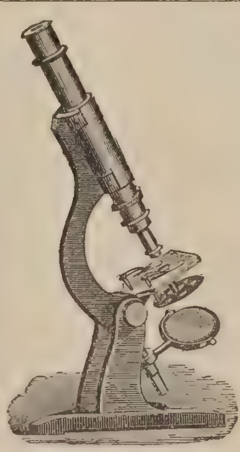

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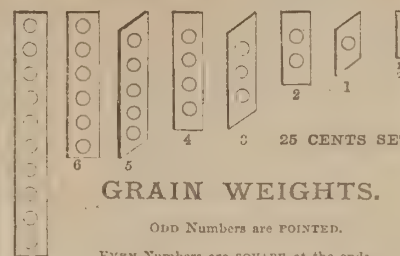

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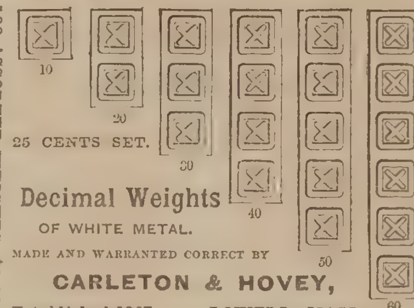

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Contents.

Familiar Science.

PLANCHETTE: WHAT IS IT?

The eagerness with which an explanation is sought of what is to many a new mystery, is by no means surprising. Within a few months a little instrument called *Planchette* has made its appearance upon this side of the water, and has found its way into thousands of families, where it is generally regarded as a toy or a plaything, which, by its performances, causes much perplexity as well as entertainment to the inmates, and furnishes a prolific theme for conversation. The name "planchette" is a French word signifying a little board. The form which the fancy of manufacturers has given to the instrument is that of a heart, about seven inches long and five inches wide, made of thin board, and supported at the base of the heart by two short legs of wood, with nicely adjusted casters, and at the apex by a pencil thrust through a socket lined with rubber to hold it in place. The instrument may be made round, square, oblong, of any size, of any kind of wood, metal, glass, or rubber, and work equally well. Usually, when two or more persons rest their fingers lightly upon the instrument, after a little while it begins to move; and, by placing a sheet of paper beneath the pencil, it will write sentences and answer questions, and move about upon the paper. The answers to questions are written out with great rapidity; and, as dates are given, and incidents and circumstances related, supposed to be entirely independent of the knowledge of those operating the instrument, it has become a puzzle and a wonder to thousands. It should be stated that in many families, and in some groups of persons, it obstinately refuses to move, and all experiments with it are failures. Not often, however, can a dozen persons be found together, but that some one or more can influence planchette and set it to work. In many families, small children have a wonderful power over its movements, and are able to keep it in motion when the efforts of three or four adults prove entirely abortive. Its chirographical exploits and other operations are capricious, whimsical, often wilful and seemingly wicked. In other instances it is all gentleness and goodness, writing its sentences with great willingness, and accomplishing results of a most startling character.

We are requested by many correspondents and friends to explain planchette. They ask: "Is it electricity, animal magnetism, 'odic' force, imagination? Please tell us what it is." We wish we could answer our friends' inquiries in a satisfactory way, but we cannot. We have been a somewhat careful observer of the pranks of planchette for *twenty-five years*, and no solution of the problem satisfactory to ourselves has been reached. It is much easier to state what it is not than what it is. We can see no difference in the class of phenomena developed through the little planchette-board and that connected with what are known as "table-tippings" and "writing mediums." The persons possessed of the idiosyncrasies of organization or temperament which enable them to influence planchette can as easily move a table of the size used for household purposes; and the pencil placed in such hands will write out strange sentences and answers to questions, against the will of the operator. There are many delicate, timid ladies now playing with planchette, and having wonderful success in influencing its movements, who would be filled with terror if they thought they were "table-tippers" or "mediums." Let them try their powers on the parlor table, and see if the results do not cause a fright which will lead them to throw planchette and all its wonderful pencil tracings into the fire. Some amusing instances of a like nature have come to our knowledge. A class of phenomena may be sought and studied in the most fastidious circles, through fashionable planchette, while the same would not be tolerated for an instant coming through the vulgar channels of "mediums" acting upon "meal-chests" or parlor tables.

In our view, planchette is nothing new, or rather it possesses no novelty, as regards what is manifested through it or by it. In the remark that we have observed its strange performances for twenty-five years, the meaning is not, that we have experimented that length of time with a little bit of board, heart-shaped, mounted on wheels and carrying a pencil, but that the same class of physical phenomena have been observed as exhibited through cheaper forms of inert matter, and sometimes through the medium of living flesh, not supposed to be quite as refined as some of that now toying with innocent planchette.

An explanation or consideration of planchette necessarily involves the consideration of a class of alleged physical phenomena regarded by some as not very proper to be seriously discussed in a scientific journal. In one view, this attitude is rather a sensible one. Conductors of scientific journals and students in the sciences taught in schools, have little or no information to communicate regarding what goes by the name of "rappings," "table-tippings," "animal-magnetism," "medium-power," etc., etc., and therefore it is very proper that there should be silence where there is nothing to communicate.

A great deal of impatience, or indignation even, is manifested by a large class, because men distinguished for their acquaintance with the positive physical sciences do not believe in or publicly engage in the investigation of this class of phenomena. The position assumed by a majority of scientific men towards it is that of entire disbelief. They do not separate the physical disturbances, the outward show of force, by unseen agencies, from the "spiritual interpretations" mixed up with, or, as they suppose, inseparably connected with the phenomena. The whole matter is regarded as a sham and a delusion, unworthy of thought or investigation. It does not come within the circle of the sciences, is not in

accordance with any known laws of the physical universe, and does not rise to a higher level than any of the ancient or modern superstitions, which are worthy only of contempt. This is, perhaps, a fair exposition of the views held by a majority of the teachers and students of science at the present time. A considerable number, however, have reached a different conclusion: They only direct attention to a single point, and first clear away all the rubbish with which it is encumbered. The great question is, whether these alleged physical disturbances actually occur or not, independent of direct and palpable human agency. Is it mischief, or is it not? Is it delusion, or is it not? These questions they have settled in their own minds; and the conclusion is, that the phenomena are undeniably real. Not a step further will they go; beyond this all is misty and dark. Many occupy this position who hesitate to admit it, as there is in scientific circles a peculiar sensitiveness upon the subject; and odium and disgrace are liable to rest upon any one, no matter how high his position may be, who cherishes a belief even in the reality of the physical disturbances. We incline to think the popularity of planchette may serve to break a link in the chain of prejudice that binds fast honest convictions, and permit a little more freedom in thought and investigation.

But let us return: We are asked to explain planchette. As already stated, to do this would be to explain a most remarkable and extensive class of physical phenomena, beginning with the antics of the little heart-shaped table, and running up through parlor table-tippings, rappings, writing, etc, etc., to the more astounding physical disturbances, noises, and hubbub, witnessed in so many dwellings in this country and in Europe. The details of a very remarkable instance of "house-disturbance" are given in the August number of the *Atlantic Monthly*. The whole affair appears to have been witnessed by cool and careful observers, and the published narrative we presume will attract considerable attention. But this is by no means a solitary instance of the kind. There are probably a dozen or more families disturbed in this mysterious manner in the United States at the present moment, but every effort is made at concealment; as but few people of respectability feel that they can bear up under the public odium attached to such proceedings. The house of a most respectable gentleman in Newton, Mass., has been for many months, and we believe is at the present time, the scene of even more astounding physical disturbances than those described in the *Atlantic Monthly*. We once, for several hours, listened to the recital of what occurred in the dwelling of Rev. Dr. Phelps of Stamford, Conn., from the lips of the venerable man himself. We were reduced to the alternative, from listening to his statement, of regarding him, his family, and a wide circle of intelligent friends, as the most egregiously duped, deluded, cheated circle of men and women, the greatest liars and imposters, that ever lived, or of believing in the reality of phenomena, which human reason and human science were incompetent to explain. We felt compelled to adopt the latter alternative. Allusion has been made to the disgrace and odium connected with the class of physical phenomena under consideration. This arises from two reasons: *first*, because the alleged manifestations are so inexplicable, strange, *unreasonable*, so contrary to the laws which govern matter and mind as popularly understood; *second*, because a large class attribute their origin to disembodied spirits, and have built up a new religious faith, based upon that hypothesis. Thousands, from the strange and unusual character of the observed phenomena, have been driven to a belief in its supernatural origin, and the unfortunate delusion has spread throughout the civilized world. The masses looked to scientific men to explain what was constantly brought under their observation; and when it was fairly understood that from that source not only no explanation would be afforded, but no open belief in the physical manifestations entertained, they drifted easily and naturally into that channel of belief which seemed to lead them out of the surrounding darkness. The deplorable position assumed by so many regarding the phenomena can never be overthrown by contempt and ridicule. It must be met in a spirit entirely different from this, if the delusion is ever dissipated. This result is also unfortunate, as it placed barriers to a field of investigation of a most interesting and important character, and turned away many who otherwise might have employed in its exploration all the resources of science. How much science could have done, or may do, in explanation, we cannot know with certainty.

We incline to think exaggerated views are entertained respecting the competency of scientific men to shed light upon the subject. The *key* to the mystery must be found before any reliable solution is reached. The first impulse of a man, who believes he sees his furniture dancing about his house, and hears strange noises echoing through the halls, and loud rappings on the ceilings and under the floors, is to send for a doctor,—not a doctor of physic, but a doctor of philosophy. This is a very natural proceeding. He expects him to explain the nature of the alarming state of affairs from his acquaintance with electrical, magnetic, or chemical laws, and looks to him to arrest further proceedings. The first difficulty met with is to secure the attendance of the "doctor," as, from the seeming absurdity of the statements made, he presumes there is no "case." If, however, attendance is secured, the professional man probably finds the occurrences to be of a nature not defined in his philosophy, and is forced to leave the patient without a prescription.

It is not designed to weary the reader with details of what the writer has "seen." Suffice it to say, that enough has been observed to lead to the conclusion that there is one power, impulse, or force, in nature, regarding the character of which mankind *are totally in the dark.*

It has proved, so far as our experiments extend, a most difficult and baffling subject to investigate. The nature of this difficulty is illustrated in "planchette." Why cannot one cause it to move as well as another? Why does it sometimes utterly and ignominiously fail when those are present who have the strongest desire to witness its movements, and when those who are supposed to influence its movements share in this desire? The attempt, or design, to carefully and methodically investigate and study the phenomenon, appears to arrest it. In some families, a lady, or a child even, stand in such relations to the instrument, as to cause it to move by passing it at a considerable distance. It seems full of impatience to "work" when such persons are in the house, and it will write, leap, and run about as if impelled by an irresistible impulse. It has occurred, when such a family has invited one or more ladies or gentlemen to an investigation of its performances, and they have come in a formal way and proceeded to test the phenomena, as they would any new development in physical science, that its movements ceased at once, or if continued, it was in such a dubious, unsatisfactory way as to cover every thing with doubt and suspicion.

The same may be said in general of rappings, table-tippings, and all kinds of house-disturbances of this nature. A calm, philosophical, careful man is not likely to become convinced of the reality of this class of phenomena from such exhibitions. Belief is often forced upon persons through occurrences in their own families, or in one with which they are closely and intimately connected. It must necessarily be a long time before even a belief is entertained of its truthfulness among a large class in the community; and it will be a *very long time* before a satisfactory and philosophical explanation is reached.

Several years ago we invited a friend—a highly distinguished professor in one of our largest Universities—to visit a house where certain extraordinary physical disturbances were alleged to be taking place, apparently in connection with a girl about twelve years of age belonging to the family. In this instance, the "power" was uncommonly demonstrative, the force being brought to bear upon several articles of furniture, but more particularly upon a parlor table, which danced and tumbled about the room, entirely regardless of the professor's cool investigations and ingenious tests to discover "the trick." This he entirely failed to accomplish. There were no conducting wires, springs, pulleys, or levers to be found; and the little girl and family were manifestly as ignorant of what produced the phenomena as ourselves.

A large number of theories were propounded and discussed, not one of which was in the least satisfactory, and the whole affair remains a mystery. In explanation, we hear it often stated that it is due to "animal magnetism." Of course, such declarations must come from the unlearned or unscientific, as science recognizes no such force or principle in nature as "animal magnetism." Some kinds of fishes possess electrical power, and can impart shocks, but then they carry about with them a little arrangement of cells or batteries, which is the source of the electrical force. Human beings are not supposed to possess any such endowment. It is very convenient to have a term to apply in explanation of the phenomena among the crowd, although it may be entirely unmeaning and empirical. Electricity offers no explanation; neither does magnetism, as at present understood. Chemical laws and principles are appealed to in vain for a solution; and as regards "odic force," we have not the slightest knowledge of what that is. In conclusion, we venture the opinion, that if the phenomena are ever explained, they will be found to be due to a blending of the psychological and physical endowments of the human organization, acting under certain laws *entirely dissimilar to any now known or understood.* Who will produce the key that will unlock the mystery?

THE COCOANUT, AND HOW IT GROWS.

To attempt to give a bare enumeration of the qualities of the Cocoanut Palm would be a difficult task, and there is a saying among Eastern nations that its attributes would fill a book. Although its strict territory is bounded by the tropics, and although a denizen of the seashore, it will grow as far north as Lucknow, in India (26° 50′ N.), and is planted far in the interior of that peninsula; but in the one case it does not bear fruit, in the other it is dwarfed, and languishes. From its littoral position, its buoyant and well-protected nuts have been driven by winds and currents all over the tropical seas; and almost as soon as the atoll changes from a mere reef to an island, the cocoanut lands on the shores.

The tall unbranching stem, often attaining the height of ninety feet, with a diameter at the base of three feet, and at the crown a foot, is a most attractive object. The scars of the fallen leaf-stalks, more and more distinct as

they approach the top, show clearly the way in which the stem has grown, starting almost at the commencement of life with its full diameter, and throwing off crop after crop of leaves as it grows in height. The leaves are usually twelve or fifteen in number, often fourteen feet long, and cluster around the cap. As a new leaf comes out, it is covered with a brown fibrous sheath, which is soon split through by the sharp end of the leaf. At first the leaflets are folded closely upon the central rib, so closely that they seem a part of the smooth, bright green blade. The midrib is now quite short, much like the midrib of our common palm-leaf fans; and if we could crumple one of these dried leaves up, we should have much the plan of the young cocoanut leaf. If the blades should now expand, the leaf would be palmate; but it goes on lengthening the axis and becomes pinnate, showing a higher order of development. Five or six leaves are unfolded every year, and as many wither and fall off. When young, the leaves are quite tender, but when fully expanded, become very stiff and hard.

The axillary spathe opens always on the under side and soon falls off, leaving a spicate spadix bearing the female flowers near the base; as in most palms the blossom is beautiful from the great number of the flowers, rather than from any individual grace. In favorable places each stem will bear from five to fifteen nuts, and a mature tree may have eight or ten, or even twelve of these stems, one blossoming every four or five weeks; so that a tree will produce from eighty to a hundred nuts annually. They ripen in succession, so that blossoms and fruit are seen at once.

As the fruit comes to us its glory is gone. It is in its best condition just before ripeness, or when the shell is soft enough to be cut with a knife; then the interior is filled with a rich clear milk, always cool when just gathered, and the shell is coated with a gelatinous cream almost transparent, and so soft as to be eaten with a spoon. When fully ripe, the inner crust has hardened and absorbed the better part of the milk, leaving an insipid water. The milk is quite nutritious, and many medicinal effects have been attributed to it. I have drank nothing else for several days, without perceiving any unfavorable result. It is perhaps with more reason regarded as a cure for sea-sickness. Carefully picked with a portion of the stem attached, they may be carried for three weeks at sea uninjured, perhaps longer, so that we might be supplied with fresh nuts from the West Indias.

A cocoanut is always planted with the three black spots, which are seen at one end, upwards. From one of these the stem rises, and the shell is soon split. Often the nut does not begin to germinate for six months, or even a year after planting, and it grows slowly for the first two years of its life. In favorable situations the tree begins to bear when six years old, and continues until seventy years, or even longer.

It is said that the palm loves the company of man, and grows best near his habitation, and well may man return the love, for it furnishes him with all the necessaries, and many of the luxuries of life, requiring no cultivation or care. The wood is hard in old trees, and very ornamental, and is used for timber. The rootlets are eaten, or rather chewed as tobacco; the young leaves are boiled and eaten as cabbage; when they are older they furnish a good surface to write on with a sharp point (cow dung is usually rubbed in to make the characters more visible), and also to thatch houses, fence gardens, make baskets, mat-beds, fish-nets, fans, sieves, and hats; when old and dry, the stout midrib is used for clubs, paddles, rafters, fence-posts; the ribs of the leaflets for brushes, torches; or the whole is burned to furnish potash. The husk of the nut is stripped off by means of a small stake fixed in the ground, and a man can strip a thousand nuts per diem, and the husks are then soaked for several months in water to separate the fibre, and finally twisted into rope, or woven into mats under the name of coir. This rope is very strong and light, does not rot when wet, and floats on the water. Forty nuts usually yield six pounds of coir. The undressed fibre of the husk is a capital polishing material, and sailors use nuts split in halves to rub down decks.

Before the spathe opens it is often tapped, and a clear juice runs out, which is fermented to form toddy, or boiled down to make jaggery, or palm-sugar. This tapping is supposed to injure the tree if long continued.

The ripe nut is cooked and eaten in various ways. When grated, it is an ingredient of the best curries; mixed with sweet potato, or kolo, and baked, it forms a fine pudding. The Pacific Islanders chew up the meat and rub it into their hair as a pomatum, and whether owing to this application or not, their hair is exceedingly abundant and black.

The oil is, perhaps, one of the most valuable products. The Micronesians break up the nuts, and expose the meat to the heat of the sun in covered troughs, wetting the mass constantly. Fermentation takes place, and the oil drops out into containers. The East Indian process is almost as rude, the nuts being ground in a wooden or stone mill of primitive construction. The oil produced, of course, varies in quality as well as in quantity, ten nuts producing one quart, or in other cases thirty nuts only three pints. In other places the ground nuts are pressed, and sometimes boiled. The best oil is used either for cooking purposes, or to anoint the body either before or after bathing, — a most grateful process in a hot dry climate; and the poorer qualities supply the lamps. Torches are often made of elephant's dung bound into cylinders by the ribs of the leaflets, and saturated with the oil. — *W. T. Brigham, American Naturalist.*

Table Manners. — To meet at the breakfast-table father, mother, children, all well, ought to be a happiness to any heart; it should be a source of humble gratitude, and should wake up the warmest feelings of our nature. Shame upon the contemptible and low-bred cur, whether parent or child, that can ever come to the breakfast-table, where all the family have met in health, only to frown, and whine, and growl, and fret; it is *prima facie* evidence of a mean and groveling and selfish and degraded nature, whencesoever the churl may have sprung. Nor is it less reprehensible to make such exhibitions at the tea-table; for before the morning comes, some of the little circle may be stricken with some deadly disease, to gather around that table not again forever. Children in good health, if left to themselves at the table, become, after a few mouthfuls, garrulous and noisy; but if within at all reasonable or bearable bounds, it is better to let them alone; they eat less, because they do not eat so rapidly as if compelled to keep silent, while the very exhilaration of spirits quickens the circulation of the vital fluids, and energizes digestion and assimilation. The extremes of society curiously meet in this regard. The tables of the rich and the nobles of England are models of mirth, wit, and bonhommie; it takes hours to get through a repast, and they live long. If anybody will look in upon the negroes of a well-to-do family in Kentucky, while at their meals, they can not but be impressed with the perfect *abandon* of jabber, cachinnation, and mirth; it seems as if they could talk all day, and they live long. It follows, then, that at the family-table all should meet, and do it habitually, to make a common interchange of high-bred courtesies, of warm affections, of cheering mirthfulness, and that generosity of nature, which lifts us above the brutes which perish, promotive as these things are of good digestion, high health, and a long life. — *Hall's Journal.*

Whole-Meal Bread. — It is well known to chemists and physiologists that the very finely bolted and white flour which is so much sought after is far less nutritious than what is termed middlings, or unbolted flour. The most nutritious ingredients of the grain — the wheat phosphates and gluten — are removed to obtain the desired whiteness. Dr. Henry McCormic, an eminent physician of Belfast, Ireland, in some interesting remarks on the subject, says: "What I want to see everywhere is the preparation of whole-meal bread — bread including the bran-phosphates, so all-essential to good bread and the nurture of our flesh and bones. But I do not think that the working classes, to whom it is so important, will ever take to it fully until set the example by the more instructed classes.

The Medical Society of Hartford County, Md., extends a general invitation to the profession to be present at its approaching meeting, August 11th, at Bell Air.

Arts.

THE FRENCH SUBMARINE "DAVY" LAMP.

Since the invention of the "Davy" lamp — which, although a wonderful discovery, gives but a faint light, and is not perfectly secure against the dangers of explosion by fire-damp — the English government offered the sum of four thousand pounds as reward for the invention of a lamp burning without contact with the external air. Two young Parisian students of the Polytechnic school, MM. H. Liaute and L. Denoyel, have carried off the prize. An oxygen lamp has been already constructed, but it could only burn under water by means of a supply of air pumped into it by machinery which required four men to work. The newly invented lamp burns alone, carrying within it the necessary supply of gas. The *savans* denied that this could be done. A man, in the costume of a diver, recently desended into the sluice opposite the Mint, to the depth of eight feet; the lamp burned beneath the water, and at the distance of two yards from him the diver was able to inscribe with a diamond on a piece of glass the date and hour of the experiment. The lamp burned for three quarters of an hour in the water, and when it was hauled to the surface it was still burning, and the flame as bright as ever. It has been made by M. Delenil, constructor to the Polytechnic school. Not only will this invention prevent the danger of explosions in mines from fire-damp, but it will enable search for drowning persons, or for property lost by shipwreck, to be pursued with the utmost facility. — *Once a Week.*

WHAT CHEMISTRY HAS DONE.

Springing alike, as it were, from the application of the inductive philosophy to the investigation of natural forces and the utilization of natural laws, chemistry and mechanical science have gone hand in hand in their ministration to the comforts and conveniences of humanity; and while to mechanics we owe the myriad combinations of the five elemental powers which multiply many thousand-fold the capabilities of labor, to chemistry are due not only innumerable substances now essential to the enjoyments of civilized life, but many of the means which, like the telegraph, conduce directly to the mental elevation of the race. Yet amid the rumble and jar of workshop and factory, the scream of the steam-whistle and the whirr of the lathe, we are too apt to forget or undervalue the still and quiet agencies that, resulting from the reaction of different substances upon each other, have been among the most active of those that have built up and secured the advancement of all civilized lands.

The simple combination of charcoal, sulphur, and saltpetre gave birth to gunpowder, and soon the feudal system crept tottering to its fall; for when the missile could pierce the steel corselet of the knight as easily as the quilted jacket of the villein, the whole plan and principle of war was changed. In like manner, when chemists were able to show how the most astonishing phenomena could be accounted for by the operation of natural laws, the power over the people of necromancer and alchemist was gone, and the faith in witchcraft waned and passed to forgetfulness. It is not, however, by considering the general results arising from the development of chemical science that we can form the most correct idea of its value and importance, but rather by noting the changes which it has wrought in various departments of industry. For instance, applied in agriculture it has been the means of reclaiming barren fens and marshes until they waxed bonny with harvests as fair as those of more favored climes; in the metallurgy it has succeeded the "iron age," when the sword bore sway, by one in which the metal enters into almost every structure that men build for use or ornament, and is shaped into ships whose voyages are longer than those of the barques that sailed to Tarshish in the olden time; in the art of the dyer, from substances viler than the slime that gathers on the sullen shores of "the lake of Asphaltites" it has brought forth dyes prouder than the purple which the Roman law made sacred to the use of noble and prince alone; and to mention another but comparatively minor illustration, in the simple manufacture of

soda-ash from common salt has so cheapened the cost of glass that the windows of the most ordinary dwelling may now be glazed in a manner that the lords of mediæval castles might well have envied. Thus, also, from the foul refuse of various manufacturing processes it distils odors as fragrant as those that the swart Moors sell in the bazaars of Tunis, and, including even the realm of humbug, gives to the wine-bibber a beverage which in aroma and bouquet he can hardly distinguish from the fermented juice of the Gascon vintage. Notwithstanding that chemical science has been thus productive of colossal results and has been extended until the labor of years is required to enable a single mind to grasp it in all its branches, its capabilities for the future are far greater than its development in the past, and there are few departments in which the desire to investigate inherent in human nature can find freer play or more definite certainty of ultimate reward. Even in the most widely extended and best studied branches of industry there is scarcely one in which chemical problems are not found that have baffled the skill of the wisest experimenters, as witness the impossibility of extracting the entire proportion of gold from gold-bearing quartz, of making iron from pyrites, however abundant, or of eliminating sulphur and phosphorus from steel and iron in the operations of manfacture; so also organic, less understood than mineral, chemistry, offers ample opportunities for the production of new materials which, like vulcanite, could find a ready place and application in the arts; and if we add to these those objects, like the manufacture of diamonds, which have been sought in vain for ages, yet which are believed with good reason to lie within the range of possibility, it is plain that chemistry offers an empire of research and discovery of which only the border provinces have thus far been reached. — *Am. Artisan.*

ZODIACAL LIGHT.

We present to our readers with much pleasure the views of Dr. Antony, of Huntsville, Ala., regarding the origin of the optical phenomenon known as the zodiacal light. Dr. A. is a gentleman of much culture, and a careful student in natural science; and we trust his brief note may lead to some further discussion of this interesting subject: —

Dr. Nichols, — I propose a solution of this mooted question in natural philosophy; and, really, the solution, to my mind, is so simple, and, when stated, so self-evident to any person at all conversant with the movements of the heavenly bodies, and the acknowledged laws of light, that I hesitate, and to give it publicity have long hesitated.

I make a short extract from a letter I wrote long since to a friend on this subject: —

"Standing on the most southern spurs of the Cumberland mountains, Huntsville, North Alabama, at evening, I see the sun go down in the west. As the night closes in upon me, I perceive a *rising* pyramid of light springing up from the point in the west where the sun went down. As the curtain grows darker, the pyramid rises higher and higher, until it culminates; and with the same even movement, the apex of the pyramid begins to sink; then lower and lower, until it passes away, leaving the uniform dark margin of the horizon.

"Before the morning, I look toward the east, and see an analogous pillar of light gradually project itself upon the face of the east, not to sink, as it did in the evening below the western horizon, but to pale and fade away and be lost in the *direct* (incident) rays of the advancing solar light. This, at times, beautiful meteor, is what is termed by philosophers the 'zodiacal light.'

"The base of this pyramid rests on the horizon; and a line drawn from its apex to the centre of its base is sometimes vertical,* and at others is inclined at varying angles to the visible horizon, *depending on the latitude of the sun.* A number of questions here present themselves, but in a hurried letter I cannot review them, nor do you wish it. So I will simply answer your question, 'What do you believe the zodiacal light to be?'

"The pyramid of light I see in the west *after* sunset is the *reflected* rays of the solar light as it is *turned* up into space from its *incident* rays as they strike the waters of the Pacific Ocean. The 'angle of reflection being equal to the angle of incidence,' of course, as the sun passes further and further west, the incident rays strike the Pacific further and further west; so the reflected rays, preserving their relationship to the incident, pass also further and further west, until they culminate, and then are themselves *turned back* and lost also in the night.

"The morning 'light' is but a reversal of the evolutions of the evening before: the column of *reflected* light becomes the herald of the incident and the sun himself, the author of both. The *evening* pyramid is a child of the Pacific, the *morning* pyramid is born of the Atlantic Ocean.

"What I have written may not be the truth; but the rationale has, in the absence of authority, served to satisfy my mind on this subject. Certainly I am not satisfied with present published statements of astronomers in the premises; indeed, they are not themselves satisfied with their own 'revolving meteoric rings,' etc., etc.

"The view taken is in harmony with all the laws of light and philosophy *I* may bring to bear on it. I hope I have at least made *you* understand what I mean." . . . .

If this be the truth, or calculated to elicit it, and you think it worth the trouble, I shall be pleased to see it presented in the columns of your most excellent *Journal of Chemistry*. I am, your servant and well-wisher,

Respectfully,
E. L. Antony, M.D.

Huntsville, Ala., July 23, 1868.

* Would be perfectly vertical if I stood on the equator instead of on 35° N., the sun setting due west.

AIR-GUNS.

Assassinations by shots from air-guns frequently occurring, have excited a good deal of curiosity as to the nature of this weapon, which, though little known in this country, may be found in England in all the larger stores where fire-arms are sold. It is in that country regarded and used more as a toy than in any other way, though it is considered so dangerous in France that its sale is forbidden by law.

Air-guns are mostly of two kinds, the air-gun proper and what is known as the "air-cane." The common form of air-gun is to all external appearance substantially like an ordinary rifle, until it is to be used, when a spherical reservoir containing air, which has been previously compressed into it by a pump, is screwed on under the breech. The discharge is effected by pulling the trigger, which opens a little valve by which a portion of the air is let out from the reservoir into the chamber of the gun behind the bullet. The report is very slight. In another form of the gun the air-reservoir is in the form of an additional barrel parallel with the barrel through which the bullets are discharged. As many as thirty shots may be discharged without replenishing the reservoir; but only a few of these have any great penetrative force, as at every discharge the pressure of the air in the reservoir is reduced, and of course its force diminishes at every successive discharge.

The air-cane consists of a barrel about the length of an ordinary walking-cane, with a head in a form something like a pistol-stock, and the air-reservoir, with the trigger, is generally in the form of a box, which is slipped on over the barrel when it is to be used. The principle of its action is the same as that of the gun. There have been, however, several modifications of both the air-cane and air-gun.

The Invention of Vulcanized Rubber. — After long years of effort and disappointment, Charles Goodyear stood apparently as far as ever from the attainment of his object; until one day, while in earnest conversation regarding his proposed invention, he emphasized an assertion by flinging away at random a piece of rubber combined with sulphur that he held in his hand. The fragment fell upon the stove, was subject to a higher heat than that to which he ever ventured designedly to subject the material; and when it was recovered it was found to possess the qualities for which he had sought so long; cold did not harden and heat did not soften the waterproof and elastic mass. And thus sprang forth the germ of an invention that has built up a new branch of manufacturing industry, given employment to thousands of operatives, and added in myriad forms to the conveniences of life. — *Am. Artisan.*

"A New Lute for the Laboratory." — A scientific journal contains a paragraph under this heading which we cannot altogether understand, for it alludes to zinc-white, fine sand, and other things not usually employed in the manufacture of musical instruments. However, as the laboratory is to have a lute, we are only too happy, as lovers of science, to present a song for the lute: —

Oh! come where the cyanides silently flow,
And the carburets droop o'er the oxides below;
Where the rays of potassium lie white on the hill,
And the song of the silicate never is still.
Come, oh, come!
Tumti, tum, tum!
Peroxide of soda, and urani-um!

While alcohol's liquid at thirty degrees,
And no chemical change can affect manganese;
While alkalies flourish and acids are free,
My heart shall be constant, sweet science to thee!
Yes, to thee!
Fiddledum dee!
Zinc, borax, and bismuth, and HO+C.
—*London Fun.*

Preparation of Whitewash. — Whitewash is one of the most valuable articles in the world, when properly applied. It not only prevents the decay of wood, but conduces greatly to the healthiness of all buildings, whether of wood or stone. Out-buildings and fences, when not painted, should be supplied once or twice every year with a good coat of whitewash, which should be prepared in the following way: — Take a clean water-tight barrel, or other suitable cask, and put into it half a bushel of lime. Slake it by pouring water over it, boiling hot, and in sufficient quantity to cover it 5 in. deep, and stir it briskly till thoroughly slaked. When the slaking has been thoroughly effected, dissolve it in water, and add two pounds of sulphite of zinc and one of common salt; these will cause the wash to harden, and prevent its cracking, which gives an unseemly appearance to the work. If desirable, a beautiful cream color may be communicated to the above wash by adding three pounds of yellow ochre; or a good pearl or lead color, by the addition of lamp, vine, or ivory black. For fawn color, add four pounds of umber, Turkish or American, the latter is the cheapest, one pound of Indian red, one pound of common lampblack. For common stone color, add four pounds of raw umber, and two pounds of lampblack. This wash may be applied with a common whitewash brush, and will be found much superior both in appearance and durability to the common whitewash.

A New Ink for Printers. — A new ink for printers has been invented by Prof. Dr. Artus and Mr. Fleckstein, a master-printer at Lichtenhain, near Jena, which ink is said to be a complete success. The composition of it is as follows: —

Venetian turpentine, $4\frac{1}{2}$ ounces; fluid soap, 5 ounces; rectified oleine, 2 ounces; burnt soot, 3 ounces; Paris blue (ferrocyanic acid), $\frac{1}{2}$ ounce; oxalic acid, $\frac{1}{4}$ ounce; distilled water, $\frac{1}{2}$ ounce.

The mixing process of this new, beautiful, and cheap ink is described as follows: —

Gradually warm the turpentine and the oleine together; put the soap on a marble plate, and gradually add, continually rubbing, the mixture of turpentine and oleine; when well mixed, add the burnt soot, which must be well powdered and sieved before; then add the Paris blue, dissolved in the oxalic acid, continually rubbing the composition on the stone, the Paris blue and the oxalic acid having been mixed before with water in the above-given proportions. A solution of soda in water is sufficient to thoroughly cleanse the type.

Bleaching Woollen Rags. — These are most effectually bleached by the application of sulphurous acid. Of course, in many instances, the color of the rags, supposing the same to belong to the class of dyed or printed goods, will be also destroyed. Chlorine cannot be used for this purpose, for two reasons: first, because it causes woollen and silk fabrics to become yellow; and, secondly it impairs the strength of the fibre, by entering into chemical combination with the wool, silk, and other similar substances of animal origin; as, for instance, sponge, animal gut, isinglass, etc.; all of which, if requiring bleaching, are bleached by sulphurous acid.

Blue-Black Writing-Ink.

Take of Aleppo galls, bruised	5½ ounces.
Cloves, bruised	¼ ounce.
Sulphate of iron	1½ ounces.
Sulphate of indigo, in the form of a slightly acid paste (sulphindylate of potash ?)	1½ ounces.
Sulphuric acid	35 minims.
Rain-water, cold	40 ounces.

Macerate the galls and cloves in 20 ounces of the water for a week; decant the liquor, and add to the residue of the solid ingredients 10 ounces of the water, with which continue the maceration for four days; then decant as before, and repeat the maceration with the remaining 10 ounces of water for another period of four days. Mix now the whole of the liquors, recovering from the galls all that can be obtained by squeezing them in a cloth, and afterwards filter. To this add, first, the sulphate of iron, then the sulphuric acid, and lastly, the indigo paste. Care must be taken that the indigo does not contain much free acid.

Effects of Lightning. — M. Becquerel related to the Academy the fact, that during the violent storm of June 21, a workman who was at some distance from the point struck by the lightning underwent a violent shock, from the effects of which he did not recover for two days. All the nails were torn out from the sole of one of his boots, which M. Becquerel exhibited as a proof of the occurrence. Several academicians cited similar facts, and, among others, M. E. De Beaumont an instance of where the nails were torn out from the butt-ends of muskets. M. Morin also alluded to a pile of balls placed near a powder depot that was overturned two successive days during two storms, which destroyed the lightning conductor. Marshal Vaillant also mentioned the case of a man struck by lightning, one of whose shoes, picked up at a great distance, was found to have had all its nails drawn.

Fexible Sulphur. — By adding to pure sulphur a four-hundredth part of chlorine or iodine it becomes very soft, so that it may be spread in thin leaves as flexible as leaves of wax.

Agriculture.

HOW AND WHEN TO PRUNE.

Pruning trees of any kind, shrubs, vines or bushes, as they should be pruned, is a science requiring the exercise of more skill and mature judgment than is requisite to do any thing else connected with the growing of plants and fruit, from the time the tiny seed is laid in the fertile soil until the branches are bending beneath an abundant yield of luscious fruit. Fruit-growers talk about pruning in the winter in some instances, and of pruning during the growing season. The true period to prune any thing, tree, brush, vine, or shrub, is, when such things are young and small, and always when the branches are growing. The best instrument that ever was employed for the purposes of pruning is the thumb-nail. No saw, axe, hatchet, or pruning-knife, will bear any comparison to the efficiency of a strong thumb-nail, employed at just the right time. The writer knows what he is relating. He has reared and trained hundreds of fruit-trees and vines, which are now in full bearing, most of which were pruned with the thumb-nail. Occasionally a small pocket-knife was employed, to take off a branch that had been neglected so long that the thumb nail could not sever it. The pruning should begin with the swelling buds. The cultivator should have a perfect understanding of what he desires to accomplish by pruning. Before he severs a single bud, he should understand the laws of vegetable physiology so far as they affect the flow of sap. There is no chance for correcting bad mistakes in pruning. If one pinches off a bud that should remain, it will be ruinous to the form of the tree or bush. There was never a more egregious error promulgated than to allow a bush or tree to grow at pleasure for a few years, and then give it a thorough and severe pruning with saws and axes. Yet this is, and has been, the practice all over the country ever since trees were planted out; and the ruinous consequences of such pruning are manifest wherever large apple-trees are found, in the decaying trunks where large branches were cut off; and because the wounds were so large nature could not heal them. This is one of the prominent causes of the failure of the apple-crop in New England and in other localities. The correct way to prune is to set up before the mind a *beau ideal* of the form of tree or bush desired, even when the tender stem begins to put forth its buds. Then, all through the growing season, the buds should be watched closely. If a bud appears where a branch is not desired, pinch it off and leave buds on the main stem wherever a branch is desired. Grafts that are now growing from scions that were set last season should be examined frequently, to see if the main stems and lateral branches are all growing uniformly. If a bush, vine or tree, increase in length faster than the stem attains proportional strength and size, apply the thumb-nail to the very extremity to check the rampant growth. Grapevines, and berry bushes of all kinds, need pruning, by pinching off the extreme ends of luxuriant branches, after they have attained a suitable growth. In our latitude the best period to do this work is in July and August. After blackberry and raspberry bushes have grown about four feet high, it is far better for the productiveness of the bushes to pinch off the ends, and make the bushes thicken up nearer the ground than to allow the canes to attain ten feet in length and then cut off the ends. — *N. Y. Observer*.

RUST IN WHEAT.

The inquiry into the nature and causes of the red rust, by the Commission appointed for the purpose by the Governor of South Australia, has elicited a vast fund of information from the collected report of eight hundrea agriculturists; and, although the statements are in many respects very contradictory, the committee was enabled from them to obtain general results, which, while they showed the fallacy of the opinions advanced, established the fact that no condition of soil or climate is free from its ravages; nor will any precautions taken by the farmer prevent these. "The rust-spores," says Dr. Muecke, "are located and spread over the whole world; neither oceans nor mountains will stop them. They do not commence to grow and multiply until they meet the circumstances favorable to their existence and nourishment." The following statement is given in the report as the evidence collected by a member of the Legislative Council:

The red rust is caused —	Red rust also prevails —
1. By the exhaustion of the soil.	1. On newly cultivated lands.
2. By late sowing.	2. By early sowing.
3. By manuring.	3. Manure prevented.
4. White straw is the best.	4. Purple straw is the best.

Such are the contrary opinions — doubtless all adopted from observation and experience, but only proving that other influences than those adduced have operated, and will constantly operate, to neutralize general theories on this and many other subjects of natural history, more especially those relating to endemic and epidemic disease, in either the animal or vegetable economy. There is not a doubt that climatic conditions have the greatest share in the production of the red rust. A moist, warm season causes a florid development of vegetation, and opens the breathing pores of the plant, and so gives passages to the spores of the parasites which are continually held suspended in the air. These, entering the openings thus left, throw out their rootlets (*mycelia*), and, by intercepting the sap between the stem and the ear, impoverish the grain and destroy the crop. Dr. Muecke is of the opinion that the red rust never attacks the wheat plant unless it is otherwise diseased — in fact, that it is *an effect*, and not *a cause*, or, at least, a second rather than a first cause, being itself superinduced by the corrupted state of the juices of the plant. "Where the rust destroys," he says, "we may safely infer that the plants were in a suffering state before they were attacked. Nature does not allow morbidness to exist. * * * The red rust has not destroyed our crops; it has merely furnished the eruption thereto." But, "on the other hand," he says further, "it is equally true, that on vast surfaces the red rust has been the main cause of the destruction of plants in regard to the formation of the grain." A remarkable case in proof of this theory is stated in his letter. Part of a field of wheat, in which wild oats had prevented the wheat from growing, was cut for hay. Immediately the wheat sprung up healthy and vigorous, and developed full ears and fully grown grains; not a particle of rust was perceptible on these parts of the field, whilst the surrounding thick and high wheat was completely covered with it. The cause assigned is, that the wheat, in the one instance, did not grow till the time was passed in which the influences supervened that predisposed the plants; consequently, they became strong and healthy. While the red rust spores passed over them they were not infected, because the spores did not find the conditions of their existence — that is, diseased sap and weak cells — upon them. This is clear enough; because, surrounded as these mown spots must have been by the wheat on which the rust prevailed, the former could not have escaped if the same conditions had prevailed in them as in the other.

We have before this had occasion to speak in terms of admiration of the enterprising spirit of our countrymen and fellow-subjects across the Pacific, in regard to the advancement of agricultural principles; and this highly scientific inquiry is another additional proof that, in this respect, they are far in advance of the farmers generally of the United States, who go, from first to last, on the principle of exhaustion of the soil. These, indeed, may be compared in progress to an invading army, leaving everything destroyed behind them so far as the land is concerned. — *M. L. Express*.

PHILOSOPHY FOR THE LADIES—PIE-JUICE.

The time is now fast coming on for fruit-pies, and therefore, for pie-juice; and as our readers strive at all points for the practical and useful combined, we intend to offer a suggestion for "the better arrangement" of pie-juice. Some people place an inverted cup in the pie, thinking this catches juice that would otherwise boil over, but that is a mistake, for though juice is found under the cup when the pie has cooled, yet it never entered the cup while the pie was in the oven, for this simple reason — the inside of the cup was as hot as the inside of the pie. The case of inverting a cup in the pie does more harm than good, for, as the heat cooks the fruit, it also expands the air in the cup, which tends to blow out the juice from the dish. But if a small hole, say a quarter of an inch, be made in the bottom of the cup, which, of course, comes to the top of the pie, when inverted in the dish, the hot air will escape into the oven, and leave room for the juice to run into the cup, which, again, will descend amongst the fruit on the pie cooling. "Now how are we to make this small hole in the bottom of the cup?" says the reader. "Listen and you shall hear," says the writer. "Take a six-inch flower-pot, fill it with dry sand or mould; then take your cup, invert it, and push it down into the mould, or sand till only the top is just seen, by which means the inside of the cup is as full of sand or mould as it will be of juice when in the pie; then take a sharp-pointed instrument, like an old pair of scissors, or a one-pronged fork, and begin to peck away little by little, and you will soon have a small hole, which can easily then be made bigger before taking the cup from the flower-pot. The sand or mold prevents the cup from cracking or breaking during the chipping process. When the cup is used invert it in the pie, but take care that the small hole is free from the crust." Here is a very simple contrivance that will soon prove itself. A grand plan is to make three pies, one without any cup, one with a cup, and one with the cup with the hole in; then you can see the difference. — *Gardener's Magazine*.

Should a Farmer be more than a Farmer? — We think he should. He should be a mechanic as well; should know something more than

> To plow and to sow,
> To reap and to mow.

He needs the ability to repair his tools; to understand how to keep his implements in proper condition without being entirely dependent on the blacksmith or machinist; to be able to do carpentering work, to patch and mend harnesses, to mend his tinware, and do many other jobs which the denizens of towns and cities find it more convenient to turn over to those who make these repairs a specialty. — *Scientific American*.

Boston Journal of Chemistry.

BOSTON, SEPTEMBER 1, 1868.

☞ Any one sending us the names of three subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For five subscribers we will send the Petite Microscope; for twenty-five we will send, in addition to the microscope, a copy of "Stockhart's Chemistry for Students," the best elementary treatise yet published; for one hundred subscribers we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug-stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. Downes is general travelling agent for the *Journal*.

☞ The *Journal* is carefully mailed to each subscriber every month, and if it is not promptly received, the blame must rest with the Post-office department. We are sorry our subscribers fail so often to obtain their papers.

☞ We can furnish several sets of Volumes I. and II. of the *Journal*, with two numbers wanting in each volume. As no articles are continued, and each number is separate and independent, this break in the volumes is not of much consequence. By remitting one dollar the papers will be sent.

☞ We hope our friends and patrons will remit to us as soon as possible the pay for Volume III. A few owe us still for Volume II. The subscription price is but a trifle; but it is the aggregate of these trifles that we depend upon to pay expenses of publication. The enlargement of the *Journal* has increased expenses several thousand dollars, and it is doubtful if they can be met at the present low price of subscription. We expect no remuneration ourselves for the labor bestowed upon it; but the numerous friends of the *Journal* must promptly furnish the means to pay the paper-maker and printer.

PLANCHETTE.

We make no apology for presenting in this number rather a long article upon planchette. It serves as the text for the expression of views upon a subject of wide-spread interest, — a subject which is pressing itself upon the attention with a force it is impossible to resist. As nothing is positively known or understood regarding this strange class of phenomena, it is better to admit our ignorance than to dogmatize or theorize or play the part of the empiric in its treatment Looking at it from a scientific stand-point, the whole matter appears *absurd, vulgar, impossible!* But *facts* are stubborn things; and if the reader has not lived long enough to find in his experience that impossible things become living realities, he has only to turn back the pages of history to become convinced that such has often been the case. No longer ago than 1839, M. Velpeau, the most distinguished surgeon of France, used this language in relation to the attempts made to discover anæsthetic agents:

"Eviter la douleur dans les operations est une chimere qu'il n'est pas permis de poursuivre aujourd'hui." "To avoid pain in surgical operations is a *chimera* which it is not permitted to follow at this day."

The idea of painless surgical operations was derided as a *chimera* by the great surgeon thirty years ago. To us, living in this year of our Lord 1868, it seems as if he was certainly mistaken in his views. *Doubts* are nothing, *facts* are every thing.

We would open our columns to discussions regarding planchette and kindred topics, but we incline to believe that among the thousands of our readers there are no new facts or theories hardly worth presenting. Theories and peculiar views regarding the phenomena are plenty enough, but manifestly we have not reached a point in its investigation where such are of much value. We are willing to receive brief communications; and if, upon careful perusal, they are found to present new and important facts, we will publish them, not otherwise.

GILDING GLASS.

The processes for silvering glass have been much studied, and have been brought to a high degree of perfection. Unfortunately, however, the silver coating in a short time loses its lustre, and the glass must then be resilvered. W. Wernicke has contrived a method by which a layer of gold is deposited upon the glass, forming a gold mirror, which he claims has many advantages over the silver one. His method has been simplified by Prof. Böttger; and by following the latter's directions we get most satisfactory results with great rapidity and ease. Three solutions are required: 1st. A solution of terchloride of gold, prepared by dissolving one gramme of pure gold in as little aqua regia as possible, evaporating almost to complete dryness, to drive off free acid; dissolve the chloride of gold in 120 c.c. of distilled water. 2d. A solution of caustic soda, made by dissolving six grammes hydrate of soda in 100 c.c. of distilled water. 3d. A reducing solution, prepared by dissolving two grammes of ordinary grape-sugar in 24 c.c. of distilled water, and adding 24 c.c. of 80 per cent alcohol, and 24 c.c. of ordinary aldehyde, of .870 sp. gr. The reducing solution cannot be kept unaltered more than a day, and should therefore be made only as required. The above solutions having been prepared, the process itself is very simple. The glass to be gilded must of course be first made *perfectly* clean. Then pour into a separate mixing glass four parts by volume of the gold solution, one part by volume of the soda solution, and one sixteenth part of the reducing solution; pour into the glass to be coated the mixed liquid, which should not more than half fill it; move the glass about in such a manner that its interior shall be thoroughly moistened by the liquid; allow it to stand, and in five minutes a beautiful lustrous coating of gold will be deposited upon it. Only a small part of the gold used attaches itself to the glass; the rest is precipiitated in a flocky state, and can be filtered off and redissolved.

CASE OF SPONTANEOUS COMBUSTION.

Editor Journal of Chemistry: —

Having noticed several accounts of the spontaneous combustion of oily rags in your very valuable paper, I thought I would report a case that came under my observation. J. R. called on me to dress a severe burn on the forearm. I applied cotton, saturated with linseed oil, until I could prepare a better dressing. After the cotton was removed it was thrown out of doors, where it remained several hours, when it was observed to be burning. It was extinguished before it was entirely consumed; and I am able to send you, inclosed in this letter, a small piece of the charred cotton. It was a clear case of spontaneous combustion, and one of a somewhat unusual character.

Bela Cogshall, M.D.

Gaines, Michigan.

Remarks. — Cotton, rags, sawdust, shavings, etc., when saturated with linseed oil, are very dangerous, as has been clearly shown in this *Journal*. Let our readers be on their guard, and save their buildings from destruction by the silent incendiary.

OUR MEDICAL JOURNALS.

We are proud of American medical literature. The increase in number, size, elegance of typography, and the ability and culture displayed in the conduct of these journals, afford clear evidence of the rapid progress making in medical science in this country. Medical literature and medical schools among us, with perhaps a few exceptions, occupy as high positions as those of any European country; and were it not for the system of special instruction in special departments which prevails abroad, students would find very little advantage in transatlantic study. As regards the journals, none of those that reach us from England or the continent compare in elegance of typographical execution, or excel in originality and value of contributions, with the *New-York Medical Journal*, conducted by Dr. Hammond. This journal, printed upon tinted paper, with new, clear type, is a perfect model of neatness and beauty.

For variety of topics discussed, and for industry displayed in collecting facts and cases, what foreign journal compares with the *Philadelphia Medical and Surgical Reporter?* This journal is filled with medical and surgical news, and hardly any thing occurring in the circle of sciences, to which it is devoted, escapes its notice. The great West has determined not to be behind its eastern cotemporaries, and sends us the *Chicago Medical Journal, Leavenworth Medical Herald, Cincinnati Lancet, St. Louis Medical Reporter*, and many others of the highest excellence and value. From the South, we receive the *Richmond Medical Journal, Southern Journal of Medical Science, Nashville Journal of Medicine and Surgery, Atlantic Medical and Surgical Journal, New Orleans Medical and Surgical Journal.* From California, we receive the *Pacific Medical and Surgical Journal*, all of which are full of interest and instruction to students and practitioners of medicine. We most sincerely hope our excellent medical journals will receive liberal support from the profession, as no one in active practice can afford to be without their weekly and monthly visits.

Sunstroke. — It is probable that more casualties of the nature of sunstroke have occurred the past summer in this country than ever before in a single season. The phenomenon is, in many respects, remarkable, and imperfectly understood among medical men. In these instances, it is difficult to believe that death is caused by heat alone, as the human body has been proved capable of withstanding for a long time much higher temperatures without injury. Perhaps the sun's actinic rays may have something to do in producing the fatal results. The best treatment is, undoubtedly, the cold douche, with vesicating substances applied to the bare scalp, and quinine or other tonics administered internally. Bleeding is condemned by the highest medical authorities.

"The Scientific American." — This journal is certainly one of great value. We have read it with interest for twenty years, and it is among the first papers inquired for by our children when the time for its weekly visit arrives. It is full of important suggestions and scientific facts; and we think it has done more to elevate and stimulate thought among the laboring classes, than any other journal published in this country or Europe. Many years ago we received a suggestion from its pages, which was worth to us pecuniarily several *thousand dollars*. It is probable others can make a similar statement. We are led to make those observations in justice to an excellent journal. It is published by Messrs. Munn and Co., New York.

QUESTIONS AND ANSWERS.

☞ Questions designed to be answered in the *Journal* must be of general interest to its readers. Questions designed to benefit individual interests solely cannot receive attention either through the *Journal* or other channels of communication.

D. B. N. F., *Amherst, Mass.* — Are pine shavings used for bedding for horses and thrown out upon the land with manure injurious?

No. They serve as effective absorbents for the liquid excrement; and, when left in contact with manure, usually undergo putrefactive change, and become themselves fertilizing agents.

I. M. T., *Lebanon, N.Y.* — How does lightning produce fatal effects?

Electricity is capable of causing disintegration and destruction of living tissues. How it accomplishes this is not known, and probably never will be. The flesh of persons struck by lightning is sometimes lacerated as if torn by a cannon ball; in other cases no physical injuries whatever can be detected. The concussion, the movement of the imponderable agent itself, whatever it may be, is probably capable of arresting vital action, and causing death.

I. B. M., *Logansport, Ind.* — Are old bones which have been lying about exposed to the elements worth any thing for making superphosphate?

Certainly they are. Their value for this purpose is even greater than fresh bones loaded with flesh and gelatine, as from these organic products no phosphoric acid is obtained. No matter how old bones are, their phosphatic value is never destroyed until full decomposition takes place.

J. L., *Reese's Mills, Ind.* — Is there any remedy known that will promote the growth of the human hair, or prevent it from falling out?

It cannot be said that there is any such remedy. An immense variety of nostrums are manufactured and vended which are alleged to possess the power of restoring hair; but they uniformly fail to meet the want. Cold water applied to the head with vigorous rubbing is thought by many to be beneficial; also a weak tincture of capsicum or cantharides has been used with supposed benefit.

A. S. M., *New Bedford, Mass.* — "Earth currents" is a term used in telegraphy, and signifies the returning current from a battery passing back to the battery through the earth. In communicating, the ground or earth beneath the wire serves the purposes of another wire, and forms a circuit. This is a most interesting point in the system of telegraphing. At the White Mountains, in New Hampshire, the wire is carried to the top of Mt. Washington; and it is a singular fact, that no earth current can be secured from the top down the sides of the mountain. The solid granite seems to be deficient in conducting power. The electricity will travel through the base of the mountain, but not down the sides.

Vesta, *Brooklyn, N.Y.* — I burn gas in my library, and I imagine it has a deleterious effect upon my books; the covers are inclined to crack, and the guilt lettering upon the backs has changed to a dark hue, or become entirely effaced. Is this due to the gas?

It probably is; and it proves that it is of bad quality or not properly purified. It contains much sulphur, which, in burning, generates sulphurous acid, and this does the mischief referred to. Bring the matter to the notice of the gas company, and if they do not promptly remedy the evil, make complaint to the city authorities or board of health, and have it abated. This impure gas is injurious to health as well as to books, and must not be used in dwellings.

S. M. N., *St. Johnsbury, Vt.* — I have read your article upon tobacco with great interest. The views presented are undoubtedly true; tobacco is injurious; but I am wedded to it. Can you suggest a substitute?

If you are convinced it is injuring you, why not summon resolution enough to quit its use? We cannot recommend tampering with "substitutes." A manly determination to break from an evil habit once fairly formed in the mind, and the work is done.

B. A. L., *St. Paul, Minn.* — The vapors from an ignited brimstone match are injurious, and sometimes have caused serious illness. Sulphur burned in the open air, by uniting with oxygen, develops sulphurous acid. This is a suffocating, deleterious gas, and the fumes of burning matches should not be breathed into the lungs.

Housekeeper, *Concord, N.H.* — In cooking meat by boiling, is it better to place it in hot water at once, or in cold water, and gradually bring it to the boiling point?

When meat is placed in boiling water, the effect is to coagulate or harden the albumen upon the *surface* immediately. This coating resembles the white of a hard-boiled egg, and serves to protect the albumen and juices of the interior from a like coagulating process. The conduction of heat to the interior is impeded, and the cooked meat is retained in a delicious, juicy condition. Cold water permeates the fibres of the meat, and as it becomes hot, heat is conducted through the pores, and the whole mass becomes hard from the coagulation of the albumen. It is therefore better to immerse meat to be cooked by boiling in hot water at once.

Atmospheric Light. — Several of our readers inquire if we can furnish the apparatus for producing the atmospheric light described in the last number of the *Journal*. We cannot. Our object in publishing the account of our experiments twenty years ago was to throw the whole matter open to the world, so that every one could avail themselves of the benefits of the invention. The various machines called automatic, pneumatic, eureka, portable, gasoleine, etc., advertised in almost every city, are atmospheric air machines, and do not manufacture *gas*. The principle of passing air through light naphthas, and conveying the vapor-charged air to burners, is precisely the same as that described by us. Instead of the airometers, a machine resembling a gasmeter is used to drive air into the naphtha. This is turned by a weight, and affords a steady current, which is very convenient. We hardly know which is best of these air machines. They are all essentially alike. It is important that they should be thoroughly constructed, and that very light naphthas should be employed. In the Middle and Southern States, the climate is sufficiently mild to admit of the successful working of the air-lighting apparatus at all seasons of the year; but we can hardly recommend their use in the rigorous climate of the North and West.

To Correspondents. — The circulation of the *Journal* is so large in every State of the Union, that it has created a correspondence we are entirely unable to manage. All strictly business letters which can be placed in the hands of clerks will be promptly attended to; but letters of inquiry and those of a professional character, of no special interest to any one but the sender, we cannot reply to. We have no objections to receiving such letters; but it must be distinctly understood, that no answer will be returned unless we have moments of leisure, which we are not favored with at present.

Bromide of Potassium. — Very much of the commercial bromide of potassium contains chlorides as an adulterating material. Some specimens contain ten per cent; others not more than four or six per cent. It has been observed by some practitioners, that the salt in their hands did not produce the results expected, or that it did not have a pleasant effect upon their patients. This probably arises from employing an impure article, or one containing the chloride of potassium. The pure bromide is certainly a safe and highly useful remedy; a remedy which intelligent physicians would be unwilling to dispense with in their practice. The impure article can be detected only by careful chemical examination.

The Ramie Plant. — We have received from Dr. Antony, of Huntsville, Ala., specimens of the products of the new *Ramie* plant, which awaken much interest. The fibre is very long and fine, and resembles silk or fine flax more than cotton. The specimen of cloth manufactured from it is very fine, and we think a sensation will be created among the ladies when such beautiful goods are thrown upon the market. The growth of this new plant in some of the Southern States is very promising. It is a native of the Island of Java, and has but just been introduced here. Dr. Antony writes us that he will have cuttings this autumn to the number of three or four thousand, and he manifests much zeal in its cultivation.

NEW PUBLICATIONS.

A Theoretical and Practical Treatise on Midwifery, including the Diseases of Pregnancy and Parturition. By P. Cazeaux, Member of the Imperial Academy of Medicine, etc., etc. Revised and Annotated by S. Tarnier, Adjunct Professor in the Faculty of Medicine, Paris, etc., etc. Fifth American from the Seventh French Edition. By Wm. R. Bullock, M.D. Philadelphia: Lindsay & Blakiston. 1868

Physicians and students will welcome a new edition of Prof. Cazeaux's great work on midwifery, carefully revised by Prof. Tarnier. This is a classical book, and the highest authority upon the subjects of which it treats. The death of Cazeaux, the distinguished author, was a great loss to medical science. But few writers could speak from so wide experience, and very few place the results of their observations before the reader in so clear, logical, convincing manner as Cazeaux. His work upon midwifery is a monument of his erudition, industry, and scientific skill; it is a book that should be in the hands of every student, and in the library of every physician. Prof. Tarnier has annotated the work in a very satisfactory way; all the recent facts and discoveries connected with the subject are incorporated into the text, and the work is rendered thorough and complete. Dr. Bullock, as translator, has done his part exceedingly well; and both he and the enterprising publishers deserve the thanks of the whole medical profession for placing this magnificent work within their reach.

A Manual on Extracting Teeth. By Abraham Robertson, D.D.S., M.D. Second Edition. Philadelphia: Lindsay & Blakiston. 1868.

The author in this work enters a new field, and places in the hands of dental surgeons a treatise, the first of the kind ever published. The matter of teeth extracting is one which comes painfully home to every masticator of food, and the number of such is somewhat large. We are all interested in having every thing new, and all useful appliances connected with this department of dental surgery known; and this unique little book meets a want long felt, and will, we think, meet with a rapid sale.

DENTAL MATERIA MEDICA. Compiled by JAMES W. WHITE. Philadelphia: Samuel S. White. 1868.

A very convenient compilation, and one long needed by dentists. It gives every thing new and useful regarding the whole subject of dental *materia medica*, and must serve as a handbook for the profession.

THE HALF-YEARLY ABSTRACT OF THE MEDICAL SCIENCES. Vol. XLVII. January — July. 1868. Philadelphia: Henry C. Lea.

Physicians can hardly feel that they are fully informed in relation to progress in medicine and surgery, unless this half-yearly abstract comes regularly to their tables. It is an admirable abstract, compiled and selected with great care by those fully competent to perform the work.

PLASTICS: A New Classification and a Brief Exposition of Plastic Surgery. By DAVID PRINCE, M.D. Philadelphia: Lindsay and Blakiston. 1868.

This work is an excellent *résumé* of the existing state of the art and science of which it treats, and we presume will meet with much favor with the profession everywhere.

Medicine and Pharmacy.

MINNESOTA AS A CLIMATE FOR CONSUMPTIVES.

We have received from Dr. B. Mattocks, Superintendent of Health, St. Paul, Minn., a communication regarding consumption, and the influence of the climate of Minnesota upon that disease, a part of which we present below. The remainder will be given in the October number of the *Journal*. Authentic statements of the kind, or views coming from reliable authority, are read with interest by medical men:—

ST. PAUL'S, Minn., July 30, 1868.

Ed. Journal of Chemistry:—

Pathologists years ago supposed that consumption was essentially an inflammatory disease of the lungs, the primary stage of which was a pneumonia, tubercles following in consequence. Therefore the treatment must of necessity be the "lowering." Vitality being in excess, the indication was to reduce to the normal standard of health. Bleeding, blisters, mercury, and emetics were the remedies. The patient must be closely housed.

The disease is now viewed differently; instead of an increased vitality, we find just the contrary to be the case. We understand to-day that consumption means, not strictly speaking a local disease of the lungs, but a constitutional malady, the local manifestation of which is generally in the lungs, or it may be in the brain, joints, or bowels; yet it nevertheless is consumption, or "wasting disease;" and, furthermore, it is consequently upon a diseased vitality. It would be almost an anomaly to see a person in robust health with tubercles; yet a person is liable to an inflammation of the lungs, be their health never so good.

The first known stage of consumption is the deposit of tuberculous matter in the lungs. Some of our modern writers suggest a pretubercular stage, — a condition of ill health peculiar to phthisis, yet anticipating the formation of tubercles. This stage is characterized by the loss of appetite, a feeling of weakness and debility, loss of flesh, digestion is impaired — it is a form of dyspepsia; in a word, before the lungs assume a diseased condition the organs of digestion do, and the decline commences. Now this state of disease may be brought about by an existing predisposition to tubercles, or there may be no hereditary taint; but there must first be a diseased nutrition. That consumption can be cured has long ceased to be a question: it is a settled fact. Lung tissue that is gone cannot be replaced; neither can medication remove a tubercle, nor is there any remedy that will absorb it. Nature performs the cure in one or two ways, either by softening the cheesey mass, and voiding the same by expectoration, or by converting it into a chalky concretion, and inclosing it in a cyst. In the first place, under favorable circumstances, the remaining cavity heals; and in the second instance the mass remains innoxious, like a bullet imbedded in flesh, where, perhaps, it may remain for a lifetime. By a homely illustration, I will perhaps be better understood by non-professional readers.

Supposing a person receive a charge of small shot in one lung, and survive the wound, what would be the result of a foreign body in the lung? Unless the circumstances were favorable, it certainly would produce death. We would at once observe all the symptoms of consumption. First, an irritating cough would be established, loss of appetite, fever-pain, and spitting of blood; should a bloodvessel ulcerate, a violent hemorrhage would result in consequence. In our effort to save the patient, what would be the very first indication? To remove him to a place of safety, where he will not subject himself to another charge of shot. The shot are in the lungs, and it is not in our power to remove them; but it may be in our power to prevent another deposition of them. Next we should try and place our patient in the most favorable condition for nature to perform a cure. If it was performed, it would be done as we have stated, by the shot sloughing out, or by being encysted. Now, during these operations of nature, in what way can we be of assistance? By supporting her in removing from her way all influences of an oppressing nature. All the surroundings must be favorable — air, food, and attention. 1st. We want our patient to breathe such air as will cause least irritation, and, while suppuration is going on, with the least exertion possible. 2d. We must nourish life with food suitable, — and here, too, we must economize strength, by furnishing such food as will give the most nourishment, with the least exertion to the stomach. I consider this all-important; it is the first to fail, it must be the first to recover. 3d. The surroundings must be pleasant. To insure this, the invalid should feel encouraged and hopeful. The liver must not be sluggish. Oftentimes consumptives improve faster with kind strangers away from home, than they do surrounded by sympathetic and grief-stricken relatives. 4th. After recovery we would not have the person forget that he has been sick, a fact too many lose sight of.

Now, in fulfilling these indications, where can a patient live with the least exertion to the lungs, and with the least irritation to the same (I do not wish to be understood as recommending no exertion of the lungs at all times; I refer now more particularly to the suppurating stage). Or, in a word, where is the best climate, all things considered, for a consumptive? According to the old theory of an inflammation existing, we should at once decide in favor of a warm, equable, moist climate. We should select the shores of the Mediterranean, Italy, South of France, perhaps Brazil, or Cuba. In our own country, the Southern States would be recommended. On the other hand, taking the present view of tuberculous disease, — viewing it as a condition of impaired vitality, with all the powers of life at their lowest ebb, lifeless and dispirited, — would it be safe, we ask, to send such a person to an equable climate, with nothing to cause a ripple in the waning stream of life; with no winds, rains, or storms; climate mild and pleasant all the year round? Could you make a climate to suit yourself, would you have an equable one? Certain conditions of the lungs, with certain temperaments, require just such a climate; as certain conditions of the body require poultices, the application of heat and moisture.

In the early days of medicine every thing must be poulticed; every wound must be "drawn." Erysipelas must have a poultice on. Heat must be drawn from a sprain by hot applications; cold from a freeze by the same means; and the great panacea for all sorts of sore eyes was a poultice to commence with. This has all changed; to poultice an eye now is to loose it; but yet who will deny that under certain circumstances a poultice is an absolute necessity. At times we here in Minnesota wish to apply heat and moisture to the lungs. We then prescribe an inhalent, either medicated or simply vapor.

A tonic, bracing air is now recommended for lung difficulties, a dry atmosphere, a healthy climate: such an one is Minnesota. The question is often asked, "Why is Minnesota a good climate for consumptives? What do you claim for your climate?" First, we claim that Minnesota is one of the healthiest, if not the healthiest State in the Union, all things considered. I conceive it folly to send a patient to India from England, to be cured of consumption, at the expense of a liver disease; or to the Mediterranean, to die of inflammation of the lungs; or to Cuba, or Florida, to die of cholera or yellow fever, or some disease of the bowels. The Mediterranean is a great resort for invalids; yet the natives to an alarming extent die of consumption. The same, I think, is true of the Sandwich Islands. In the city of Mexico they are to a wonderful degree free from phthisis; yet in other diseases they have an alarming mortality.

In St. Paul, Minnesota, in 1867, there were 251 deaths, of which about 50 were non-residents and accidents (by non-residents, I mean strangers who came here in the last stages of disease, but to die), leaving about 200 deaths by disease among our citizens. The general average of deaths the world over is about 22 per 1,000 inhabitants. Now St. Paul has a population of 18,000, and her death-rate is 11 per 1,000 inhabitants, just one half the average number of deaths. In the State at large, of course, the death-rate would be much less. Of these deaths in St. Paul, two thirds of them are of foreign birth, and a great part of them occurred in shanties, or rudely constructed hovels. From these 200 deaths, 17 died from consumption, or one in eleven. In New York and Philadelphia, the proportion is one in six or seven. Of these 17 deaths by consumption, all but three were of foreign birth. *But three Americans, in a city of* 18,000 *inhabitants, died in* 1867 *of consumption.* Justice claims that I state these figures are but for one year, the only year of data at my command.

In the census of 1860, Oregon had the fewest deaths in proportion to its population of any State in the Union; Minnesota next. At that time, however, there were few or no women and children in the State of Oregon.

STRENGTH OF CARBOLIC ACID SOLUTIONS.

Editor Boston Journal of Chemistry:—

Having occasion to employ carbolic acid in the city of New York, I sent to Hegeman & Co., 203 Broadway, to obtain, if possible, your "saturated solution." I received instead a vial marked "Sol. Carbolic Acid," with the statement that it was of Hegeman's own preparation.

Shortly afterward, I placed this vial on a shelf in Providence side by side with a vial of your "saturated solution;" and wishing to apply one of them experimentally to my own face, I took the first which came to hand (Hegeman's), and used it as I was accustomed to use yours. Instantly the skin became white from the characteristic carbolic acid burn, and I have since, for nearly two months, worn a red belt across my face. The vial obtained from Hegeman was not an *aqueous* solution, but the colorless concentrated fluid acid, containing from ninety to ninety-five per cent of pure carbolic acid, the remaining five to ten per cent consisting of other products of distillation.

The saturated aqueous solution contains, I suppose, not more than five per cent of carbolic acid. Here, therefore, were two articles sold as saturated solution of carbolic acid, one of which was nearly twenty times stronger than the other!

Within a day or two I have seen two other similar cases. A physician in the city of Brooklyn, N. Y., directed the application of "solution of carbolic acid" to an eruption on the forehead of an infant. The solution so called was duly obtained, and its application followed by a burn, of which the stain still remains after several weeks. A drop of the solution fell upon the hand of a lady at the same time, and a circular red stain still marks the spot.

Now I have not written this communication with the slightest intention of reflecting upon Hegeman & Co., of New York, or upon the druggist who filled the order in Brooklyn. But I wish to call attention to the importance of some distinctive nomenclature for the carbolic acid preparations. The concentrated fluid acid ought not to be called solution of carbolic acid, and perhaps the solution in water should be called saturated aqueous solution, to avoid the possibility of mistake.

The concentrated fluid acid is a dangerous substance to dispense, while the saturated aqueous solution is strong enough for every use, except as a caustic in the surgeon's hands. Unless the attention of physicians and druggists is called to the difference in these two preparations, serious accidents may result, prejudicing the use of carbolic acid, which is so simple and safe in its ordinary applica-

tions, while it stands pre-eminent in its power of destroying the organic germs of infection, zymotic poisons, ferments, etc., as well as parasites, and all the lower forms of vegetable and animal life, and while it has an application hardly less important, and perhaps hardly separable from this, to the skin, mucous membrane, and other tissues in diseased states.

WM. F. CHANNING, M.D.

PROVIDENCE, R.I., Aug. 1, 1868.

NEW TREATMENT OF ACUTE RHEUMATISM.

At St. Mary's we have noted of late several patients recovering from acute rheumatism, and learned something of the plan which has been adopted by Dr. Sibson during the last year, in all cases without exception. It may be described as embracing three points: 1st. Removal of pressure and tension of joints. 2d. An even and warm temperature. 3d. Removal or relief of pain. To accomplish the first of these ends, the patient lies in bed, and his joints are muffled in cotton-wool and flannel, a cradle being placed where the weight of the bedclothes is painful. For the second, the patient wears a flannel dressing-gown, and the blankets touch the skin of the lower extremities, sheets being placed only over the upper part of the bed. For the third, the linimentum belladonoæ of the Ph. B. is applied to painful joints, and covered over with wadding. Occasionally, where the pain is very excessive, from an eighth to a quarter of a grain of morphia is injected subcutaneously. For the rest, he has now and then found it useful to apply a leech or two to a swollen joint or to the cardiac region. In cases where there appears to be a gouty complication, Dr. Sibson employs a little iodide of potassium; but apart from this he does not give any potash to his patients. He tells us, in answer to an inquiry, that he finds the urine rarely containing acid after the first few days of treatment. As regards food, his experience and practice are not a little interesting. The patient is allowed from the first, roast-meat, rice-pudding, and porter. We ascertained, moreover, from inquiry of the nurses, that this diet was not only ordered by the Doctor, but was consumed by the patient with very rare exceptions. Some patients to whom we spoke confirmed this statement, and added also strong testimony to the immense relief derived from the application of belladonna in the way described. The nurses said that the patients generally slept well at ight.— *Lancet.*

TIN-LINED LEAD PIPES.

We present the following extract from a note sent to us by a gentleman of the highest scientific attainments, and the first authority upon points involved in the question at issue:—

DR. NICHOLS,—I was truly grateful for your article on tin-lined lead pipe. I wrote an article three or four months ago for a popular journal, exposing its dangers, which the editor declined to publish, on the ground that the weight of scientific testimony, as published by the company, was wholly in favor of the tin-lined pipe. I think we shall have frequent cases of lead-poisoning from it before long. Some years ago, I had a specimen sent me of tin-lined pipe quite honeycombed by the action of the water from the inside. A whole family had been poisoned in that case.

I believe by far the safest pipe into which lead enters at all is simple lead, coated inside with sulphuret of lead by pouring into the pipe a solution of sulphuret of potassium or sodium. This is liable to crack when the pipe is bent, or when the water in the pipe is frozen, *just as the tin lining is*; but where the coating is of sulphuret, there is no galvanic action to corrode the exposed lead, as there is where the lining is of tin.

NARROW ESCAPE FROM DEATH.—An apothecary yesterday put up chemically pure sulphuric acid, instead of the aromatic, as the prescription of the physician directed. Fortunately the physician visited the patient, a lady in the west part of the city, before the fiery dose was administered, and, discovering the blunder, saved the soul of the careless apothecary from the imputation of murder.— *Prov. Journal Aug. 4th.*

Dr. Edwin M. Snow, Superintendent of Health of the city of Providence, publishes the following, in the *Providence Journal*, July 29:—

"HOOPING-COUGH.—This disease is quite prevalent in the city at the present time, and though not often directly fatal, it is often most distressing in its effects, and leaves the system liable to other more fatal diseases. It has been stated that much relief has been found to the paroxysms of coughing by carrying children to the gas-works, and keeping them for hours exposed to the gases found there. But this is difficult and often impossible. In several instances recently, I have suggested the use of *carbolate of lime*, and in all cases it has apparently produced a marked effect in diminishing the frequency and severity of the paroxysms of coughing. Small quantities of the carbolate of lime are placed in saucers in the room where the child sleeps; merely sufficient to make the odor perceptible. The odor is like coal-tar, and if not too strong is not unpleasant. The carbolate of lime is about the same price as chloride of lime, and for all disinfecting purposes is far more valuable than the chloride of lime."

The *carbolate of lime* is a very valuable article, and its cheapness places it within the reach of all. For disinfecting stables, pigsties, cesspools, and to destroy flies and other insects, it is prompt in its action.

CARBOLIC-ACID VAPOR IN DIPHTHERIA.

DR. NICHOLS.—*Dear Sir:* Through your excellent *Journal*, which I hope reaches every one of our profession in New England, I would suggest the employment of carbolic-acid vapor, by inhalation, in diphtheria, in which disease I have found it of transcendent value. It seems to arrest putrefaction of the peculiar membranous exudation, and to change the whole condition of a case for the better, when the blood has evidently become poisoned by the air passing over it to the air-cells. Might not this mode also be useful in putrid or typhoid fevers of a grave character, as the contact with and influence upon the blood through the pulmonary surfaces would be most certain and effectual?

Yours truly,

MOSES W. KIDDER, M.D.

LOWELL, Aug. 12, 1868.

RESUSCITATION OF THE DROWNED.

The Marshall Hall and Sylvester methods have rendered signal services. Here is another, lately proposed by M. Marchant (of Charenton), in the *Archives de Medecine*, especially in view of asphyxia after immersion. The author thinks that the best means of success is to pay little attention to circulation, but to bestow much on respiration, by which hæmatosis of the blood is restored. Pulmonary insufflation is to be performed in the following manner: a tube of any kind, even of a tobacco-pipe, well washed, should be introduced into a nostril, and both nostrils pressed against the tube. The mouth should be stopped by the operator's hand, and he should then blow with sufficient force into the tube to drive air into the lungs. The chest then is seen to rise. By removing the tube, and the hand from the mouth, expiration will spontaneously take place, or it may be aided by the open hand applied to the base of the thorax. This manœuvre being repeated ten or twelve times, the heart is felt to heat, if the patient had at the beginning of the operation any vitality in him.—*Lancet.*

ON THE USE OF SULPHITE OF SODA IN ERYSIPELAS.

Dr. Hewson stated that he had been using the solution of sulphite of soda as a local application in erysipelas since February, 1864, and had obtained results from it, in the various forms of that disease, which were to him interesting and surprising. He had been induced to try it from the representation made by Prof. Polli of its influence in destroying all the diseases of a cryptogamic or animalcular origin—a source to which recent researches would lead us to suppose erysipelas was due. At first he administered it internally, in doses of ten grains every two hours, as well as applied it locally; but the effects of the local use were so prompt and decided, that he has now abandoned its internal administration altogether. In extensive trials of this remedy, both in hospital and private practice, he has never seen it fail when thoroughly applied before the deep planes of cellular tissue had been invaded by the disease. Under the latter circumstance, no positive curative results were of course to be expected from its mere external use. But before such parts had become affected, a solution of ten grains of this salt to the ounce of water, when thoroughly applied on lint all over the surface affected, and to a considerable distance beyond it, and covered with oiled silk to prevent the evaporation of the solution, had not only produced a decided bleaching effect on the discolored surface in every such instance, in the first twenty-four hours of its use, but had invariably destroyed all traces of the disease in forty-eight hours from its first application. The result was the same whether the application was made in the traumatic or idiopathic form of the disease. He had thus cured twenty-seven cases, seven of which were of idiopathic erysipelas. Even in the cases where the deep planes of cellular tissue were involved, as well as the surface, the disease on the surface was always apparently affected by the application. It was most positively bleached in all instances, and in many was evidently destroyed within the period above stated, even whilst that in the deeper parts proceeded on steadily to suppuration. —*A. Hewson, M.D., in Canada Med. Journal, April.*

THERMOMETRICAL OBSERVATIONS IN TYPHOID FEVER.

BY R. E. THOMPSON, M.D.

Dr. Thompson's observations extend over a period of three years, and are made from a careful study of forty-seven cases. They tend to confirm Prof. Wunderlich's researches on the same subject. In typhoid fever, a decrease of temperature is not always a favorable sign, nor is a rapid fall symptomatic only of a crisis. As a rule, the nocturnal increase of temperature in this form of fever is very considerable, and amounts to two or two and a half degrees. During the latter half of the first week, the heat increases day by day, and varies between 102° and 103° in the morning and 104° or even 105° in the evening. These high temperatures are quite sufficient to distinguish typhoid fever from tubercular meningitis, or from peritonitis, these diseases seldom showing much increase over 102° Fahr. During the second week, the temperature varies between 102° in the morning and 103° and 104° degrees in the evening, the oscillations being influenced by the amount of diarrhœa. The thermometer does not enable one to say by a longer prediction than twenty-four or forty-eight hours whether the case is likely to be fatal or not; but a steady rise in the temperature will often indicate the danger of ulceration of the bowels twenty-four hours before the intestinal lesion is manifested by diarrhœa and hemorrhage. The mode of termination of the fever is characterized by extraordinary oscillations in the temperature between morning and evening, the difference being sometimes as great as nine degrees. This feature distinguishes the thermograph of typhoid fever from that of almost all other diseases. In one case of perforation of the bowels, which was preceded by hemorrhage, the heat of the body was reduced from 102° to 99°.5, and was followed by a rise to 102°.2, where it remained for forty-eight hours before death, during which period perforation took place.

The conclusions that the observations made with the thermometer in cases of typhoid fever lead Dr. Thompson to draw are the following:—

1. The thermometer points out a distinction between typhoid fever and some other diseases which often stimulate it; viz., acute granular kidney, meningitis, peritonitis.

2. The thermograph of typhoid differs from that of other fevers, and especially in the mode of favorable termination.

3. An additional distinction between typhoid and typhus fevers is thus given.

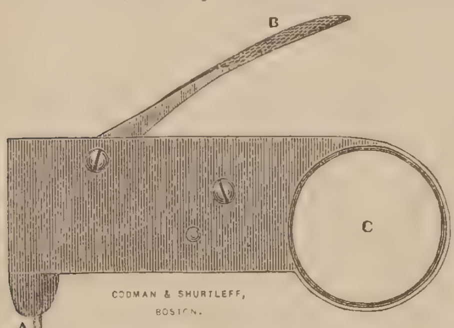
4. It is possible by its use to appreciate intestinal lesions before they are recognized by the ordinary symptoms.

HOW TO VACCINATE WITH THE CRUST FROM KINE.

A medical friend, who has had most extensive experience in the use of virus from kine, sends the following directions regarding methods of vaccination:—

Lancet Method.—Produce crucial abrasions of the cuticle in two spots on the arm with a lancet, by making four vertical parallel scratches half an inch long and one eighth inch apart; cross them with other four like scratches, by scratching the spots in different directions until the cuticle is denuded. Then lay on the spot a portion of the crust which has previously been rubbed up on a vitreous or ivory surface to the consistency of cream; prick it in, and expose the spots to the air till dried; or moisten a portion of the surface of the crust with water; rub it in with the lancet until a portion of the crust is scraped off, and apply this to the abraded cuticle as above.—(Martin.) Or, cut from the crust a small triangular section, and insert it under the cuticle in a little pocket made by the lancet point; cover up with adhesive plaster, and allow it to remain not less than two hours.

Instrumental Method.—Having rubbed up a portion of the crust as directed above, charge the point of the automatic vaccinator, made by Codman & Shurtleff, Boston,



and insert the charge into the arm by simply depressing the lever of the instrument. It is necessary to hold the skin tense, and to press the instrument lightly but firmly. Expose the spots to the air till dried. These methods answer for ordinary cases. The following are for difficult ones:—

Blister Method.—After the cuticle has been raised by means of blistering with either empl. cantharides, cantharidal collodion, ammonia, hot water, or heated wire (nail head), puncture the bulb, wipe off the serum, and then lay on a portion of the crust rubbed up with water. This is very sure. The virus is introduced through the absorbents. The writer has succeeded with it after many physicians had failed.

Croton-Oil Method.—Proceed as in the lancet method, and on the next day rub in on each spot one drop of croton oil. This method was first used by a layman, Mr. Stephen Skilton, of Burlington, Mass. With it he succeeded in making his family take, after his family physician had failed. It is the most sure method that the writer is acquainted with. The croton oil produces an inflammation which excites the lymphatics to activity, and also affords a nucleus for the contagion.

There are other very deserving instruments for introducing virus, but the automatic vaccinator excels in the fact that *one motion only* is required to insert the matter.

FALLING OF THE HAIR.—Those of our readers—and we know there are many of them—who are troubled in spirit by a growing tendency to become barefooted on the tops of their heads, as the traditional Irishman expressed it, will thank us for telling them something about the experiments of Dr. Pincus, consigned to a recent number of Virchow's *Archive*. To arrive at some rational method of treatment, this investigator experimented with various medicaments on the back of his hand, so as to watch the influence they exerted on the hair there growing. He thus arrived at the conclusion that arsenic, veratria, cantharidin, and sabina, made the hair brittle, while carbonate of soda and strong alcohol have no such effect. Rubbing the skin thoroughly increases the number of hairs and their length of life. Oleum sabinæ lessens the rapidity of capillary growth, but increases the vitality—the length of life—of the hair.—*Med. and Surg. Rep.*

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It is an interesting book, and will serve a useful purpose in popularizing science. — *Silliman's Journal.*

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The whole book should be in every family, and not only read but made a study by all, instead of poring over the miserable trash which floods the country. We heartily commend the book to every family in the land. — *N. E. Farmer.*

Some months since, we published extended extracts from "Chemistry of the Farm," and were struck with the sound sense and perfect command of the English language therein displayed. We have read the volume of essays with even more admiration. The subjects are original; the mode of treatment highly interesting; and there is no person who will not acquire some useful and entertaining knowledge from the perusal. If any scientific or literary man wishes a good example of style in writing, he will find it in this volume. Altogether it is a volume of uncommon interest and excellence. — *New York Observer.*

A. Williams & Co. have issued another popular and practical agricultural book, entitled "Chemistry of the Farm and the Sea." The book contains essays which present facts in a familiar style, easily comprehended, and on common topics of interest to the farmer and his family. — *Boston Advertiser.*

It cannot fail of being one of the most useful family books that a housekeeper can find. It is free from technicalities, and written in a style suited to the common comprehension. — *Providence Post.*

Multum in parvo might very appropriately have been adopted as the author's motto in the preparation of the book; for seldom do we find so much really useful information in so small compass as is contained in the 123 pages now before us. The first essay, "Chemistry of the Farm," is worth, to any practical farmer, a full dozen of the modern agricultural addresses at our state and county fairs; and the whole series abounds in choice morals, served up in a most pleasing style. — *Vermont Farmer.*

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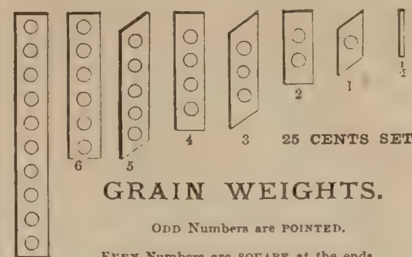

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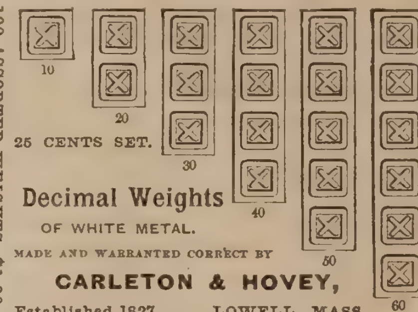

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"This form of the drug may be resorted to to produce soporific and anodyne effects, when the others could not be ministered with safety; and therefore it is calculated to meet a want long felt by every physician in active practice." — *Extract from Dr. Nichols's paper on Opium and its Alkaloids.*

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By one single, instantaneous operation with this ingenious, but simple instrument, the skin is punctured, and the virus deposited in immediate contact with the absorbents, where it is retained by the sphincter or contractile action of the dermoid tissue.

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BOSTON JOURNAL

OF

CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. III.—No. 5.] BOSTON, NOVEMBER 1, 1868. [ISSUED MONTHLY, AT FIFTY CENTS PER ANNUM.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

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Contents.

Familiar Science.

ANCIENT MAGIC AND "MEDIUMSHIP."

We have in our library a rare old book, which is often taken from its place and read with curiosity and interest. Its title-page is as follows: "*Historie of the World, commonly called the Natural Historie of C. Plinius Secundis; translated into English by Philemon Holland, Doctor in Physic. Londini*, 1601." This edition of Pliny's Natural History is therefore two hundred and sixty-seven years old, and is the first translation of the work ever made into English. It possesses the quaintness of expression, and exposes the ignorance and superstitions regarding science and art, not only of the age of Pliny, but of the translator also.

This work of Pliny was written, or published, at Rome, about A.D. 55, and was designed to be a great *Encyclopædia Romana*. It occupied about the same position in the ancient Roman world that the *Encyclopædia Britannica* and *Encyclopædia Americana* do in England and the United States at the present time. It was a compendium or compilation of all the learning of the age in which he lived. The work, independently of that of animals, plants, and minerals, includes an account of the heavens and the earth; of medicine, commerce, navigation, the liberal and mechanical arts, the origin of usages and customs; in a word, the history of all the natural sciences and all the arts of human invention. Only two translations of this great work have been made into English: one by Philemon Holland; the other is included in Bohn's series of the classics.

Our medical readers would be highly astonished and amused at the vagaries and monstrous absurdities connected with the healing art which are found in this translation. At a future time we intend to make a few extracts for their amusement. We allude to it at this time to call attention to some singular statements made in two or three of the first chapters of Book XXX., which treat of magic, witchcraft, and, curiously enough, of modern spiritualism, mediumship, etc. We will confine ourselves to one or two quotations. In Chapter II. of Book XXX., Pliny speaks at length of the various forms of magic or necromancy known in his time, and is quite severe upon the Emperor Nero, who was very fond, as is well known, of practising these strange arts. He says of Nero, as Holland translates him:—

"Never was there man that studied harder and followed any art more earnestly than he did magicke. Riches he had enough under his hands, and power he wanted not to execute what he would; his wit was quicke and pregnant to apprehend and to learne anything; and yet hee gave it over in the end without effect—an undoubted and peremtorie argument to convince of the vanitie of this art, when such an one as Nero rejected it. But would to God he had conferred with familiars and spirits; yea, and taken counsell of all the devils in hell, for to be resolved of those suspicions which were gotten into his head; those cruel imaginations whereupon he murdered most piteously so many good citizens, and filled Rome with their restless ghosts."

It appears from the above that not only old Pliny, but Philemon Holland, Doctor in Physic, had but little faith in "magicke" and familiar spirits. In the latter part of the chapter, he speaks of one Appion, a "great and famous gramarian," who not only taught grammar to the Roman youth, but acted probably as a "table-tipper" or "medium." Pliny says of him:—

"This same Appion reported in my hearing that he hath conjured and raised up spirits to enquire and learn of Homer, what countryman born he was, and from what parents descended. Mary, he durst not report what answer was made, either unto him or them."

This is indeed a curious extract. Making all proper allowances for peculiarities, or errors of translation, the fact is brought to light, that, eighteen hundred years ago, the same want of knowledge existed as at present, as to who Homer was, and also the same curiosity to learn something regarding his family and history. But still more curious is the fact, that, to obtain knowledge which history failed to furnish, "mediumship" was resorted to, or spirits were inquired of as they are inquired of at the present day in hundreds of "circles." Whether the spirits communicated by "raps" or by writing, we are not informed by Pliny. Whatever answers Appion may have received, he feared for some reason to divulge them. We have a curiosity to learn something respecting this Appion. It would be interesting to know what information he obtained regarding Homer. If we should suggest to some of our modern mediums that they summon Appion and put this inquiry to him, we fear they would embarrass us by replying that the information might just as well be obtained at first hands, and Homer would answer for himself. We are not particular through whom the information comes, so long as we get it.

How true it is, that human thoughts, emotions, desires, and experiences, do but repeat themselves as the ages roll along! Outside of knowledge gained by discoveries in physical science, how much is there in our experience which is positively *new?*

THE CUCUYO: THE FAMOUS FIRE-BEETLE OF THE WEST INDIES.

At the head of the list of light-giving creatures, and far exceeding them all in the amount and intensity of its phosphorescence, stands the West-Indian fire-beetle, called by the people of the islands, cucuyo; by naturalists they are known as the *Elater* (pyrophorus) *noctilucous*, or night-lighting elater. Though found in all the West-Indian islands, the sugar plantations of Cuba are their paradise, and during the warm evenings of the rainy season they exhibit themselves to perfection.

By the kindness of a friend,* I am now in possession of a thriving family of these strangely beautiful beetles, numbering over forty, of all sizes; and while I write, they are shining in all their brilliancy just by my side. Considerable care and attention is necessary to keep them in health. They are soon to have their supper, which consists of sugar-cane, cut into thin strips and moistened with weak syrup, which they suck, or rather lick, up with an evident relish. They present a singular

*Mr. F. Margollis, of this city.

appearance, ranged in rows upon the bottom of a plate, each with his mouth applied to the strip of cane. As soon as they have finished their meal, they are to take a bath for their health and comfort; for, like children who indulge in sweets, they get pretty thoroughly daubed, and need a good washing. This bath of tepid water seems to arouse all their light-giving energy, for while feeding the light is extinguished (very economical, surely!). The basin in which they float is all aglow; it is indeed a magnificent spectacle, which I wish all your readers could share with me. The water seems to possess the same luminous property as the insects, and resembles, when seen at night, a basin of liquid gold. . . . . .

They have nothing peculiarly attractive but their power of giving light. The spots from which issue the luminosity are not situated upon the head, as most persons suppose on seeing them, but upon the sides of the thorax, or middle portion of the body, and there is also one on the abdomen just below the insertion of the last pair of legs, where the abdomen and thorax join. This abdominal spot is not so frequently seen to be illuminated as the spots on the thorax; but when the insect is about to fly, or when, by accident, it gets upon its back, this part gives out light of tenfold intensity. The side lights are oval and convex, standing out laterally, and are hard and horny externally; but this is only a very thin and transparent protection to the luminous matter that fills them. When not shining, they are of a dirty white or light brown color.

They are really lanterns, and, as such, serve to light the insect on his nocturnal rambles. It is worthy of notice, that these lanterns are so placed that the light from them never enters the eye of the beetle directly, but only when reflected from surrounding objects; in fact, they are placed just as we place lanterns upon our carriages, and for the same reason — that the light may not shine into the eyes of the driver to dazzle and confound him, but only upon objects before and around him, from contact with which he might be in danger. This light also serves to attract their friends, as I have had occasion to notice while a number of them were upon the wing together in a dark room. While flying, their light seemed to arouse their companions, who soon joined them; and we enjoyed the rare sight, at least in this region of the globe, of seeing several of these flying about my room at one time; they seemed to play as flies do during the hot days of summer. . . . . .

Being "birds of night," they remain dormant during the day, hidden in the damp leaves or herbage, looking as if dead, but being full of life and activity as night draws on. I have endeavored to cheat them by taking them into a darkened room during the day, but the attempt was not successful; they still remained quiet until the usual hour; and when disturbed by rough treatment and placed near a window, they invariably crawled towards the darker parts of the room. One of my colony, by some mishap, got one of its side lanterns out of repair, so that it emitted no light for two days, but after that time perfectly regained it. Most of the little pets seem to have met with the loss of one or more legs, and some have lost all; but this mutilation does not seem to interfere with their luminous powers at all. These poor cripples have to be assisted more than their companions when taking their food. . . . . .

By placing the luminous parts of one insect quite near the paper, very fine print can be easily read by its aid, though I cannot imagine the light, even of a large number, to be sufficient for any practical illuminating purposes, as has been affirmed by some writers. The Cuban ladies make a singular use of these living gems, sewing them in lace bags, which are disposed as ornaments upon their dresses, or arranged as a fillet for their hair.

An examination of the peculiar matter upon which their power of luminosity depends, or in which it manifests itself, shows it to be composed, in a very large degree, of fat, in which are found some air-tubes and a very large supply of nerves. This fatty matter is of a chalky whiteness, and, when spread upon a slip of glass and examined by the microscope, gives the characteristic appearance of fat globules. When rubbed upon paper and warmed, it leaves a greasy stain; and when the whole mass is digested in sulphuric ether, the fat is dissolved out, leaving branch-like masses of nerves in great abundance, and also the tubes of the air-vessels. The mass of luminous matter upon the abdomen is, as has been stated, many times greater than that upon the thorax, and is covered externally by a very delicate and flexible membrane, which forms the joint, and reaches completely across the animal. Inside it has not so distinct a boundary, the vessels of other portions of the body being continuous with it, the luminous matter still being quite distinct. In the thorax this same substance is found lying behind the two oval, convex, transparent membranes, of a horny nature, being separated from it by a very thin, transparent membrane, which acts as a special envelope, and is also supplied with nerves and air-tubes, as in the abdominal portion.

It becomes very evident to any one who attentively examines these insects while in a living and healthy state, that their luminous power depends, not upon chemical action, as does the air in our lungs during respiration, which action must go on entirely independent of any voluntary effort on the part of the possessor, but that it is completely under the control of the animal, and is used by it for purposes which render its exercise at times wholly needless. It is also evident, that whatever arouses the nervous energy of the animal to full activity, causes a corresponding manifestation of luminosity; and, on the contrary, whenever the insect is placed in media which depress its vital powers, and act either directly or indirectly upon its nervous masses, then it ceases, wholly or in part, to give out its light, using it as means to accomplish a desired end as truly as its muscular power. — G. A. Perkins: *Am. Naturalist.*

Arts.

THE ZODIACAL LIGHT.

Dr. Nichols. — *Dear Sir,* — I read with interest Dr. Antony's letter, in the September number, on the Zodiacal Light. As the Doctor's theory at first view is quite plausible, and as I entirely agree with you, that no explanation hitherto given is entirely satisfactory, I propose to *review* briefly the position of Dr. Antony, from which it will appear that his hypothesis is obviously untenable.

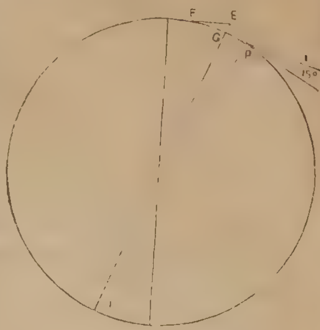
It is easy to show, that, viewed from the Cumberland Mountains, the highest point of the atmosphere that could be illuminated by reflections from the Pacific Ocean is *far* below the horizon. But the question might still be asked, May not reflections from a point sufficiently *near* produce the phenomena in question? It is this more general question that I propose to answer.

It is sufficiently obvious that twilight is produced by the atmospheric reflections of, not only the direct rays of the sun upon the illuminated atmosphere, but also his reflected rays, which fall upon the atmosphere by reflections from the surface of the earth. Hence the apex of the zodiacal light, if caused by reflection from the atmosphere, could never subtend a greater angle with the sun than twilight does, which is estimated generally at 18°. But the apex of the zodiacal light has been observed 100° from the sun. Hence it is totally impossible that it can be the result of atmospheric illumination, whether by direct or reflected rays.

To make my argument plainer, I will apply it to the particular explanation suggested by Dr. Antony.

The nearest point of the Pacific Ocean west of Huntsville in Alabama, is about 30° westward, or two hours in time. Hence, at the end of twilight (the time when the zodiacal light first becomes visible in the evening), which is about an hour after sundown at Huntsville, the sun will be about an hour high if seen from the nearest point of the Pacific Ocean west of Huntsville, and consequently his reflected rays from the ocean will make an angle with the horizon of about 15°, and will therefore be projected upon the highest strata of the atmosphere that are capable of reflecting light (viz., 45 miles, as determined by the phenomena of twilight), at a point about 200 miles east, and would be just visible in the horizon when viewed from a point 800 miles east of the shore of the Pacific. Hence, if the zodiacal light were produced by reflection upon the upper atmosphere from the Pacific Ocean, it would be totally invisible at Huntsville, and for a distance of at least 1200 miles west of Huntsville; all of which is obvious from a consideration of the recognized laws of light in connection with a well-known geometrical proposition (Eucl. 36, 3), as will appear from the following

DEMONSTRATION.



Let FGPH represent a small circle of the earth, corresponding with the parallel of Huntsville; P, the point of reflection in the Pacific Ocean; I, the incident ray at the end of twilight at Huntsville: GE, the height of the atmosphere (45 miles); GH, the diameter of the earth (7925 miles); and FE, a tangent to the earth's surface at the point F:

Then, because the angles of incidence and reflection are equal (15°), and GE = 45 miles, we have the secant PE = 174 miles, and (Eucl. 36, 3) $HE \times GE = \overline{FE}^2$, or $\sqrt{7970 \times 45} = \sqrt{35865}$ = 600 miles = FE. Hence the distance, FP = 174 + 600, or, in round numbers, 800 miles.

J. E. Hendricks, M.D.

Des Moines, Iowa, Sept. 10, 1868.

PROF. SIMPSON ON PROGRESS IN SCIENCE.

At the close of the ceremony of "capping" the medical graduates of the University of Edinburgh, Sir James Y. Simpson, one of the most celebrated physicians of Europe, delivered an address, in the course of which he said: —

"A most extensive field for new investigations lies temptingly open for the young and ambitious physician in the almost innumerable series of new chemical compounds which modern organic chemistry has evolved. Among this world of new compounds will probably be yet detected therapeutic agents more direct, more swift, and yet more sure in their action than any which our present pharmacopœias can boast of. It may be, also, that the day will yet come when our patients will be asked to breathe or inspire most of their drugs instead of swallowing them; or at least when they will be changed into pleasant beverages instead of disgusting draughts and powders, boluses and pills. But that day of revolution will not probably be fully realized until those distant days when physicians — a century or two hence — shall be familiar with the chemistry of most diseases; when they shall know the exact organic poisons that produce them, with all their exact antidotes and eliminatories; when they shall look upon the cure of some maladies as simply a series of chemical problems and formulas; when they shall melt down all calculi, necrosed bones, etc., chemically, and not remove them by surgical operations; when the bleeding in amputations and other wounds shall be stemmed, not by septic ligatures or stupid needles, but by the simple application of hemastatic gases or washes; when the few wounds then required in surgery shall be swiftly and immediately healed by the first intention; when medical men shall be able to stay the ravages of tubercle, blot out fevers and inflamations, avert and melt down morbid growths, cure cancers, destroy all morbific organic germs and ferments, annul the deadly influences of malaria and contagions, and by these and various other means markedly lengthen out the average duration of human life; when our hygienic condition and laws shall have been changed by State legislation, so as to forbid all communicable diseases from being communicated, and remove all causes of sickness that are removable; when the rapidly increasing length of human life shall begin to fulfil that ancient prophecy, "The child shall die an hundred years old;" when there shall have been achieved, too, advances in other walks of life far beyond our present state of progress; when houses shall be built and many other kinds of work performed by machinery, and not by human hands alone; when the crops in these islands shall be increased five or ten fold, and abundance of human food be provided for our increased population, by our fields being irrigated by that organic waste refuse of our towns which we now recklessly run off into our rivers and seas; when man shall have invented means of calling down rain at will; when he shall have gained cheaper and better motive power than steam; when he shall travel from continent to continent by submarine railways, or by flying and ballooning through the air; and when — to venture on only one illustration more — tiresome graduation addresses shall no longer require to be written by old professors nor listened to by young physicians."

THE MOON AND THE WEATHER.

At the late meeting of the "Scientific Congress" in Chicago, Professor Loomis presented a paper on this subject. He stated that from a comparison of twenty-eight years of observation in Germany, Schubler deduced a sensible influence of the moon, the number of rainy days at the time of the second octant being twenty-five per cent greater than at the time of the fourth octant. From a comparison of observation made at Paris, Orange, and Carlsruhe, Gasparin arrived at results not differing greatly from those of Schubler. By a comparison of sixteen years of observation at Greenwich, nine years at Oxford, and sixteen years at Berlin, Mr. Harrison, of England, has obtained results which are remarkably consistent with each other, and which indicate that the moon exerts an appreciable influence upon terrestrial temperature, the maximum occurring six or seven days after new moon, and the minimum about four days after full. The difference between the maximum near the first quarter, and the minimum near the last quarter, is two and a half degrees of Fahrenheit. These results, which are so different from what might be anticipated, Mr. Harrison explains by supposing that the moon really attains its greatest heat about the last quarter, but that the heat which the moon radiates to the earth is entirely dark heat, and therefore absorbed by our atmosphere. The heat raises the temperature of the air above the clouds, causing increased evaporation from their surface, by which they are dispersed, and thus there is an increased radiation of terrestrial heat to the sky, and consequently a diminution in the temperature of the air near the ground. He supposes that opposite results must occur at the period of minimum heat in the moon. In order to compare the influence of the moon with that of the sun, he had taken the average cloudiness of Greenwich, as indicated by observations made every two hours for a period of seven years, and the table shows: The greatest cloudiness due to the moon's influence occurs about the time of the greatest heat; that is, near the third quarter, and the minimum follows about a week after the maximum, or about one fourth the time of the moon's rotation. This disturbance of the vapor of our atmosphere gives rise to storms, during which vapor is precipitated, and a vast amount of latent heat is liberated. The motion of these storms over the earth's surface is influenced by local causes, such as latitude, proximity to mountains or the ocean. The result the Professor found in the statement that the moon does influence the atmospheric phenomena in an appreciable manner; but, in ordinary parlance, the influence being so small, it may be said that there is no influence of the moon upon the weather.

Gold and Silver. — We learn from interesting tables, which are cautiously compiled, that in 1865 the principal gold-producing countries of the world yielded 559,587 pounds troy of gold, and upwards of four million pounds troy of silver. It will be found, by calculating the value of metals at the present market prices of them, that man's industry has added to the world's wealth, by the quantity of those metals which he has obtained by mining, nearly four hundred million pounds sterling. Of gold, California and the adjoining States produced 210,000 pounds troy; Australia and New Zealand, 191,000; Russia, 69,500; South America, 34,000; Southern Asia, 25,000; and our own Welsh hills gave the little contribution of 742 ounces. Of silver, Mexico produced 1,700,000 pounds troy; the United States, 1,000,000; Peru and Chili, 598,000; Spain, 110,000; and the rest of Europe, including the British Isles, 526,000.

Considerable difficulty is sometimes experienced in handling new rope, on account of its stiffness. This is especially the case when it is wanted for halters and cattle ties. Every farmer is aware how inconvenient a new stiff rope halter is to put on and tie up a horse with; and new ropes for tying cattle are frequently unsafe, for the reason that they are not pliable enough to knot securely. All this can be remedied, and new rope made as limber and soft at once as after a year's constant use, by simply boiling it for two hours in water. Then hang it in a warm room, and let it dry out thoroughly. It retains its stiffness until dry, when it becomes perfectly pliable. — *Ohio Farmer.*

THE ZODIACAL LIGHT.

Dr. Nichols. — Dear Sir, — J. E. G.'s objection to the views of zodiacal light entertained by the Huntsville, Ala., correspondent, may obtain as to his explanation, but I think not as to his theory. Dr. Antony did not explain why the light appears to us in a pyramidal form. My views are: —

The rays of light reflected by the ocean do not strike the eye of the observer from that surface, but are again reflected by the vapors of the atmosphere; and the divergence caused by the convex surface of the ocean is more than compensated by the convergence from the concave surface of the reflecting materials of the atmosphere; or the rays of light directly on a line from the observer to the sun are seen farther from the horizon than those on either side; that would give a pyramidal appearance to the phenomenon.

One thing is certain: the rays of the sun are not reflected from the ocean directly to the observer, but are again reflected by the vapors of the atmosphere, and partially decomposed into their chromatic colors, as seen in the beautiful tints of red, orange, yellow, etc., that appear soon after sundown; the colors least refracted being the most distinct.

This is an interesting subject, and I should be pleased to read your views in the next number of your truly scientific journal. B. D. Joslin, M. D.

North Brownville, Mich.

A New Kind of Meerschaum. — Chemistry has discovered a new and interesting use for potatoes and other vegetables, illustrations of which were seen by visitors at the Paris International Exhibition. If potatoes are peeled, macerated for about 36 hours in water to which 8 per cent of sulphuric acid has been added, well washed with water, dried in blotting-paper, and then in hot sand for several days, on plates of chalk or plaster of Paris, which are changed daily, being compressed at the same time, an excellent imitation of meerschaum, answering well for the carver, or any purpose not requiring a high temperature, will be obtained. Greater hardness, whiteness, and elasticity will be produced if water containing 3 per cent of soda, instead of 8 per cent of sulphuric acid, is used; and if, after the potatoes have been macerated in this solution (soda), they are boiled in a solution containing 19 per cent soda, a substance resembling stag's horn, and which may be used for knife-handles, etc., will be formed. Turnips may be used instead of potatoes in the production of the artificial horn; and if carrots are substituted for potatoes, a very excellent artificial coral will be presented.

"Deodorized" Alcohol. — In the fermentation of grain, which yields most of the whiskey and alcohol used, there is formed not only the compound known as alcohol (vinous alcohol, ethylic alcohol), but some other similar bodies which in part are classed by chemists as alcohols from analogy of composition, but which possess odors differing from that of pure vinous alcohol, and one of these is fusel-oil or amylic alcohol, so called because it always forms in the fermentation of starchy substances. It is the odor of this amylic alcohol which in the main produces the (to refined senses) unpleasant perfume of bad whiskey and ordinary alcohol; pure alcohol leaving behind on evaporation no odor whatever, except, perhaps, a slight one of vinegar. However, when mixed with amylic alcohol, which is not by far as readily volatilized, the latter remains behind. Founded upon this latter property is the process of deodorization, which yields pure alcohol when common spirits are subjected to a second rectification, care being taken to draw off only a part of the spirit at a moderate temperature, so as to leave behind in the still as nearly as possible all the fusel-oil with a portion of alcohol and water. By repeating this process, or by collecting as pure alcohol only the portions coming over after the first, and before the fourth quarter, all traces of the impurity can be removed. This end is hastened by filtering the spirits previously through vegetable or animal charcoal, or by the addition of certain substances which act destructively upon the impurities. The multiple *F's* after Aq. Ammon. are meant to stand for *fortis, fortior, fortissima,* or instead of *fortior* (stronger) by so many times; but they indicate really only several commercial grades of strength, as you will perceive on consulting the price-current of any manufacturing chemist. — *Druggists' Circular.*

Agriculture.

GRAPES.

From a somewhat extended experience in the cultivation of grapes, and from careful observation of the growths and qualities of the numerous varieties recommended, we have reached the conclusion that the number which can be successfully raised in the New England and Northern States is quite small. We selected, several years ago, four varieties which we regarded as best suited to our climate, and placed them together in a favorable locality for field culture. The varieties selected were the Concord, Hartford Prolific, Delaware, and Northern Muscadine. Our object was to note the time of ripening, the comparative hardiness, prolific character, and quality of each kind when grown on the same field and subjected to corresponding treatment. The Concord is the grape of the four varieties which has most fully met our wants or expectations. It has ripened at about the same time with the Hartford, is a better grape, and the fruit does not fall from the stem, as does that. The Delaware is too tender, and very liable to mildew. This year it suffered from three different species of fungi, one of which affected the under, another the upper surface of the leaf, and still another the berry. The Northern Muscadine is a foxy grape, not worth cultivating. We raised the present year, from less than a third of an acre, over three thousand pounds of Concords, most of which ripened very fairly, although the season has been exceedingly unfavorable.

We are fully convinced of another fact regarding the fertilization of the grape, which is of the highest importance. Animal excrement or stable manure we regard as unsuited to its successful cultivation; or, at least, it is far better to employ the fertilizing agents which are so largely found in the plant structure and in the fruit. Potash, phosphoric acid, and lime are the great food staples which the grape demands, and they cannot flourish unless these elements are abundantly supplied. We fertilize our vineyards and grape borders with unleached ashes and dissolved bones, and obtain most abundant returns. We have not space to enter into particulars regarding this method of treatment, and shall reserve for a future number of the *Journal* a more extended explanation of the nature and results of our experiments in grape culture.

HOW THE BANANA GROWS.

The banana is the best and most important of all tropical fruits found in the tropics of every continent, and universally cherished by the people whose meat it is. Every one would know a banana at sight, and yet the pictures of the plant, even in our best text-books, are very faulty. One of the common geographies represents it as bearing two bunches of fruit; another, as having a distinct stem.

When the cutting or shoot is planted (and it requires a deep, rich earth and much moisture to grow in perfection), it soon sends up two leaves, tightly rolled together, until the green roll has grown some two or three feet, when the blades unroll, and become most tempting food for cattle of all sorts. These leaves are followed by others until the stems of the leaves have formed a smooth trunk some eight or ten inches thick, and sheathed by the drying or dried remains of the earlier leaves. At the end of nine months a deep purple bud appears in the centre of the leaves, and its constantly lengthening stem pushes it out beyond the leafy envelopes, and it hangs down heavily like a huge heart. Now along the stem are seen little protuberances in rows, extending perhaps two thirds of the way around the stem; and as the great purple envelopes of the bud fall off, these are seen to be little fruits, each with a waxen blossom and huge projecting stigma at the end.

These are the female flowers farthest from the end of the stem, while as successive purple leaves fall off (you may see the scars they leave on any bunch of bananas), the male flowers are seen in closer rows and of the same waxen yellow color. The flowers are full of a good honey. Three or four months are required to ripen the fruit, and in the meantime the bunch of male flowers has withered and dropped away, and the ovaries of the female blossoms have swollen into bananas, it may be a foot long, and the huge bunch hangs down scarcely supported by the now withering stem. The fruit is ripe, and the banana has done its work, and, if left alone, soon dries up and dies. From its base spring up shoots which may be transplanted. If the stem is cut down to the ground as soon as the fruit is gathered, the round bulbous rootstock sends up new leaves, and a second plant matures much sooner than do the offshoots.

Although most banana bunches hang down in maturity, a kind is found on the Society Islands, whence it has been introduced to the Hawaiian, whose very large bunches of deep orange-colored fruit stand up erect, forming ornamental rather than useful objects; for their taste, even when cooked, is exceedingly disagreeable and acrid. The Brazilian banana, so called (and no attempt is made to give here the correct names, as the nomenclature is hopelessly confused in different countries; and the bold writer who should attempt to write a monograph of this genius would need all his courage), is tall, rising to a height of fifteen, or even twenty feet, and the fruit is yellow and excellent, rather vinous in flavor; these are the long, yellow bananas common in our markets. The Chinese banana seldom exceeds five feet in height; the leaves are of a silvery hue, and the fruit quite aromatic. The Fei, or Tahitian banana is similar to the Brazilian, but not so tall; and the fruit is angular, yellow, turning black when fully ripe, and the flesh is salmon-colored, or buff, and slightly acid. Then there are varieties with red fruit quite common here, blunt fruit, and some with a very diminutive fruit of fine flavor. The names Banana and Plantain are used almost indiscriminately, but the latter usually applies to those varieties which are coarser and usually eaten cooked.

Usually no seeds are found within the pulp; but at Akyab, and along the coast of Arracan, a kind is found full of seeds. These seeds are black, rough, about the size of cotton-seeds, and enveloped in a sort of fibre, so that they cannot be readily cleaned. The taste of this variety is very inferior.

The Spaniards have a curious superstition about the fruit. The cross section presents a rude cross, and from this they suppose the banana was the forbidden fruit, and Adam saw, in eating it, the mystery of redemption by the cross. The cross is not very distinct; and the excellent Padre Labat remarks, after mentioning this belief, "There is nothing impossible in this; Adam may have had better eyesight than we, or the cross was better shaped in the bananas which grew in his garden."

The ways of eating bananas are almost innumerable. Raw, they are eaten by themselves, or, cut in slices, with sugar and cream, or wine and orange-juice. Cooked when green or ripe, they are fried alone or in batter, baked with the skin on, made into a pudding much resembling an apple-dumpling, or baked in pies. They may be cut in strips and dried, or pounded into a paste and dried; in the latter form they are the staple food of many Mexican tribes. The amount of nourishment is very great; and Humboldt's statement is often quoted, that the same extent of land which produces one thousand pounds of potatoes bears forty-four thousand pounds of bananas; a surface bearing wheat enough to feed one man will, when planted with bananas, feed twenty-five. Lucky the people who can eat bananas, and leave the potatoes for the hogs!

The young shoots are cooked as greens, but the stem and old leaves are full of a watery, acrid juice, which stains white cloth an indelible black or dark brown. The fibres of the leaves make a textile fabric of great beauty, known as a fine kind of grass-cloth.

In cultivation the plants are set closely, the Chinese banana requiring only three or four feet between the rows; and the clusters are gathered before they are quite ripe, and hung up in some cool place, or, better still, buried in the earth. Some bananas are certainly improved by this premature gathering, but others are much better when ripened in the natural way. The prices on the Isthmus of Panama, and at most tropical ports, vary from a real ($12\frac{1}{2}$ cents) to a dollar, according to the size of a bunch and the season of the year. The prices asked in the Boston market are simply outrageous, and our fruit-dealers let the fruit rot in their windows rather than lower the price.

A plantation will yield all the year round by timing the planting, but the crop is much more abundant at one season. The care the plants require is little enough, if they are planted by a brook or in moist ground, and the bunches of fruit may weigh eighty, or even more than a hundred pounds when ripe.

The geographical limits of the banana are much more extensive than those of the cocoanut, and extend even beyond the tropics.—W. T. Brigham: *Am. Naturalist.*

CARE OF HOUSE PLANTS.

Do not remove the plants to the house until there is danger of frost; and then give them abundance of air and light. And here we will say that some of the finest plants we ever saw were kept in a south chamber in which there was no fire, but adjoining a room which was warmed by a stove. There is generally more danger from too much heat than too little. For such plants as geraniums, petunias, fuchsias, roses, oleanders, etc., a temperature from 45 to 65 degrees is abundantly warm.

Perhaps the greatest obstacle to success in window gardening lies in the dryness of the air. When houses were warmed in the old-fashioned way, by fire-places or wood stoves, with abundance of cracks at the windows and doors to let in fresh air, plants grew very well. And now, when a few plants are kept in a kitchen window, where the air is charged with vapor from the boiling water, they often thrive with old-fashioned luxuriance. How, then, can we modify the parched air of our parlors and sitting-rooms? One way is to keep a pan of water evaporating on our stoves and in the air-chamber of our furnaces. In addition to this, provide a table for the plants as wide as the window and just the height of the window-sill. Fasten a rim around the border of the table two inches high, and line the whole with zinc. Fill this space with sand and cover it with moss. Set the pots on this sand, and keep it always moist. If you are willing to take the trouble, set each pot in another one half an inch larger, filling the space between with moss, which is to be kept moist. By these means, the air around the plants will be kept somewhat humid.

As to watering and ventilating, discrimination should be used. As a general rule, water should be given copiously enough to wet the entire ball of soil; wetting simply is not enough. A daily sprinkling or syringing of the leaves is always a good thing. In ventilating, it is seldom safe, in cold weather, to open the windows directly in front of the plant-stand. A better way is to let in air from a window on the opposite side of the room; it will then become tempered a little before reaching the plants.

Stir the soil often with a small stick when it is dry. If insects appear, pick them off, or kill them by fumigating. —*Rural American.*

HOW MUCK AND ITS COMPOSTS HELP THE SOIL.

In our last issue we noticed some of the methods of composting muck and peat, and of preparing them for fertilizers. We now point out some of the ways in which they benefit the soil. They add a large mass of organic matter directly to growing plants, and supply their wants. These peat-swamps are the sepulchres of dead plants, containing most of the elements of our cultivated crops. Composting puts this organic matter in a condition to be used. An analysis shows that peat contains nearly the same elements as cow-dung. All our hard-cropped fields, in the older States, need this vegetable matter. It is especially valuable upon sandy and gravelly loams; and if we add it in large quantities enough, we can turn a barren sand into a fertile field. Astonishing results are shown from the application of these composts to thin, hungry soils. They are largely made up of carbon, and their decay in the soil furnishes carbonic acid gas, both to the roots of plants and to their leaves. The great luxuriance of crops upon drained swamps, and fresh clearings, is due mainly to the abundant supply of this gas, furnished by decaying vegetable matter. In all cultivated lands the carbon in the soil is steadily wasting by the removal of the crops, and it must be restored, or the land will not pay for cultivating. But peat contains nitrogen in considerable quantities, which furnishes to plants nitric acid and ammonia, the most costly elements in all fertilizers. The average amount of nitrogen found in the thirty samples of peat analyzed by Professor Johnson, for the Connecticut State Agricultural Society, was $1\frac{1}{2}$ per cent of the air-dried substance, or more than three times the quantity usually found in stable or yard manure. When the peat is weathered and composted, and distributed in the soil, this nitrogen furnishes ammonia to plants, like other nitrogenous fertilizers. A ton of sun-dried peat, according to the estimate of the Professor, contains thirty pounds of nitrogen, equivalent to thirty-six pounds of ammonia, worth, at twenty cents a pound, $7.20 a ton. This may not be all available for plants the first season, but it is so much plant-food stored away in the soil, certain to be wanted in due time. It is as really money to the farmer, as the nitrogen which he puts into the soil in yard manure and Peruvian guano. There is also an incidental benefit from the free use of muck compost, too often overlooked. It enables the soil to appropriate the free nitrogen of the air. This is oxidized in the pores of the soil to nitric acid, and thus the farmer's crops are daily dressed with the most costly of all fertilizers. The inorganic elements of peat are also valuable. The ashes have considerable quantities of lime and sulphuric acid; and magnesia, phosphoric acid, potash, and soda in less amount. These are worth as much as the same elements furnished in other manures.

Besides the plant-food which is furnished directly by the peat, it helps the soil in other ways. It absorbs water, and holds it like a sponge for a long time. This property of peat makes it exceedingly valuable for thin, sandy, and gravelly lands. These lands are said to be leachy, from the well-known fact that manures do not benefit them much after the first season. But the escape of the valuable properties of the manure, is into the air, rather than into the earth, because there is not vegetable matter enough in the soil to retain them. It is of great value to dress these lands heavily with peat composts. They hold moisture much better to guard them against drought, and they retain the ammonia furnished by other manures. So many and important are the benefits of peat, that every farmer who has bogs, ought to ascertain their quality, and spend money freely in making composts. Very often they are the cheapest means of enriching the farm and making it pay large dividends.—*Am. Agriculturist.*

Leaves of Plants.—Autumn leaves by millions rot in heaps unheeded, and yet each one a microscopic wonder of contrivance. And this snow wreath that half envelops them, made up of myriads of crystals, melting while I look at them—what an utter waste it seems! Wisdom and beauty thrown wholesale into a pit of corruption. Until the day of the resurrection we shall never comprehend this melancholy mystery. Then shall atoms all be portioned out, and every organized particle of the earth's crust be found to be a part of some soul's tabernacle. Then shall we understand how Cæsar's dust has also lived in the leaf, and his moisture effloresced in the snow, duly to be restored and produced when time and its use are no longer; but meanwhile used everywhere, and nothing lost, mislaid, wasted, or forgotten.—*Dublin University Magazine.*

Tree-Planting.—In planting trees this fall, all should remember that it is requisite to set the tree only just so deep as to enable it to stand, for we can place earth around it so as to protect it from heaving off the winter's frost; and as soon as spring opens and the ground is levelled down, the roots will start and seek their appropriate depth. If we dig a deep hole, especially in hard clay soil, and fill it with good loam and set our tree therein, we first invite the water there as a cistern; and second, we cause a vigorous growth of roots, until they reach the undisturbed clay, when a check is at once perceptible: and often an orchard stands from five to seven years without apparently making any progress. Remember, then, and plant your trees just so deep as to cover their roots, but no more; then earth up for a winter protection against frost for the year, and dress down again to a level in the spring.—*Horticulturist.*

Boston Journal of Chemistry.

BOSTON, NOVEMBER 1, 1868.

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Mr. B. R. Downes is Travelling Agent for the *Journal*.

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☞ We have to thank our patrons for their prompt response to our "reminder," placed in some copies of our last number. There still remain a *few* who have not remitted for Vol. III. We shall soon remove the names of all delinquents from our books.

THE CHEMISTRY OF AUTUMNAL TINTS.

The striking change in the hues of the foliage of plants and trees during the autumn months, can hardly fail to excite the wonder and curiosity of the most indifferent observer. Through what agency is this change effected? We know that up to a certain period of the year, when the vital sap flows freely and the life principle in vegetable growths is active, the prevailing hue of the leaves is of a dazzling green, and that this peculiar color is due to a chemical principle common to all plants called chlorophyl. This substance in many respects resembles wax, and is contained in the deep cells or *mesophyllum* of the leaves. It may be readily isolated or extracted from its receptacles, and subjected to chemical examination. Alcohol dissolves it readily, and from its solution it may be deposited in granular form. It consists of two separate principles, one of which forms a red compound with acids, and the other yellow with alkalies. The blending of these two coloring agents under the modifying influence of vital action, produces the reflection of the green rays of light; and thus our fields and forests are clothed during the summer months in "living green." Light is the mysterious agent which elaborates the chlorophyl; and while it continues to exert its full influence the green hue is sustained, and not until it decreases, upon the approach of autumn, do different tints appear. Frost is not necessarily the agent which changes the verdure of the fields. Frost may prematurely arrest the vital forces in plants, and so modify the action of light as to prevent the elaboration of chlorophyl. If no frosts came, however, the natural decrease in the amount of solar light at the close of the summer, and the exhaustion of plants consequent upon the maturation of the life-principle, or seeds, would cause the chemical changes which produce the varied and beautiful hues of autumn. The tints are indeed much more beautiful if they come in the natural way, without the intervention of frost. The change takes place both in the evergreen and deciduous leaves, but is most marked and striking in the latter. In the clear electrical atmosphere of the Northern States, the display is most gorgeous and pleasing: in no country in the world is it more so. Artists of established reputation have, recently, hardly ventured to put upon canvas the marvellous rainbow hues of our fields and forests, as seen in the glorious month of October, and submit the result of their labors to English or French criticism. The grossest exaggerations have been charged upon such paintings by those who have never witnessed the magnificence of the display. Indeed, we ourselves could hardly admit the faithfulness of the coloring without being witnesses of its truthfulness.

DYNAMITE.

M. Nobel, of nitroglycerine fame, has invented a new blasting agent, which he calls Dynamite. In reality it is not new, but is only nitroglycerine in a better form to work with. Dynamite is simply nitroglycerine absorbed in highly porous silica, in the proportion of 757 of the former and 2570 of the latter. Nitroglycerine, though it is a blasting agent of great power, has been brought into some disrepute by the terrible accidents resulting from its careless handling. Properly handled, it can undoubtedly be used with comparative safety; but in dynamite the inventor claims that he has so changed the properties of nitroglycerine as to make it easier to handle, and its use much safer. In the first place, dynamite is a rather pasty solid, and can be packed directly into the bore-hole; whereas nitroglycerine, being a liquid, must be used in cartridges, which cause loss of power by windage. Another disadvantage of the liquid is its inveterate propensity to leak; and, of course, when leakage occurs, the chances of accident are greatly increased. That changes in the explosive properties of nitroglycerine had been brought about by its conversion into the solid form, was conclusively shown by experiments at Glasgow, Stockholm, and other places. At Glasgow, a box containing 8 lbs. (equal to 80 lbs. gunpowder) was placed over a fire kindled on the ground, where it burned away without explosion; and a similar box was dropped from a height of 60 feet, upon solid rock, without exploding it. At Stockholm, a weight of 200 lbs was dropped twenty feet, upon a box of dynamite, with no results beyond breaking it and scattering its contents about.

M. Nobel says that, although recently introduced into the market, fifty tons of dynamite have been sold, and the most serious accident it has caused was the case of a man who, having lighted the fuse, kept the cartridge in his hand till it exploded and blew off his arm. He naïvely adds: "No explosive is safe against accidents of that kind."

But if the solid form of nitroglycerine has gained safety and facility of use by a loss of power, it can never replace the liquid. M. Nobel shows, by numerous experiments, that this is not the case, and that dynamite is at least as powerful as nitroglycerine. An inch bore-hole was put through the centre of a cylindrical block of wrought iron 11 in. in diameter and 12 in. in height; a charge of 6 oz. of dynamite was introduced, without plug or tamping, and fired. The cylinder was broken into two pieces, and one of the halves hurled with such violence against a $\frac{3}{4}$-in. boiler-plate, at some distance, as to break it. Allowing for the hole, and putting the tensile strength of the iron at twenty tons to the square inch, the strain necessary to effect the rupture must have been equal to 2400 tons, and as there was no plug at either end of the hole, it is evident that the charge was too much for the work. Experiments made in a quarry near Glasgow, were equally successful. One blast in the solid rock with a charge of 6 lbs. of dynamite, threw out 4000 cubic feet of rock, and loosened twice as much more. A second blast, with the same size of charge, put into the strongest rock in the quarry, ruptured it from the bottom to the top, 40 or 50 feet in height, thoroughly breaking up the rock. In spite of its drawbacks, nitroglycerine has come into pretty general use for blasting; but it, as well as gunpowder, must give way to dynamite, which is really a much better article.

MODIFICATION OF THE MAGNESIUM PROCESS.

The preparation of magnesium according to Deville's process (the one in ordinary use), is a rather difficult matter. M. Richert proposes to improve it by using carnallite (a mineral obtained abundantly from the mother liquors of the Stassfurth salines).

ANALYSIS OF CARNALLITE.

Chloride of Magnesium	30.98
" " Potassium	24.27
" " Sodium	4.83
" " Calcium	2.81
Sulphate of Lime	1.05
Sesquioxide of Iron	.14
Water by difference	35.92
	100.00

For the operation, melt in a crucible 1 kilo. carnallite (fused and powdered) with 100 grammes fluoride of calcium and 100 grammes sodium in fragments. The reaction goes on calmly, and the return corresponds to that which the anhydrous chloride of magnesium affords. It is important that the carnallite should not contain any sulphate of magnesia, or dangerous explosions may result. Colorless pieces should be used, or else the color freed from iron by solution and filtration. The bright green pigments made from arsenic or copper are objectionable from their poisonous qualities, and for some time chemists have been trying to discover a mode of making a color equally brilliant and at the same time harmless. Many compounds of chromium have been proposed, of which the borate (called Vert de Guignet) is the best, but they are all too costly and difficult to prepare. Quite recently a French inventor has patented a process for preparing sesquioxide of chromium of a brilliant green, superior to the Vert de Guignet. To make this color, which he calls "Imperial Green," he takes a solution of a chromium salt and changes it into the green modification, by any appropriate reagent; he then adds either gelatinous alumina or recently precipitated hydrated oxide, carbonate, or sulphide of zinc, in just sufficient quantity to saturate the acid. The reaction goes on rapidly, but may be hastened by heat. After washing and drying, the precipitate is ready for use. The color thus made is harmless, of good body, has a brilliant shade; and it is said that it can be prepared cheaply, since any chromium salt or residue may be employed in its manufacture.

☞ The *New York Medical Gazette*, one of the most valued of our exchanges, after a brief suspension, has appeared in a new form and dress. It is a publication worthy of extensive patronage.

☞ The *Transactions of the Indiana State Medical Society*, have been sent to us. It is a volume filled with able and interesting medical papers. We hope to find a place for some extracts from this volume in future numbers of the *Journal*.

SAD AFFAIR AT CHARLESTOWN.

Two little children, — Addie, aged 9 years, and Minnie, 7 years, — daughters of Levi Brown, residing at No. 6 Webster Street, Charlestown, were burned so severely on Saturday evening as to cause death to both yesterday.

It seems that, about 7 o'clock on Saturday evening, Addie was helping her younger sister in her lessons, and had in her hand a fluid lamp. A little brother of the sisters came running into the room, knocked against his elder sister, and she let the lamp fall to the floor. The lamp was broken, the fluid ignited, and was scattered over the clothing of the two girls.

Their screams for help brought their parents to the room, and they immediately carried them into the entryway and succeeded, by wrapping heavy clothing around them, in smothering the flames. Such methods of relief as were at hand were applied, and medical aid summoned. Dr. Stevens and son soon arrived, and afforded all the relief in their power, but both cases appeared hopeless. The entire lower part of the eldest girl's body was burned, and also her arms, hands, and face; and it is supposed, from the appearance of her face, that the flames entered her mouth. She was in a prostrate condition, and so feeble as to scarce have strength enough to complain. In this condition she remained until about ten o'clock yesterday morning, when death ended her sufferings. She had just recovered from a severe attack of scarlet fever, and her system was ill able to survive this shock. Her death was owing more to the extent of the burns than to their depth.

Minnie, the younger, was not so severely burned, but her sufferings were more acute, and were only ended by a welcome death, which occurred about five o'clock on the same day as the death of her sister. One of her legs was burned, and both arms, hands, and face severely: and from the appearance of the face, it was also supposed that in screaming for help the flames entered her mouth and nostrils. The death of Minnie was also caused more by the extent of the burns than their depth.

Both of the parents were severely injured in trying to save their children. The girls were very interesting and amiable, and their sad death has entirely prostrated with anguish the father and mother; and the entire neighborhood sympathizes with them in their sorrow.

The above statement, regarding one of the most sad and afflicting events that ever occurred in this vicinity, is copied from the *Traveller* of Oct. 5th. We have taken pains to fully investigate the matter, and have secured for analysis a portion of the liquid which caused the death of the children. We find it to be *very light, inflammable naphtha*, such as hundreds of unprincipled, wicked men are selling all over the country as cheap kerosene, or burning-fluid. We unhesitatingly say, that a gallon of it in a family is as dangerous an agent *as an equal bulk of gunpowder*. We shudder to think of a child or adult sitting by a table with an ignited lamp filled with this volatile, highly explosive, and inflammable fluid standing upon it; and yet we have reason to think a large number are jeopardizing their lives in this manner every hour. We hope no family into which the *Journal* is received and read are taking this fearful risk.

Two little children burned to death by naphtha! Was this an accident, or a murder? Who is responsible? Who sold this liquid to the parents? We have severe and stringent laws, both state and national, against the vending of such liquids — why are they not enforced? A strange apathy, indifference, or ignorance, pervades the community respecting the nature of illuminating fluids, and the responsibility of those who offer them for sale. We have done what we could to disseminate correct information upon these points, believing we could render no greater service to our readers.

☞ In view of the number and urgency of the demands made upon us for services outside of our business, in purchasing or supplying articles needed by physicians, chemists, experimenters, artists, manufacturers, housekeepers, etc., we have deemed it almost, or quite a necessity, to provide a medium through which their demands may be promptly and satisfactorily met.

We intend, as soon as arrangements can be made, to establish an agency in connection with the *Journal* office, for the purpose of supplying medical and scientific books, surgical instruments and appliances, chemical and philosophical apparatus, re-agents, and all other articles and substances which may be wanted by our numerous family of correspondents and readers. This, we think, will prove a great convenience to them, and meet a want which has long been felt. As soon as arrangements are completed, notice will be given in the *Journal*.

Schönbein. — Christian Friedrich Schönbein was born at Metzingen, in Wurtemberg, 18th of October, 1799. At the age of twenty-eight, he took the position of Professor of Chemistry in the University of Basle. Schönbein never held a prominent position as an analyst, but he made several discoveries that gained him considerable reputation. He discovered ozone in 1839, and ever since has experimented more or less upon it, but the conclusions of other investigators who have studied the subject, are considered more reliable than his. His other principal discoveries were those of gun-cotton and collodion in 1845. He was in his sixty-ninth year at the time of his death.

Melting Metal in a Handkerchief. — The following is an excellent form of this very neat experiment: — Melt two or three pounds of fusible alloy and run into an evaporating dish; when cold, a handkerchief is stretched over the smooth convex form thus obtained, and the mass may then be melted over a Bunsen burner, in the course of a few minutes; on piercing the handkerchief, the melted metal runs out and may be received in a mould.

A new golden-yellow dye, called dinitronapthyl, has been obtained from the napthaline of gas-works, by treating a solution of muriate of napthaline and nitrate of potash, with nitric acid.

Bright Coating of Platinum on Metals. — Boettger gives the following process for obtaining a bright coating of platinum on brass, copper, and other metals. He first makes a nearly neutral solution of chloride of platinum, by carefully adding carbonate of soda to the acid liquid, till effervescence ceases. To this solution, he adds a little glucose and some chloride of sodium, without which latter the platinum would be deposited black. The deposition is almost instantaneous; and the articles to be coated are to be immersed in the liquid for a moment, then washed, and dried in sawdust.

Petroleum in Sweden. — A boring has been made to a depth of 253 feet on the Osmund mountain in Sweden, to obtain petroleum. The materials brought up are impregnated with surface oil, and the searchers are confident that they will get abundance of oil at 600 feet down.

The *Mining Press*, of San Francisco, gives the following curious receipt: "*To Clean a Brass Clock.* — Boil it whole. The water used should be pure rain-water. Dry on a warm stove to prevent subsequent rusting. This plan saves trouble and works well, when the only trouble is accumulated dirt or thickened oil."

Mr. A. E. Budd, of Mount Holly, N.J., asks, —

"What is the best grease for an iron-armed wagon? Lard does not seem to do very well; castor-oil does well, but it is expensive. If you do not feel prepared to answer, perhaps some of your patrons may."

Crude petroleum thickened with flour is used, we believe, to some extent in the oil regions of Penn. We have never tried it ourselves, but should think it might work. It certainly would have the advantage of being *cheap*.

French and German experimenters, have, for several months, been working on a process for depositing iron by electricity. The particulars of the process are not yet known, but it is supposed to be analogous to electrotyping. The iron so produced is not nitrogenous, but pure. It will withstand the action of hydrochloric or sulphuric acid in the cold, and will therefore not rust in the open air. It is of a clear gray color and takes a fine polish. With a weak current of a single Daniell cell, iron two millimetres thick can be easily deposited in a fortnight.

Improvement in Cabinet Organs. — A new invention has just been brought out by the Mason & Hamlin Organ Company which will attract much attention. It is an improvement upon what has been known to some extent as the *vox humana*, and produces a very rich and beautiful quality of tone, somewhat resembling that of the human voice. The same thing has been attempted before, but when partial success has been attained, the machinery was so complicated as to be constantly getting out of order. The improvement of Mason & Hamlin is ingenious, simple, as durable as the instrument itself, and exquisite in its effect. The reputation of this company for the best instruments of this class in the world is well established. They were winners of the first prize-medal at the Paris Exposition. — *New York Musical Gazette.*

Messrs. Mason & Hamlin have a world-wide reputation as organ manufacturers. Their instruments are used in thousands of families, halls, and churches, all over the country, and they afford the highest satisfaction to purchasers.

Poisoning by Green Wall-Paper. — In spite of the numerous warnings, another case of death from wall-papers colored with arsenite of copper is reported in the *Journal de Chimie*. It is that of a paper-hanger, who neglected to wash his hands before dinner.

Hot Milk a Remedy for Diarrhœa. — Hot milk has been very successfully tried in Bengal as a remedy for diarrhœa. A letter from a resident says, that a pint every four hours will check the most violent diarrhœa, stomach-ache, incipient cholera, or dysentery. It is perfectly soothing to the whole alimentary canal. Half a pint every meal generally reduces gradually and pleasantly any ordinary diarrhœa.

Method of Rendering Wood, etc., Incombustible. The process originally patented by Dr. Wilde, but now public property, consists in saturating the wood with a very dilute solution of the silicate of potash, as neutral as possible, and, when dry, varnishing once or twice with a more concentrated solution. By this simple process we can render our doors, staircases, and other woodwork, perfectly fire-proof. The process is in common use in Germany.

Carbolic Soap. — A soap containing carbolic acid is manufactured in Europe and used to great advantage in cutaneous diseases.

Many of the cheap French wines, especially clarets, are often adulterated with alum.

BOOK NOTICES.

Constipated Bowels: the Various Causes, and the Different Means of Cure. By S. B. Birch, M.D., Member of the Royal College of Physicians, London, etc., etc. From Third London Edition. Philadelphia: Lindsay & Blakiston. 1868.

This is decidedly an English book, and by an author whose rotund form and ruddy countenance we fancy we can see on almost every page as plainly as if he were standing before us. Beer, roast beef, exercise — these are the Englishman's hygienic agents, capable, in his view, of restoring weakly invalids to robust health and strength. We hardly think the debilitated, flatulent stomachs of American dyspeptics would bear up long, under the pint of "half-and-half," or the same quantity of "best English stout," recommended by the doctor to be taken sometimes before breakfast. Constipation is a great and very common evil. The number of those suffering from this difficulty is rapidly increasing, and is due, in large measure, to the facilities which railroads afford to many people of doing business in cities and living in the country. The hurry and anxiety of an early start in the morning, when nature's calls are most imperative, are unfavorable for regular compliance therewith; and

hence, from neglect, habits are acquired of a most unpleasant character. Dr. Birch treats the whole subject in a very thorough and sensible manner, and the book can be read with profit, not only by physicians, but by all intelligent men and women suffering from the malady of which it treats. We intend, at a future time, to allude to this subject in a more extended manner, and perhaps make some extracts from Dr. Birch's book.

The Science and Practice of Medicine. By William Aitken, M.D., Edin. Professor of Pathology in the Army Medical School. Second American, from the Fifth Revised London Edition. With large Additions by Meredith Clymer, M.D., Ex-Professor of the Institutes of Medicine in the University of New York, etc., etc. Philadelphia: Lindsay & Blakiston. 1868.

The publishers deserve the thanks of the medical profession and students for this second American edition of Prof. Aitken's magnificent work. So great was the demand for the first edition, that it was entirely out of print in less than twelve months after its publication. This rapid sale affords evidence of its appreciation by the profession, and we predict for the new edition a demand equally as pressing. The additions made by Prof. Clymer bring the work up to the present advanced position of medical science, and in it the student will find presented in detail the new discoveries and suggestions which have been made within the past five years, many of which are important in their bearing upon the scientific treatment of disease. No modern treatise upon the science and practice of medicine, in our view, will compare in value and importance with this. The accuracy of observation and the clearness of statement found in the work, together with the breadth of research apparent upon every page, render it one of no ordinary character. The price for the two large volumes is $12.00.

Diseases of Children. A Clinical Treatise, based on Lectures delivered at the Hospital for Sick Children, London. By Thomas Hillier, M.D., London Fellow of the Royal College of Physicians; Physician to the Hospital for Sick Children, etc., etc. Philadelphia: Lindsay & Blakiston. 1868.

It cannot be said that the diseases of children are often different from those met with in adults, but they sometimes exhibit peculiar features which render special description and treatment necessary. Dr. Hillier states, that of 1000 children born, 150 die within twelve months; 113 during the next four years; giving 263, or more than a quarter, within five years of their birth. From statistics published in this country, which have recently fallen under our notice, we learn that this enormous mortality is even greater in some localities here than in England. If any thing can be done through the agency of medical or hygienic treatment to arrest this fearful mortality, it is important it should be understood. Dr. Hillier's treatise is a most excellent one. The suggestions and statements made result from a wide experience in the treatment of children, both in hospital and private practice; and few physicians can read the work without greatly adding to their stock of medical information.

Cleansing Musty Cider and Beer Barrels.—A large number of inquiries have reached us regarding the permanganate of potassa, recommended in our last number for the purpose of cleansing old cider and beer casks. The crystals of permanganate sold by druggists are too expensive for this use. We have been induced to prepare the article in a liquid and cheaper form, which will admit of its general employment. Enough is stored in a small bottle to cleanse four 36-gallon casks, at a cost of about one shilling each. By its use, old musty casks are rendered sweet, and as suitable for refilling as those that are new.

☞ Sheet-iron stoves are preferable to cast-iron, as they are impermeable to gases.

Medicine and Pharmacy.

CARBOLIC ACID.

We intended in the September number of the *Journal* to append to Dr. Channing's communication some remarks regarding carbolic acid and solutions of the same. In this agent we undoubtedly have one of the most important additions to *materia medica* which has been made for several years, and it is important that its exact nature should be understood. It is called an *acid;* not that it has *sour* properties, but because it behaves like acid bodies in the presence of alkalies. It is a substance capable of uniting with the alkaline earths and metals and forming salts. As regards its classification, we rather prefer to adopt Dr. Gibbs's view, and rank it with the alcohols. It is manufactured from coal-tar, and is found associated with other bodies in the waste products of the stills used in the manufacture of the pitch used for covering roofs. One method is, to first convert it into crude carbolate of lime, and then, by decomposition of the lime salt, obtain it in a condition to be purified by repeated distillations. Much of that found in the market is very impure, holding, among other extraneous bodies, considerable quantities of the tarry compounds. We have found it necessary to purify most of the article furnished by the English manufacturers before it is suited to the nicest medical and surgical applications. It requires peculiar adaptation of apparatus to work the material successfully. The ordinary methods of condensation of the vapor do not answer, as it is so dense it forms an obstacle to the flow of the material, and thus dams up the retort. It is not a very pleasant agent to manufacture. There are but few uses to which the pure crystalline acid can be applied; as an escharotic, it is used to some extent in surgery; it is very powerful, and must be used with caution. Carbolic acid is soluble in water, alcohol, glycerine, etc. The form in which it is best adapted for medical purposes is in aqueous solution; distilled water takes up five per cent of pure acid, and it will hold no more; therefore the solution prepared in our laboratory is a saturated aqueous solution, holding precisely five per cent. This is a very convenient form for medical use, and was adopted as a standard in our laboratory two years ago. The acid from which it is prepared is *chemicallg pure*, and therefore the solution is adapted to the nicest purposes in medicine and the arts. An impure liquid carbolic acid, holding about eighty-five per cent, has been quite extensively thrown upon the market, labelled "Solution Carbolic Acid." A large number of serious accidents have resulted from its use, and we can hardly conceive of a more dangerous blunder than this. Dr. Channing states that he was severely burned by the article sold by Hegeman & Co. as *their* preparation. It is hardly presumable that these gentlemen have appliances for manufacturing carbolic acid, and therefore this is a mistake. It is probable that the article vended by them was procured from the same source as that from which many other druggists have drawn their supplies. We feel it to be a duty to call special attention of physicians to this so-called "solution" of carbolic acid, as it has been largely supplied to the trade. The saturated aqueous solution can be further diluted to any required extent with water, and thus be made suited to all the uses to which carbolic acid is applied. Mixed with five parts of water, it is used in many families as a general purifying and sweetening agent, such as rinsing the mouth after eating, bathing the feet; and a portion is often added to water used for general bathing purposes. The saturated solution is also adapted for use as a gargle, or douche in nasal affections; also for internal administration in flatulent dyspepsia, etc., etc. One grain of the pure crystals is held in twenty grains of water, which is equivalent to about fifteen drops of the fluid. With these statements clearly in the minds of physicians, much of the uncertainty and confusion in which the new agent has been involved is removed, and a clear understanding of its nature and the character of solutions secured.

INTESTINAL WORMS.

We have received a communication from, and also have had an interview with, Mr. E. C. Haserick, of Lake Village, N.H., regarding the annoying and often fatal trouble of worms in horses and other animals. Mr. Haserick claims that he has made some new discoveries in respect to the nature, habits, and methods of propagation of these living parasites, which are of the highest importance; what is still better, he has discovered a very simple method of ridding horses and animals of them. From very careful and long-continued observation, he has learned that worms in the intestinal canal cannot propagage their species without access to light and air. The prevalent idea that the parasitic ovum is deposited in the mucous follicles of the stomach and intestines, and there developed and matured, is incorrect. The intestinal cavities are not the natural breeding places for any variety or species; the instinct of the worm leads it to crawl to the exterior orifice, and there, outside the folds of the sphincter muscle, the eggs are deposited and hatched. The process is a rapid one, the egg requiring but five or six hours after it is deposited to germinate and produce a new animal, which immediately enters the canal as its natural feeding ground and home. The life of the worm is a short one, not exceeding six days; and therefore Mr. Haserick claims, that if the eggs deposited at the anus can be destroyed so as to prevent a repetition of life, the animal in one week will be entirely free of the trouble, the dead worms passing away in the feces.

When the discovery of the habits of propagation of the animals was made, he set about to find some application which would destroy the ovum deposits, which were plainly to be seen upon the external parts. A great variety of agents were employed, but without effect, so tenacious of life are the germs. At last, he found the simple application of *lard* effected a perfect cure; by keeping the external orifice thoroughly anointed with lard, the parasite cannot deposit the egg. He has observed them approach the orifice, move about, and return to die, unable to lay the egg upon the oily surface. It is not necessary to give horses or any animals turpentine, "condition powders," or any internal medicine whatever for worms; the simple application of lard to the external orifice will completely cure every case in one week. Mr. Haserick asserts that children can be relieved of worms in the same way, by the application of lard to the anus. The intolerable itching in that locality is caused by the irritation of parasites crawling out to deposit the egg. Prevent them from accomplishing their purpose, so that no new families may hatch and colonize, and the old ones soon die out and relief is afforded.

Mr. Haserick is not a medical man, but a chemist; of a very observing turn of mind, and quite a student of nature. For several years his views have been tested practically in an extended neighborhood, and their correctness in every case has been confirmed. We are willing to present the subject for the consideration of our readers.

VACCINE VIRUS FROM KINE.

So constantly is the vaccinator met with the challenge, honestly and earnestly, put by anxious mothers, "Is your matter good?" that it cannot be denied that there exists a strong and almost innate popular idea of a possible impurity in vaccine virus, as commonly used. In other words, people seem firmly convinced that vaccination may communicate other diseases than its own, and that it is a matter of the highest moment to procure virus which is free from suspicion of even a possible taint.

The medical profession have not shared in this impression, except so far as to be very careful not to employ virus from so called "humory children," or those liable to it from hereditary taint. No honest physician uses such virus, from conscientious scruples. The advances in medical knowledge, however, are rendering this subject less and less an open question, as time rolls on. It is now proved that syphilis may be communicated by vaccination. In the London *Lancet* for 1862, an account is given of a town in Italy which was syphilized in this manner. One case was once reported to the Boston Society for Medical Improvement. It is, however, stated that the syphilis is communicated only when *bloody* lymph is used; so that if simply lymph, pure and free from admixture is employed, this loathsome disease cannot be imparted. However, when it is admitted that one other disease besides vaccinia has been imparted by vaccination, the question arises, Why may not pityriasis, psoriasis, and other skin diseases be imparted in the same way? From considerations like these, measures have been taken in foreign lands to secure vaccine virus direct from the heifer, and thus have a virus which is as pure as possible. They propose to renounce the vaccination from arm to arm.

Some idea of the importance of this subject may be derived from the fact that the Russian Government has ordered Dr. Bulmerink to organize, at St. Petersburgh, a service to produce animal virus. In Naples, this practice dates back to the year 1810, by Dr. Galliati. In 1858, M. Negri revived the procedure, and is deemed the great authority at the present time. From thence, the practice has spread to Paris, where Dr. Lanoix was very active in its introduction. (See *Etude sur La Vaccinateur Animale*, Paris, 1866. New York, Ballier Bros.)

In the United States, several physicians have dealt with this matter. As long ago as 1836, one Massachusetts medical man ruined himself by giving small-pox to cases he supposed he had vaccinated with vaccine from kine. In 1840, Dr. Adams, of Waltham, Mass., conducted some successful experiments in inoculating cows. It is, however, a curious coincidence, that Dr. Ephraim Cutter, of Woburn, Mass., in 1858, contemporaneously with Negri, of Naples, began his experiments in collecting virus from kine. He has kept them up ever since. He states that he has inoculated nearly one thousand kine in his investigations.

It is thus seen that the medical profession have endeavored to supply their clients with virus of the most unexceptionable character, and, by their use of it in their own families, have given countenance to the idea that vaccine virus from kine is preferable.

There is also an impression that vaccine virus deteriorates by long use, by many removes from the cow. This is not sustained by facts. The protective influence is not found to be destroyed. In fine, the great advantage of vaccine virus from kine must lie in its being entirely free from syphilitic taints, and probably of all other infections which are believed by some to be communicated in connection with vaccination.

COFFEE AS A DEODORIZER.

Editor Journal of Chemistry: —

By coffee is here meant the burnt and ground coffee berry of commerce. About three years since, coffee was recommended by a French physician for the neutralizing of foul odors that emanate from organic bodies in a state of decay. It is, however, about twelve years since the late Dr. Benjamin Cutter, of Woburn, Mass., employed it especially for this purpose in purifying the dead. He was in the habit, just before concluding an autopsy, of pouring a pound or two into the cavities of the abdomen and thorax, covering the viscera, and invariably neutralizing the foul, cadaveric odor which is so unpleasant and distressing to mourning friends. The writer has pursued the same course in many instances. He has also employed coffee decoction as a detergent wash for the mouth, etc.

These instances are enough to show that coffee is an efficient deodorizer. The *modus operandi* probably depends on the fact that it is a charcoal which has the power of absorbing mephitic gases, and also that it is pervaded with an aroma arising from the carbonization of essential oils, which aroma is one of the pleasantest that acts upon the nose.

For the purification of the sick-room, coffee is incomparably superior to the burning rags so commonly practised, as it has a direct chemical influence, and is, besides, a delightful perfumery.

E. Cutter, M.D

Boston, Oct., 1868.

Remarks. — We fully coincide with Dr. Cutter in his views regarding the value of coffee as a deodorizer. It can be used with advantage where other agents would be inadmissible. It is often the case that rats are poisoned in dwellings, and, dying in the spaces between the floors, fill the rooms with an intolerable odor. In these cases we have recommended placing a pound or two of fresh burnt and ground coffee between the floors, with most excellent results. Coffee is not, probably, a destroyer of contagion, like carbolic acid, or the chlorides; but it is a pleasant and highly effective destroyer of unpleasant odors.

SYRUP OF PHOSPHATES OF IRON, QUININE, AND STRYCHNINE.

Editor Journal of Chemistry: —

I have been much in the habit of using in my practice the Syrup of the Phosphates of Iron, Quinia, and Strychnine, prepared by your manufacturing house. It is not too much to say, that your chemicals of all sorts (which I have used almost constantly for the last four or five years) are the best and purest I am able to obtain; but the syrup to which I have alluded possesses a special adaptation to cases of chlorosis above and beyond all other remedies I am acquainted with. Combining the important element of phosphorus with powerful tonics, it undoubtedly exerts a beneficial influence over "the nervous apparatus which presides over the functions of nutrient assimilation." The worst cases of chlorosis acknowledge the effect of this elegant combination by prompt and speedy recovery.

The remedy doubtless has a much wider range of application than any to which I have applied it. It would be convenient to dilute your preparation with simple syrup to suit certain indications, if the formula was at hand, so as to judge of the relative quantities of the several ingredients. The formula is said to be that of Dr. Aitken, of the Royal Victoria Hospital, Netley, England; will you please give that formula, or inform me where it is to be found? In so doing, I doubt not you will oblige many other physicians who have admired the effects of this medicine, but have been puzzled to know how to prescribe it to strumous children, and other delicate patients.

Ira D. Brown, M.D.

Weedsport, N.Y., Sept. 19, 1868.

Remarks. — Dr. Brown will find in the May number, Vol. I. of the *Journal*, a paper by Prof. Aitkin, in which the formula, and a detailed statement of the process of preparing the remedy are given. The formula, like many suggested by English physicians, is defective, inasmuch as the amount of phosphoric acid directed is insufficient to hold up the iron and alkaloids. Unless this is increased, an abundant precipitate of the iron and other ingredients occurs in the syrup in a few days, and it is rendered unsuited for prescribing. The remedy is a very valuable one, but it rests under the great disadvantage of being exceedingly unpleasant in taste. Some patients declare that they cannot take it, and throw it aside after one or two doses are taken. With the view of obviating this disadvantage, and also another which pertains to it, — that of not keeping well in warm weather, — we substituted, for the phosphate of iron, the citrate, and put the preparation in the form of beautiful garnet-colored scales, readily soluble in water and syrup. The *Citrate of Iron, Quinine, and Strychnine*, is not a disagreeable remedy, keeps well, is portable, cheap, and, we think, subserves nearly or quite all the ends reached in Dr. Aitkins' syrup.

TREATMENT OF CHRONIC DIARRHŒA.

Dr. Nichols: — In March last a patient came to me suffering from chronic diarrhœa of two and a half years' duration. I soon put her upon the use of pills of ipecacuanha and ext. gentian. Each pill contained two grains of ipecac. She was directed to take four daily: one an hour before each meal and one at bedtime; but, as she found that each pill vomited her, she took a less number. A great improvement was manifest in three days, and in three weeks she was well, and has remained so to this time. I have used the same pills in some other, but less protracted cases, with very marked good effects. It is desirable that vomiting should be induced at least once every day or every alternate day.

Would you not do a good service to many returned soldiers and others by giving this mode of treatment a notice in the *Journal?* Yours, most truly,

Andover, Mass. Stephen Tracy, M. D.

P.S. This case of two and a half years' standing was induced in India, and had, of course, been under treatment both there and in this country for the whole time. Last winter she was in New York city, under the direction of distinguished physicians, all to, apparently, no benefit. She was the widow of a physician. S. T.

A Novel Way of Reducing Strangulated Hernia. Dr. Geo. Weller, in the *Lancet*, relates a case of strangulated hernia, about the size of a small pear, reduced by the following singular method, after the failure of manipulation in the warm bath: The patient's eyes were covered with a towel, and the leg of the affected side flexed upon the abdomen, after which about a pint of cold water was suddenly dashed upon the chest and epigastrium; the result was a deep and quick inspiration, and the slipping back of the hernia into the abdomen.

Chloroform in Obstetrics. — Dr. Sansom, at a meeting of the London Obstetrical Society, advocated the use of a mixture of one part chloroform and three of absolute alcohol. By this means less vapor is given off, and the mixture can be given on a common handkerchief. The majority of European accoucheurs prefer chloroform to ether.

Pills for Atonic Dyspepsia. — Deaurentur.

℞ Argenti oxydi, gr. xii.
Pulv. piperis capsici, gr. iv.
Ext. gentianæ, gr. xxiv.

Mix, and divide into 8 pills. One twice a day.

☞ The first regular session of the School of Dentistry connected with Harvard College commences first Wednesday in November.

ON THE SPECIAL ACTION OF THE PANCREAS ON FAT AND STARCH.

Dobell's Pancreatic Emulsion has been constantly referred to by European medical writers during the past two years, and much inquiry has been made regarding it upon this side of the water. Dr. Chambers, in his interesting work upon "The Indigestions," speaks favorably of it. We present below Dr. Dobell's paper, or a part of it, describing it, and method of preparation:—

I have been engaged for several years in experimenting with the secretion of the pancreas. The inquiry of which I now make known the results has reference especially to the mode of action of the pancreas upon fats—a point which has been the subject of investigation by various physiologists ever since the discovery of the influence of the pancreatic fluid on the absorption of fat, by Claude Bernard, nearly twenty years ago.

In the chemical parts of my experiments I owe much to the efficient aid of my friend Mr. Julius Schweitzer, and to the energy and perseverance with which he carried out my suggestions under many difficulties.

The objects of my investigations have been as follows:

1. To discover the exact character and nature of the influence exerted by the pancreas upon fats.
2. To discover a means of obtaining and preserving the active principles of the pancreas in a form suitable for experiment in the laboratory, and for administration as a remedial agent.
3. To discover the effects of the administration of the active principles of the pancreas as a remedial agent in certain wasting diseases, and to test, by an *experimentum crucis*, the truth of a conclusion on this subject at which I had previously arrived by a process of inductive research.

I shall not occupy the valuable time of the Society by narrating the many more or less unsuccessful experiments, but restrict myself to a concise record of those attended with success.

Experiments were made with the pancreas of several different animals; but that of the pig was selected for the experiments of which I am about to give the results, as being nearest in the character of its functions to that of the human subject.

In order to ascertain the normal reaction of the pancreatic juice, and whether this is altered by the length of time that has elapsed since the last meal, the following experiment was made with the assistance of Mr. Schweitzer and of Mr. Harris, of Calne, who kindly placed his extensive pig-killing establishment at our service for the purpose.

On March 22, 1866, forty pigs were killed, and the pancreas of each examined immediately after death; the killing and examination were so rapidly conducted, that the pancreas was in each case examined while warm from the body; and the killing and examination of the forty pigs in succession occupied less than an hour.

The pigs were killed ten at a time. The first ten had been fed two hours before they were killed; the second ten, five hours; the third ten, nine hours; and the fourth ten had not been fed for two days.

The pancreas in each group presented the same characters in size, color, and reaction. Each pancreas was cut through so as to lay open the principal duct, but in no case was there any fluid in the duct. Litmus-paper was applied to the interior of the duct and to the divided gland-cells, and on being pressed sufficiently against the tissues to absorb moisture, the paper was in each case reddened where it was moistened. This acid reaction was not found in the fat and muscles of the animal.

At my request, Dr. Collins, of Albert Terrace, Regent's Park, examined the reaction of the pancreas in a series of cases at the moment when all the digestive organs were under active excitement. He gave the pigs a good and relishing meal, and while they were eating it, divided the spinal marrow in the neck, so as to destroy sensation in the body. The pigs were then immediately cut open, the pancreas removed, and its reaction examined. On August 3d he wrote me: "As you requested, I have tried a series of experiments upon the pancreas, parotid, and sublingual glands. The two latter have a decidedly acid reaction, but the pancreas I am not quite so certain about; in one batch of pigs killed in Buckinghamshire it was alkaline, but in another lot in Hertfordshire it was acid."

The reaction of the pancreas is always acid when it reaches the laboratory for experiment as quickly as possible after removal from the animal. This we have proved in many hundreds of instances.

To discover the influence of the pancreas upon fat, the fresh pancreas of the pig, freed from all adhering blood and other extraneous matters, was cut into small pieces, bruised, and mixed with lard; and to this mixture water was gradually added. In the bruised condition the pancreas had an acid reaction. By stirring this mixture of pancreas, lard, and water, the fatty character disappeared, a thick, white, creamy fluid being formed, which, on standing, solidified into a firm pasty mass. This mass had also an acid reaction. In order to free it from the *debris* of pancreas, it was pressed through muslin, and a uniform smooth creamy emulsion remained. This emulsion rapidly putrefied, but remained a permanent emulsion until putrefaction set in. . . . . .

The influence exerted by the pancreas upon fats, therefore, appears to operate by breaking up the aggregation of the crystals of the fat, and altering its hydration. It alters the molecular condition of the fat, mingling it with water in such a way that even ether cannot separate the fat from the water. A permanent emulsion is thus formed ready to mix with a larger quantity of water whenever it may be added.

The pancreas, therefore, in acting upon fat, does not decompose it into fatty acid and glycerine, the absence of the glycerine from the watery stratum, and the presence of the glycerine in the pancreatized fat of the ethereal stratum, having been demonstrated.

Action of the Pancreas upon Starch.—It is well known that, in addition to the influence of the pancreas upon fat, it has the power of converting starch into glycose by simple mixture. This property remains, to a certain extent, after the pancreas has exhausted its property of acting upon fat. The quantity of pancreas, which, before mixture with fat, will convert about eight parts of starch into glycose, after saturation with fat will still convert about two parts of starch into glycose.

Second Object.—To discover a means of preserving the active principles of the pancreas in a form suitable for experiment in the laboratory, and for administration as a remedial agent.

The properties of the pancreas can be extracted from the tissue of the gland by means of water. This watery fluid putrefies very rapidly. It has an acid reaction, a deep yellow color, coagulates largely by boiling, leaving the color of the fluid unaltered. It may be precipitated by lead solution, and decomposed again by sulphuretted hydrogen.

When this watery fluid is evaporated, it forms a syrupy extract, which is highly hygroscopic and very difficult to dry. With great care and trouble it may be dried. For general purposes, the drying is greatly facilitated by adding a dry absorbing-powder, such as powdered malt. For experimental purposes, it may be used in its pure undried state of syrupy extract, but must in that case be used fresh. In the dry state, either pure or mixed with malt-dust, it may be kept good for an indefinite length of time, if protected from moisture in a well closed bottle. This extract of the pancreas, containing the active principles of the pancreas in the highest degree of efficiency, whether fluid or powdered, I call "pancreatine." This term is used only for convenience' sake, and must in no way be understood to signify that the property possessed by it is *single*. All attemps to isolate the several properties of the pancreas into separate products have failed, no one of such products having been found to possess in perfection the property of acting upon fat in the manner described in this paper as peculiar to the pancreas. By the term "pancreatine," then, I desire to represent the *entire properties of the pancreas*, extracted in a convenient form for keeping, for experiment, and for administration as a remedial agent.

One part of the pure pancreatine dried, without mixture with malt-dust, will digest at least sixteen parts of lard, and enable it to form a thick creamy emulsion, with about one hundred parts of water. The emulsion thus formed presents in every respect the characters and qualities of the emulsion produced by the fresh pancreas already described. In this way, therefore, the active principles of the pancreas may be obtained and preserved in a form suitable for experiment in the laboratory and for administration as a remedial agent.

The third object of my investigations has especially occupied my attention in a long series of experiments at the Royal Hospital for Diseases of the Chest. Full details of these and of the results obtained have been published from time to time, during the last four years, in the medical journals. I shall not, therefore, occupy the time of the Society with any account of them in this paper.

EFFICACIOUS PRESCRIPTIONS.

Sulphuris loti, ℥iss; confect. sennæ, ℥ij; potass. nitrat., ʒj; syrup. cort. aurant., q.s. Mix. Dose ʒj—ij twice a day for hemorrhoids.

Dr. Mulveny of the British Navy, in an excellent article in the *Medical Press and Circular*, treats of the pathology of hemorrhoids, and recommends for internal and bleeding piles the administration of belladonna, which gives tone to the colon and rectum through the intestinal branches of the solar plexus, and acts upon the vasomotor nerves of the hemorrhoidal arteries, thus arresting bleeding, and diminishing the size of the tumors. Externally he uses as an ointment "the grease which runs from the hot bearings and eccentrics in the engine-room of a steamer when under steam. This grease, which contains chiefly oxides of copper and lead, will be found," he says, "when mixed with one eighth its bulk of lard, an unfailing remedy for external piles."

In simple excoriation of the rectum, use an ointment composed of hydrarg. cum creta mixed with cold cream in the proportion of ʒss or ℈ij to the ounce.

In cases of neuralgia of the rectum in which opium, belladonna and other anodynes, have been used fully, without real benefit, apply the vapor of chloroform or the ether spray over the seat of the pain.

In cases in which inactivity in the formation of bile may be regarded as giving rise at the same time to sluggishness of the bowels and hemorrhoidal disease, a dose of manganese every night, and a few drops of tincture of nux vomica by day, have been found useful. In other cases ten or fifteen drops of tinct. sem. colchici, with three to five of tincture of nux vomica, two or three times a day, has cured all three complaints.

In other cases, in which there is an herpetic eruption in and about the rectum, small doses of Fowler's Solution combined with tincture of nux vomica will prove the best remedy.

Ten to twenty drops of tincture of hammemelis virginiana or witch hazel, or equal quantities of the tincture of achillea millefolium, or common yarrow, with or without the simultaneous use of rectal injections of infusions of these plants, are said to relieve many cases of bleeding piles; but they are probably not as useful as the geranium maculatum, or crane's bill, or the preparations of tannin and gallic acid.

Oxide of zinc made up into suppositories with cocoa butter, is a very safe and efficacious remedy in like affections.

A handful of the chopped root of collinsonia canadensis in a quart of water boiled down to a pint, and taken in wineglassful doses three times a day, is said to cure cases of hemorrhoids and chronic constipation in a few weeks.—*N. Y. Medical Gazette.*

How to Disguise the Taste of Quinine.—Every physician is familiar with the frequent complaints of patients to whom he administers quinine. The taste of quinine is so very bitter and nauseous that it is difficult to get a patient to swallow it, except in the pilular form. All object to it, and not a few refuse to take it, except in the form of a pill.

I have ascertained that chocolate will completely disguise the taste of this medicine. Let the patient obtain a few "chocolate drops" from the confectioner, and he can take quinine in solution without tasting it. Immediately after each dose is swallowed, put two or three chocolate drops in the mouth and chew them up, and the bitter taste of quinine will no longer be perceived. Chocolate, perhaps, would answer the same purpose, but I have not tried it. Any one can satisfy himself of the truth of the above statement, by filling the mouth with a solution of quinine, and using the chocolate drops immediately after

ejecting it. By this simple means, the solution of quinine can be used, when otherwise the pilular form would have to be resorted to. It is often desirable to get the patient quickly under the influence of the remedy, which could not be done where pills are used. There are persons, too, who cannot take a pill, and object to the taste of quinine, and beg the doctor to substitute some other remedy in place of it. In these and many other cases it will, in my opinion, be found useful to know that chocolate will disguise the taste of quinine. — *Medical and Surgical Reporter.*

FERROMANGANIC PREPARATIONS.

The ferro-manganic preparations, and their introduction into therapeutics, are the consequence of numerous physiological and pathological observations.

The fact that iron is one of the normal elements of the blood has been universally admitted, since the demonstrations of Menghini, Fork, and Laibach.

Now, as Scheele's and Gahn's discoveries, in 1774, showed that manganese is invariably associated with iron in organic nature, a suspicion arose that it existed also in organisms containing iron; and it was subsequently found not only in a multitude of plants, but also in the blood, flesh, milk, etc., as a constant accompaniment of iron.

Fourcroy and Vauquelin had already discovered manganese in bone-ashes; afterwards, in 1830, Wurzer found it in calcined blood; Million, in 1847; Marchesan, in 1848; and, lastly, Hanon, in 1849, formally declared, after further diligent research, that manganese is the constant and natural associate of iron in the blood.

Finally, Burin du Buisson, acting on the suggestion of Dr. Pétrequin, undertook to verify these researches, and acquired the certitude, not only of the simultaneous presence of manganese with iron in the blood, but also found it even in healthy pus.

Such facts could not fail to lead to the inference that, as morbid elements are produced by the absence or deficiency of iron in the blood, the same effect must likewise occur with regard to manganese; and, consequently, that whenever the exhibition of iron alone failed to cure chlorosis, the sole cause was, that these chalybeates could not supply the economy with the manganese, which was wanting.

Repeated experiments soon confirmed the truth of these conclusions. Numerous analyses of the blood demonstrated, that the diminution of the proportion of iron in the blood of chlorotic patients was in constant ratio with the diminution of manganese; and many obstinate cases of chlorosis, which had resisted all treatment with chalybeates, were completely cured by the ferro-manganic preparations.

These facts led Dr. Hanon to the singular theory which consisted in distinguishing two kinds of chlorosis; one arising from a deficiency of iron, the other from a deficiency of manganese. But as Dr. Hanon was unable to give a diagnosis of the difference between these two kinds of chlorosis, we cannot but regard as empirical his method of administering manganese by itself in cases for which iron alone had produced no result.

Chemical experiments having demonstrated, as above stated, that manganese exists in the blood simultaneously with iron, and in clearly determined proportions, the absence of one being always attended with a proportional decrease of the other, this fact supplied a most reasonable motive for the simultaneous use of manganese and iron for all cases in which the exhibition of the latter alone was inefficient.

The subsequent experiments of Dr. Pétrequin, and after him of Dr. Gensoul, Gubion, Contagne, Bonnaric, Delorme, and many more, perfectly justified this theory, and we can assert, without fear of error, that it is not only rational, but indispensable, in many cases, to prescribe the ferromanganic preparations instead of the simple chalybeates hitherto employed. — *Boston Medical and Surgical Journal.*

Operations on the Vocal Cords. — At a meeting of the Royal Medical and Chirurgical Society, in London, on May 26, seven cases were reported in which morbid growths were removed from the vocal cords by the aid of the laryngoscope.

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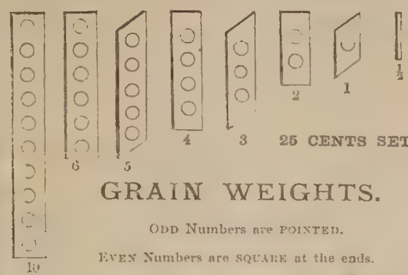

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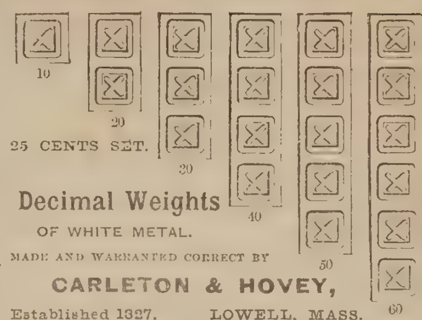

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"The ordinary sedative dose of this is twenty-five drops, equal to about one sixth of a grain of the opium alkaloids.

"If much pain or irritation is to be combated, ten, fifteen, or twenty-five drops more may be required. A pleasant tranquillity and calmness is usually produced by the minimum dose; but in some cases, to complete the effect and produce quiet sleep, a repetition of the dose is required.

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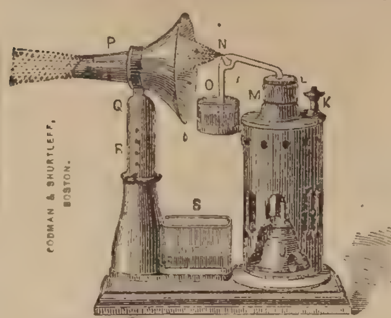

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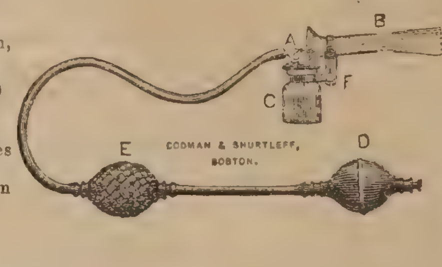

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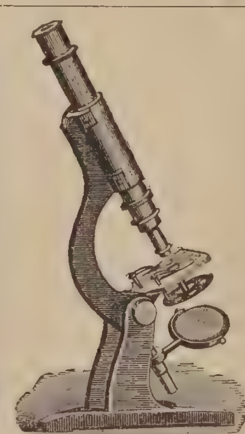

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DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. III.—No. 6.] BOSTON, DECEMBER 1, 1868. [ISSUED MONTHLY, AT FIFTY CENTS PER ANNUM.

THE Boston Journal of Chemistry IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

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RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

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Contents.

Familiar Science.

ABOUT TELESCOPES.

A correspondent requests information regarding telescopes, and wishes to know which is the most powerful and perfect instrument in use in this country. Undoubtedly, the great refractor at the Cambridge Observatory surpasses all others for general purposes of astronomical observation. The magnificent object-glass, made by Mr. Clark, of Cambridge, and which is now mounted at the Chicago Observatory, and placed under direction of Prof. Safford, has equal, or perhaps greater, penetrating power, and, for some kinds of work, is fully the equal of the Munich glass. We remember examining this wonderful lens as it rested, a few years ago, upon a wheelbarrow support in the hall of Mr. Clark's modest mansion at Cambridge. It was then unsold, and the price asked for this disc of glass—so small that we could almost cover it with a hat—was $15,000. The insurance upon it was $10,000. Mr. Clark is ranked as one of the most distinguished opticians of the age, and occupies the enviable position of having constructed a telescope which is second to none in the world. The best objectives for microscopes have been made by Spencer and Tolles; and the best object-glasses, for telescopes, by Clark. Certainly we have no need to look to foreign artists for our optical instruments.

The great Cambridge refractor was made in Munich, and cost $18,500. Its entire length is twenty-three feet; diameter of object-glass, fifteen inches. The instrument weighs three tons, and is so nicely poised, that a child can move it in any direction. The clock-work adjustment is a wonderful piece of mechanism; and when the instrument is once directed to an object, terrestrial motion is overcome, and it follows the star automatically. The observatory is largely indebted to the ingenuity and mechanical skill of the late Dr. Bond, so long its director, for the marvellous nicety of these adjustments.

The observatory has a "standard" clock, manufactured in London, which is regarded as a specimen of very superior work. It is governed by galvanic action, and is so connected with the observatory clocks in Washington, Albany, Cincinnati, etc., as to move in perfect accord with them. By closing the circuits, the clocks can all be heard by the visitor to tick in concert. The exact time is communicated to this city at twelve each day; the bell is struck simultaneously with the tick of the Cambridge clock at the instant of twelve.

The direction of the wind is indicated by a vane, and the velocity by four hemispherical cups, attached to horizontal arms at right angles with each other, and which are found, by repeated trials, to revolve at *one third* the velocity of the wind. The transit instrument is a fine one. It is mounted on a perfectly horizontal axis, upon a stone pier, having a foundation below the reach of frost, and so arranged as to move exactly in the plane of the meridian. To note the exact instant a star passes the meridian, several *spider webs* are placed in the focus of the instrument, and the record is made by the magnetic current. How wonderful are the devices required to aid the labors of those engaged in scientific research! Modern science is very exacting as regards accuracy of observation and experiment; and all the resources of human art and skill are exhausted in perfecting the instruments used by astronomers, chemists, engineers, and others laboring to extort from nature her marvellous secrets.

MIRRORS AND BURNING-GLASSES.

BY GEO. S. CHASE.

Mirrors, or looking-glasses, date back to a very great antiquity. Moses (Ex. xxxviii. 8) speaks of them in a manner to show that they were used in his day; and pictures of females with hand-mirrors are common among the decorations of Egyptian monuments. At what time they were first made concave is not known; but Plutarch, in his "Life of Numa," who died B.C. 672, describes them in the following words:—

"If, by any accident, the vestal fire is allowed to go out, it is not to be lighted again from another fire, but new fire is to be gained by drawing a pure and unpolluted flame from the sunbeams. They kindle it generally with concave vessels of brass, formed by the conic section of a rectangular triangle whose lines from the circumference meet in one central point. This being placed against the sun, causes its rays to converge in the centre, which, by reflection, acquiring the force and activity of fire, rarefy the air, and immediately kindle such light and dry matter as they may see fit to apply."

Burning-glasses which concentrated the sun's rays were invented later. The earliest reference to them is in one of the plays of Aristophanes (B.C. 430), where Strepsiades, a cunning spendthrift, proposes to guard himself from arrest for debt, by melting, by means of a burning-glass, the wax seal upon the warrant of the officer, before the latter could reach him.

Pliny (born A.D. 23) mentions "globes of glass or crystal, which, being exposed to the sun, would burn clothes, or the flesh of a patient when cauterization was required."

But the most famous account of burning-glasses handed down from antiquity is the performance of Archimedes, who is reported to have set fire to the Roman fleet at the siege of Syracuse (B.C. 215). By many, this story has been considered a mere fable; but others are inclined to think the feat strictly practicable.

Kircher, one of the most noted of modern opticians, actually made a voyage to the site of Syracuse, and, by examination of the place, satisfied himself that the ships of Marcellus could not have been more than thirty paces (150 feet) from the spot where Archimedes planted his mirrors; and that, at that distance, it would have been feasible, at least, with modern appliances, to have burnt

all the ships, one after another, by the concentrated rays of the sun. He supposes that, at the time, the ships must have been anchored or left aground by the receding tide. Tzetzes, who wrote in the twelfth century, quoting as his authority the now lost books of Diodorus, describes the scene as follows: —

"When the fleet of Marcellus was within bow-shot, the old man (Archimedes) brought out a hexagonal mirror which he had made. He placed at proper distances from the mirror, other smaller mirrors which were of the same kind, and which were moved by means of their hinges and certain square plates of metal. He afterward placed his mirrors in the solar rays precisely at noonday. The rays of the sun being reflected by this mirror, he kindled a dreadful fire on the ships, which were reduced to ashes at a distance equal to that of a bow-shot."

In modern times, the first record of burning-glasses is in a quaint old book published in London, in 1571, by an Englishman named Leonard Digges, and republished in 1591, by his son, Thomas Digges. In the preface to the second edition, the latter says: "Archimedes also (as some supposed) with a glasse framed by revolution of a section parabolicall, fired the Roman nauie in the sea, comming to the siege of Syracusa. But, to leaue these celestial causes and things done of antiquitie long agoe, my father hath at sundrie times by the sunne beams fired powder and discharged ordnance *half a mile* and more distante; which things I am the bolder to report, for that there are yet liuing diuerse of these his doings (*oculati testes*, eye-witnesses) and many other matters far more strange and rare, which I omit as impertinent to this place."

A few years later, Baron Napier, of Murchison, a famous Englishman (died 1617), speaks of a secret invention of a system of burning-mirrors which should destroy the fleet of an enemy at any distance; but refuses to give a description of it, for the reason that, "for the ruin and overthrow of man, there were too many devices already framed;" which would seem to prove that he was, in his views, what is called a "conservative."

The next author is Kircher, who, as has been already stated, went to Syracuse to satisfy his mind as to the truth of Archimedes' exploit. Kircher was born at Geysin, Germany, in 1602, and died at Rome, in 1680. He commenced experimenting with parabolic reflectors, but soon found that they were more expensive and no better than plane mirrors. These he so arranged that they all reflected the light of the sun upon the same spot. He found that a single mirror reflected heat much less than light; two gave a very perceptible heat; three, the heat of a fire; with four, the heat could still be endured; but with five, it was almost intolerable.

But, of all who have studied this curious problem, Buffon has done the most to exhaust the subject, by the variety and ingenuity of his experiments. He, too, commenced with single concave mirrors, but found, upon trial, that reflectors composed of a number of plane surfaces were more satisfactory. He found, too, that glass polished and silvered upon the back reflected more powerfully than the best polished metals. Of the light reflected from such glasses, it was proved, by careful experiment, that only one half was lost. He observed, also, a most curious fact; viz., that, whatever the shape of the mirror, the shape of the reflection was the same only at a short distance; but, as the distance increased, the angles were rounded off, until, finally, the figure became nearly circular. He explains this upon the ground that the sun, though apparently small, is in reality larger than any object upon which it shines; and hence, the rays proceeding from opposite points on its periphery converge when approaching the mirror, subtending an angle of half a degree. And as every point on the mirror reflects all the rays of the sun, the reflection must be necessarily composed of intersecting rays, causing the edges to be more or less blurred and indistinct. Hence, too, the reflection of any plane mirror will always be larger than the mirror itself; and hence, too, as a corollary, the focus of a concave mirror or convex lens will never be a mathematical point, but a circle whose diameter is almost exactly one hundredth of the focal distance.*

He made a compound mirror, composed of a number of small ones, each eight inches by six, arranged in a square frame, and each hung upon a double axis, so that they could all unite their force upon any given point, at any desirable distance. The first experiment was on the 23d day of March, 1747, at mid-day. With forty glasses, it set fire to a plank of tarred beech. Later in the same day, with ninety-eight glasses, it set fire to a plank daubed with tar and brimstone, at a distance of one hundred and twenty-six feet. On the 10th of April, with one hundred and twenty-eight glasses, a plank of tarred fir took fire instantly over the whole focus, which was sixteen inches diameter. The next day, the focus was reduced to twenty feet. With twenty-one glasses, a beech plank was set on fire; with forty-five glasses, a flagon of tin weighing six pounds was melted; and with one hundred and seventeen glasses, thin pieces of silver were melted, and an iron plate heated red-hot.

A peculiar circumstance noticed was that the metals, and particularly the silver, smoked much before melting; enough, indeed, to cast a shadow on the ground. Since the time of Buffon, but few other experiments have been made with compound mirrors. Of single concave mirrors, a great many have been constructed. M. Villette, who lived at Lyons, in 1670, made no less than five. One thirty inches in diameter, with a focal length of three feet, and a focal image one third of an inch in diameter, produced, among others, the following effects: a small piece of pot iron was melted in forty seconds; a silver piece of fifteen pence was pierced in twenty-four seconds; a brass counter pierced in six seconds; the end of a sword-blade burnt in forty-three seconds; a stone calcined and vitrified in one second; while green wood and other organic bodies took fire instantly. Another, forty-seven inches in diameter, focal length thirty-eight inches, melted cast-iron in sixteen seconds, tin in three, slate in three, copper in sixteen, a piece of Egyptian granite in fifty, and iron slag in twenty-nine and one half.

In 1667, Francis Smetherick, Esq., produced before the Royal Society two concave mirrors, ground of a parabola. One was 6 inches diameter, focal length, 3 inches, and the other same diameter, with 10-inch focus. These, when brought toward a lighted candle, somewhat warmed the faces of those that were four or five feet distant, and when held to the fire, they burned gloves and garments at a distance of three feet from the fire. At another time, by refraction of the sun's rays, the deeper of the two burned a piece of wood into a flame in ten seconds, and the shallower one in five. A remarkable effect was produced by exposing the deeper concave to a northern window, upon which the sun did not shine, when it was found to warm the hand, by collecting the warmed air in the day-time, which it would not do after sunset.

Tschirnhausen, a German savant, 1651–1708, made a mirror of thin copper, 1-16 of an inch thick, 5 feet diameter, 3½ feet focus; or, according to another account, 4½ feet diameter, 12 feet focus. Its effects were as follows: wood flamed immediately; water, in an earthen vessel, boiled until it was all evaporated; a piece of tin or lead 3 inches thick, melted and dropped away as soon as put in; iron and steel became red-hot, and in a little while were burnt through; copper, silver, etc., melted in five or six minutes; slate, tile, potsherd, pumice-stone, a piece of a crucible, bones, and a clod of earth, all melted and ran to glass in a few minutes. The beams of the full moon, at her greatest altitude, were collected by this speculum, but no perceptible degree of heat was experienced.*

It is possible to construct mirrors of cheaper materials, which, though not so powerful as those of metal, should still have great reflective power. They have been made of wood, gilded on the inside.

Zahnius states that an engineer of Vienna, named Neuman, formed burning mirrors of pasteboard, covered in the inside with straw glued to it, and that they were capable of melting metals almost instantly. One would suppose that with the facilities offered by gutta percha, it would be easy at the present day to make of that substance mirrors of great power.

Hoesen and Ehrard, of Dresden, constructed parabolic mirrors of wood, faced with copper ⅛ of an inch thick. Four of these were made, varying from 9 feet 7 inches in diameter, focus 4 feet, to 4 feet 2 inches diameter, 1 foot 9-inch focus. Of these, Wolfius states, that in burning, calcining, melting, and vitrifying, they far exceeded any thing of the kind ever known. The hardest stones scarcely resisted more than a few seconds. Metals were rapidly perforated, and vegetables and bones were immediately burned to a cinder and vitrified.

M. Zeiher, of St. Petersburg, was among the first to experiment in concave mirrors of glass, silvered upon the back. His great difficulty was to bend the glass to the proper shape. One experiment was to lay a plate of glass upon a concave mould of the proper shape and put them both into a furnace, when the glass, softening with the heat, settled down into the mould. Others he bent cold by a screw, either passing through a hole in the centre of the glass into a stationary nut in the rear, or pressing against the face of the glass itself.

Buffon tried still another way. He placed a plate of glass upon an air tight drum, from which he exhausted the air, when the atmospheric pressure bent the mirror to the form desired. These were particularly valuable, since by varying the exhaustion of the air the convexity of the mirror and consequent length of focus could be regulated at will, and thus the different intensity of the heat at varying distances be accurately measured. With one of these, 46 inches in diameter, he concentrated the rays of the moon, but with the most delicate thermometer no heat could be detected.

In regard to burning-glasses, the first of any importance were constructed by Tschirnhausen. He employed two, the light first passing through a large lens 3 or 4 feet in diameter, with a focal length of 12 feet and an image 1½ inches in diameter, and thence through a small one, with a focal image not over ⅝ of an inch. These burned wood instantly, even when wet; boiled water immediately, and easily melted all the metals. It was noticeable in these experiments: 1st. The ashes of wood, paper and cloth melted into glass; 2d. That a substance easily fused assists in melting more refractory substances, when melted with it; and two substances, like flint and chalk, which were difficult to melt separately, melted easily when in contact; 3d. All bodies, except metals, lost their color. The precious stones were instantly deprived of it. Certain bodies that are transparent when melted, become

* It is said, however, that lenses have been made of rock salt, which converge the rays to a mathematical point.

* More recent experimenters, however, have discovered heat in the concentrated rays of the moon, though perceptible only to the most delicate instruments.

opaque when cooled, and *vice versa*, and substances which the heat at first renders transparent, but which become opaque in cooling, if melted with others that are always opaque, produce a beautiful glass, always transparent.

Buffon constructed lenses of various kinds. The great trouble with large glasses is their extreme thickness at the centre. This, by absorbing the heat *in transitu*, diminishes to a great extent their power. He found, by experiment, that the loss of light, and therefore presumably of heat also, in passing through glass 1-12 of an inch thick, was 1-7 of the whole, and through glass $\frac{1}{2}$ of an inch thick, it was $\frac{2}{3}$ of the whole. Hence, in very large lenses the central portion must be nearly useless. His first attempt to obviate the difficulty was by combining two circular segments of a glass sphere to form a lenticular cavity, which he filled with water. But the refractive power of water was so small, even though saturated with salt, and the aberrations caused by the differing densities of the glass and the water so great, that the plan had to be abandoned.

Finally he conceived a very ingenious plan, which has since become of great importance, from its application by Fresnel to the lenses for light-houses. It consisted in forming the lens of several pieces. The central one was a small circular lens one third the diameter of the one proposed to be formed, but of the same focal distance, and therefore much thinner than the central portion of the whole one would be. Around this is placed an annular section of a lens a little larger than the first, but also of the same focal distance, and outside of that a third. In this way a large lens is built up, which is yet extremely thin, and thus transmits light freely.

The most powerful lens ever constructed up to the present time was made by Mr. Parker, of London, about the year 1800. It was double convex, 3 feet diameter, $3\frac{1}{4}$ inches thick at the centre, focal distance 6 feet 8 inches, diameter of focus 1 inch, weight 212 pounds, and cost £700 sterling. The rays from this were concentrated by a smaller lens, 16 inches diameter, central thickness $1\frac{5}{8}$ inch, focal length 29 inches, diameter of focal image $\frac{3}{8}$ inch, and weight 21 pounds. The combined focal length of the two was 5 feet 3 inches, diameter of focus $\frac{1}{2}$ inch.

A great many substances were fused by this, among which we specify: common slate, 2 seconds; gold, 3; platina, 3; cast-iron, 3; silver, 4; crystal, 6; barytes, 7; asbestos, 10; steel, 12; copper, 20; cornelian, 75; rotten stone, 80. Ten cut garnets from a ring, ran together in a few seconds. This instrument was taken to Pekin by Lord Macartney, where it now remains.

To augment the power of a lens, Sir David Brewster proposes to arrange a series of small lenses around a sphere, without regard to the rays of the sun, but so as to have their several foci all at the same point. Then, by means of plane mirrors, one for each lens, the rays of the sun may be deflected, so as to fall full upon all the lenses, and their combined heat, thus directed upon a single point, will naturally be very great. We believe that hitherto no lens has been constructed upon this system, but should think it well worth a trial, as in this way a number might be made to compensate for lack of size, and so the expense be comparatively small.

Within a few years, the experiment has been tried of causing the flame of a powerful battery to play through the focus of a large burning glass, when a most intense heat ensued. We have seen no statements of the effects of such heat, when applied to minerals, but understand that it was beyond all comparison the most fervent ever produced.

We understand that Mr. Ericsson, the well-known inventor of the Monitor, has been lately making experiments in boiling water for steam-engines, by concentrating the heat of the sun either with lenses or mirrors. We hope at some future day to record the result of his efforts in this direction.

DIVISIBILITY OF MATTER.

Editor Journal of Chemistry:—

The question as to what extent matter may be divided is an interesting one. It is reasonable to assume, that matter cannot be infinitely divided, and that there is a point beyond which further division is impossible. It is also reasonable to suppose, that the ultimate atoms to which various substances may be resolved, vary in size, and that some substances are capable of far greater division than others. Is there any way by which we can ascertain, and indicate by figures, the various degrees of divisibility of which matter is susceptible?

Chemistry and philosophy teach, that the odor which arises from any given substance is, in fact, the solid matter of that substance in a highly volatilized state. The perfume of a rose or of musk, the vapor of iodine or alcohol, are examples of the great divisibility of which matter is capable. Hydrogen probably affords the best illustration; for if it is a metal, as some chemists believe, the minuteness of the ultimate atoms must be almost incomprehensible. Under great pressure, hydrogen can be forced through the finest glass. This would seem to indicate that matter possesses different degrees of divisibility, corresponding, perhaps, to the figures representing chemical equivalents. It would be interesting, if not useful, if we could attach figures expressing the various degrees of divisibility with the same certainty we do to indicate chemical equivalents.

It is not a difficult matter to go through the mechanical operation of dividing a drop of any given tincture one hundred times by one hundred. Place a sufficient number of goblets in a row; put into each one hundred minims of distilled water or absolute alcohol, as may be required; with a glass tube take up one minim of the tincture to be divided, and put it in the first goblet. After thoroughly mixing, take one drop from the first, and convey to the second; continue this operation through the series. The question now arises, Will not the original drop of tincture be reduced to its ultimate atoms long before the one-hundredth division is accomplished, thus rendering it impossible to impregnate the contents of the remaining goblets with any portion of its substance?

Tests afforded by chemistry, by taste, smell, and vision, are very limited. Arsenic cannot be detected beyond the fourth goblet. Tincture of capsicum loses taste after the fourth, and smell after the seventh division. Starch, considered a very delicate test for iodine, reveals no color after the third; and the spectroscope has no power over substances divided by the sixth.

From these illustrations it is fair to suppose, that the most delicate perfume or the most rarefied gas does not require a very long line of figures to express its divisibility. Very few persons have an appreciative idea of the enormous sum expressed by the figure 1 with one hundred cyphers attached. Such sums, like the distance to the fixed stars, can be realized only by comparison.

We all have an idea as to the size of the earth. Those who have travelled much have a different idea from those who never crossed the boundaries of their own state. Take the earth, then, as a comparison, and suppose it to be one enormous globe of fine sand; it is not a hard matter to express by figures the number of particles of sand composing such a globe. The figure one with fifty cyphers is more than sufficient for that purpose. Does it look reasonable, that a grain of arsenic, or of burnt clam-shell, or any other substance, can be divided into as many parts as there are grains of sand in the supposed globe? More: there are persons who believe appreciable effects are produced with medicines divided *eight times* that amount; or, supposing such a division possible, as would be represented by the figure one with four hundred cyphers!

The object of this article is not to attack any particular school of practice, but to turn the attention of experimenters to this subject, in the hope that they will determine, by positive tests, to what degree matter may be divided. C. H. Merrick, M.D.

Cleveland, Ohio, Oct., 1868.

Arts.

PHOTOGRAPHS OF NOBERT'S BANDS.

We have examined with much interest a number of splendidly executed photographs of the celebrated bands of Nobert, made by Dr. Woodward of Washington. The first series of bands are presented with great distinctness, all the lines showing clear and perfect. The plate used by Dr. W., was the more recent one of Nobert known as the nineteen-band plate. Three different kinds have been produced: one of thirty, one of twenty, and another, the last, of nineteen. The twentieth on the twenty-band plate corresponds with the eleventh on the last one produced by Nobert. The bands and lines as they go along up to the inconceivably fine ones beyond the twelfth, become less well defined, but still they can be counted to the fifteenth. Beyond this they cannot be recognized, and Dr. Woodward regards their definition as impossible with our best objectives. Messrs. Stoddard and Greenleaf of this city, two of the most accomplished microscopists in the country, do not assent to this conclusion, and declare that with one of Tolles's best 1-5 objectives they have seen and counted the lines of the *nineteenth* band. The objective used by Dr. W. was one of Powell and Leland's 1-5. The best we have ever been able to do with a Nachet 1-5 objective was to resolve the eleventh band. Those by Tolles are much superior.

ELECTRICAL CONDITION OF THE GLOBE—ITS INFLUENCE UPON ORGANIZATIONS.

M. de la Rive makes an interesting communication to the Academy of Sciences, in Paris, upon the electrical state of the globe. We will give a summary of it after a few considerations.

Perfect instruments are of an extreme delicacy; the least thing deranges them and makes them valueless. It is the same with choice organizations. Persons whose moral and physical characters are uniform, moderate, always the same, who fall into no extremes, who are rarely subject to slight variations of health and strength, but who, whenever they are indisposed, are so in earnest,—these persons, whose thoughts and feelings move always upon the same diapason, possess a quantity and intensity of life nearly uniform, ever the same, which changes but slowly and with difficulty, but which, when once modified and enfeebled, is also with difficulty restored. These temperaments are bad conductors of life. They guard it well; but if circumstances unfortunately arise to enfeeble it, it can only be restored with much difficulty.

There are vulgar and common natures having no sentiment of poetry, made to live uniformly, without excesses of any kind. It is on this account they are commonly called good characters. But there is another category of individuals. See that man, full of force, of joy, of enthusiasm. Life animates all his fibres; existence is for him only happiness and success. But observe him to-morrow—even to-day, perhaps. Dejection contracts his features; a profound melancholy shades his expression. How much sadness in his physiognomy! Apprehension, indecision, the most complete vacuity has seized hold of him. He sees only bitterness on the earth; happiness has disappeared. And, what is strange, his whole life passes in these alternations of strength and weakness, courage and fear, joys and sorrows indescribable. This is the type of those organizations which fill themselves with life in a moment, and may also lose it in a moment. They are to-day on the borders of the tomb, and to-morrow rejuvenated as though regenerated.

These natures with characters so variable, which give the diapason in all degrees to human passion—now full of strength and vigor, now cold and glacial—are what the vulgar term melancholy characters; but the close observer will recognize in them the impress of choice natures,—those alone capable of great things. These especially need to study the hygiene suited to them, and

the wisdom which will give them strength to restrain and subdue their characters; then they make the saints and heroes, the great men of every description. These natures alone are susceptible of sublime enjoyments and sublime sorrows, and of experiencing all that human life comprises. In their ranks are found the great martyrs of humanity; the geniuses and poets, who see the truth and feel its expression; the beautiful in every art, — music design, literature, etc.

Nature entire is a language which these natures know by heart, and which reveals to them unutterable secrets unknown to vulgar natures. The splendors of a beautiful night, the shades of the forest, the shuddering of the foliage in the breeze, the roaring waves of the sea, speak a language known to them.

It is very unfortunate if these natures go astray and are careless to curb their evil passions; for it is these alone who are capable of becoming the greatest and most corrupt profligates, or the most pure and noble philanthropists. If all the individuals belonging to this category are not endowed with an intelligence sufficiently vast to be marked out in the multitude, they have, nevertheless, a certain stamp which enables them to be recognized as belonging, more or less, to this noble class.

From the individual who is the most imperfect conductor of life, to him who is the best, there are an infinity of degrees, where each energy of character, with all its consequences, finds its place. It is not astonishing, then, that the atmospheric condition of the globe operates so much upon the persons of whom we are speaking, when we know the relations which exist between electricity and life, and the perturbations which atmospheric changes produce in the electrical state of the globe.

It is now generally admitted, observes M. de la Rive, that, in the normal state, the atmosphere is charged with positive electricity, and that this electricity goes on increasing, from the surface of the earth, where it is null, to the greatest attainable heights. The terrestrial globe, by way of compensation, is charged with negative electricity, which is proved by a great number of observations, some direct, others indirect. It is, moreover, the consequence of the presence of positive electricity in the atmosphere; one of the electricities not being able to manifest itself in a free state, without an equivalent quantity of the other manifesting itself equally.

At the surface of the contact of the atmospheric air and the solid or liquid part of the terrestrial globe, there exists a layer of air in a neutral state. The two electricities opposite are there neutralizing themselves constantly, considering that the cause (probably subterranean) which liberates them acts necessarily without interruption. This neutralization is naturally facilitated in the plains above the sea, by the humidity, always more or less considerable, with which the layers of air in contact with the earth are there impregnated.

But it is not thus upon the summits of mountains, and especially at the top of the highest peaks; the dryness of the air must render the combination of the two electricities there more difficult, and allow them to acquire a degree of tension tolerably energetic. This is what proves, on one side, the strong positive electricity which the air possesses at these great heights, and on the other side, the attraction which the mountains exercise, by virtue of their negative electricity, upon the positive clouds of the atmosphere. Now, what will happen, asks M. de la Rive, if we unite, by an electric wire, a metallic plate planted in the soil of the plain, with a similar plate planted in the soil of an elevated place? As there is a continuous current of negative electricity from the earth towards the positive of the air, which produces the neutral layer, there results, then, necessarily, a transfer of negative electricity above and below; or, what is the same, a current of positive electricity ascending in the conducting wire which unites two places unequally elevated above the sea.

We see that the electrical phenomena passing at the surface of our globe and in our atmosphere are quite complex. There is, first, a general fact, namely: the accumulation, by the effect of the trade-winds in the atmosphere of the polar regions, of the positive electricity with which the air of the equatorial regions is found constantly charged by the particles of watery vapor which arise from the sea. The influence of that positive electricity accumulates and condenses near the poles a large proportion of negative electricity which the solid portion of the globe possesses, at the same time that it is also condensed by it. The reports, more or less frequent, which take place between these condensed electricities through the atmosphere, give birth to the northern lights, the appearance of which is always accompanied with electric currents circulating in the earth. These currents manifest their presence either by their action upon the needles of the mariner's compass, or by their transmission across telegraphic wires.

But, besides the general and principal fact which M. de la Rive calls up, there exists a great number of partial and local ones arising from the inequalities of tension in the distribution, more or less variable, of the electricity, either negative or positive, with which the terrestrial globe and its atmosphere are respectively charged. Such are ordinary storms, and all the varied phenomena which accompany them.

The attraction of clouds by mountains, the effects of phosphorescence which they sometimes present, proceed from the same cause; and it is probable that many other natural phenomena — water-spouts, for example — have also the same origin. C. W. F.

PROVIDENCE.

ZODIACAL LIGHT — ITS CAUSE.

DR. NICHOLS. — Dear Sir, — As I attempted in the November number of your *Journal* to prove that the zodiacal light is *not* a reflection from the earth's atmosphere, I will here state, with your permission, what I conceive to *be* its cause. And first, perhaps, it may be proper to state what *other* supposable causes have been proved to be *not* its cause.

1. It cannot be caused by a body, whether an atmosphere or a ring, concentric with the sun and interior to the earth's orbit.

2. It cannot be caused by a ring concentric with the sun and exterior to the earth's orbit.

3. It cannot be caused by a nebulous planet or comet revolving about the sun in an orbit either wholly interior to that of the earth, or wholly or partly exterior.

4. It cannot be produced by reflected light from a geocentric ring, as supposed by Mr. Jones (see *Silliman's Journal* for July, 1855), as has been sufficiently proved by Prof. Barnard. (See *Silliman's Journal* for March, 1856.)

Vision is a sensation produced by the minute waves of an elastic fluid, the luminiferous ether; and the waves, motions, or undulations of the ether, by whatever means induced, when sufficiently intense to produce the sensation of vision, we call light.

The molecules of all self-luminous bodies have a rapid vibratory motion which they communicate to the surrounding ether, through which the vibrations are transmitted outward indefinitely in straight lines until they meet some form of aggregated* matter by which they are, in general, partly absorbed, partly transmitted, and partly reflected.

Light, therefore, is always and necessarily a result of one of the three following causes; viz., —

1. A self-luminous body, whose molecular vibrations are transmitted by the ether in straight lines to the eye.

2. A refracting or reflecting body, which serves to transmit and bend, or to *reflect* the vibrations excited by a self-luminous body.

3. Opposing or interfering currents of the luminiferous ether may excite ethereal vibrations sufficient to produce the sensation of vision.

As the exterior observations and deductions of Mr. Jones seem to show conclusively that the zodiacal light can result from no *other* cause than a luminous geocentric ring or arc, and as the investigations of Prof. Barnard, above referred to, sufficiently prove that the observations of Mr. Jones are incompatible with the existence of a geocentric ring made visible by reflected light, there remains therefore only the alternative of a self-luminous geocentric ring, or the *third* and last of the above-named sources of light, as the possible cause of the zodiacal light.

I have elsewhere shown (see *Iowa School Journal* for October, 1868) that the luminiferous ether in the vicinity of revolving bodies, as the sun and planets, has a motion of translation corresponding in direction with the axial motion of the revolving body, and that it is more or less stratified; the strata increasing in density as their distances from the centre of the revolving body increases.

It is obvious, therefore, that the third source of light, above referred to, exists, and precisely *where* the zodiacal light appears.

Let S represent the sun, and E the earth; the concentric lines about S, the solar vortex of revolving ether, and the concentric lines about E, the terrestrial vortex of revolving ether.

Then will the arrows in the marginal figure denote the direction of the motion of the revolving ether. Let the angles SEF and SEG each equal 18°, and the angles, SEH and SEI each equal 100°. Then will F represent the base and H the apex of the zodiacal light, when seen in its most favorable position at the commencement of twilight in the morning, and G the base, and I the apex, as seen at the end of twilight in the evening.

It is obvious, from inspection, that the greatest amount of interference, and therefore of vibratory motion, or light, will occur between F and G, and that the amount of interference, and therefore the intensity of the light will gradually diminish from F toward H, and from G toward I. But, by actual observation, the zodiacal light is always found to have the greatest breadth and intensity from F toward H, and from G toward I, and under ordinary circumstances to become evanescent at H and I. The observations of Mr. Jones prove, however, that when observed under favorable circumstances, the zodiacal light is extended as a "luminous arc" throughout the circle from I to H. This, again, is precisely what we should anticipate from an inspection of the diagram; as there is obviously some interference at K, though it is a minimum there, and increases both ways to L, where it is a maximum.

Of the two alternatives, therefore, of referring the zodiacal light to a self-luminous, hypothetical, geocentric ring, or to vibratory motion induced by the interference of ethereal strata, the existence and motion of which are necessary deductions from known facts, the latter appears to me much the most probable; especially as the observed phenomena accord entirely with the supposition; whereas, in the former, they are, in several particulars, incompatible. J. E. HENDRICKS, M.D.

DES MOINES, IOWA, Nov. 2, 1868.

MANUFACTURE OF SULPHUR FROM ALKALI WASTE. — The residue from Leblanc's process for making soda contains a large amount of sulphur. It is very desirable to utilize this waste, in order to get rid of a great nuisance as well as to obtain its sulphur. The method which has been most successful in attaining this end, is that proposed by Mr. Ludwig Mond. By this process, the insoluble sulphide of calcium is changed to a soluble compound by exposure to the oxidizing influence of the air, and is then dissolved, but by water. By this process three times repeated, half of the sulphur in the waste is obtained in a solution, from which it is easily thrown down in a pure state by acids. The residuum contains the other half of the sulphur as sulphate of lime, which is of some value for application to land.

* By *aggregated matter*, I mean all forms of matter except *ether*.

SOMETHING LIKE A LECTURE!

Prof. Morton, Ph. D., in a lecture delivered recently at the Academy of Music, Philadelphia, before an audience of about 3,500 persons, gave some experiments in the production of monochromatic light on a large scale. Our space will not allow us to give a long report of the lecture; we must, therefore, content ourselves with merely referring to some of the experiments which were most novel and effective. The amount of apparatus employed was something extraordinary. There were ninety Bunsen's burners, five lime-lights, a galvanic battery of great power, an oxyhydrogen blowpipe and two large cameras, induction coil and electric-wheel, screens and mirror, eight gas-bags, two hydrogen generators, and a large iron reservoir, holding seventy-two gallons of oxygen. It required fifteen assistants to work the apparatus, and forty young gentlemen from the university to represent the spectrum. To show that the temperature of the sun resembled that of the oxyhydrogen blowpipe, the lecturer placed himself and apparatus on a platform secured to one of the stage-traps, and then was raised to a great height above the floor, at which elevation he burned in the compound blowpipe a piece of thick steel-wire rope. The fountain of scintillating sparks and drops of melted steel, descending in a broad sheet some fifteen feet in height, poured upon the stage, and rolled in a torrent of fiery hail towards the footlights; proving to the audience that the metal was reduced to the gaseous condition in which it exists in the sun. A wheel five feet in diameter, composed of Geissler tubes, was rotated; while flashes of electric light, produced by the large induction coil constructed for the University of Pennsylvania, produced the effect of a star darting innumerable colored and constantly changing rays. The stage was then illuminated with a number of lime-lights; a procession was formed of brilliantly costumed figures, personating the prismatic colors, and bearing banners; at a signal, the lime-light was replaced by yellow light, produced by ninety Bunsen's burners, when every trace of color disappeared, and the entire phalanx became a ghastly company of spectres bearing banners of white and black. — *Chemical News.*

A NEW SOLDER FOR ALUMINUM. — Dentists who make plates of aluminum will find a solder composed of seven parts aluminum to one part tin far superior to the silver solder in common use.

LIQUID GLUE. — Three parts of glue, broken into small pieces, should be covered with eight parts of water, and left to stand for several hours: one half part of chlorhydric acid and three fourths part of sulphide of zinc must then be added, and the whole exposed to a temperature of 175° to 200° during ten or twelve hours. Let it settle, and it will be found to retain its fluid form, and be a most useful agent for joining purposes. — *Austrian Paper.*

HOW TO MAKE A CRANBERRY PIE. — There are various ways. Some make them open, like a custard or squash pie. This is good, but not so good as to cover like an apple pie. Do *not* stew the berries as some do before baking, but slit each berry with a knife. This will preserve the freshness of the fruit, which is quite an important thing. A coffee-cupful of berries, and an equal quantity of white sugar, will make a medium-sized pie. Those who like a sweet pie should have more sugar; also more berries, if desired. Bake as usual. A little flour sifted over the fruit gives it a thicker consistence. One thing should not be forgotten — add a small teacupful of water. We will give the receipt in short: —

One coffee-cupful of slit berries; the same quantity of white sugar; half the quantity of water, with a little flour added or not. This is one of the very best pies for variety, in the whole course of cookery. It is good-looking, as well as good eating. — *Cultivator and Country Gentleman.*

THE WEIGHT OF A FLUID OUNCE. — The Troy ounce weighs 480 grains; the Apothecaries' ounce weighs 480 grains; the Avoirdupois ounce weighs 437.5 grains; the Imperial fluid ounce weighs 437.5 grains; the Wine measure ounce weighs 455.7 grains. Thus the minim, Imperial measure, weighs .91 grains, and the Wine measure minim weighs .95 grains. — *N.Y. Medical Record.*

Agriculture.

THE POTATO-MOULD.

Mould and mouldiness are two words with which every one is familiar, but few are aware how numerous and diversified are the forms under which the little plants these words designate occur, and to what extent is the mischief they occasion, or know much of the utility in the plan of nature they sustain.

The science of botany as such does not date back very far, and in its place and prior to its existance, all vegetable growth was regarded with a superstitious, and in most cases with an useless reverence, containing as was supposed some rare power in healing, or some efficacy in incantations and magic.

With regard to the moulds, it was Micheli, who in 1729 published his *Nova Plantarum Genera*, that established the scientific character of the genus Botrytis, on which since, from certain structural differences in the mode of producing the seed, other genera or distinct kinds of mould have been constructed. Of these, Corda instituted the genus Peronospora; the minute moulds which belonged to it, and they are numerous, infesting only living plants. The discovery that their presence caused injurious effects and even great loss is of modern date, and to the investigations of Professor Caspary of Bonn, the botanist and the agriculturalist alike are indebted for the valuable knowledge.

The words "mould and mouldiness," familiar as they are, are now significant of topics interesting to the farmer, and by them he is annually subjected to the loss of his cabbages, clover, lettuce, onions, parsnips, peas, potatoes, etc.

To the common eye, and unaided by science, mildews, mouldiness, and similar microscopic plants, would be readily confounded. But the mildew is a much more highly developed fungus, and though apparently as dangerous, is not so to the same extent. The egg-like mould (*Oidium*) which covers and suffocates the young gooseberry or the grape, readily yields to agents which will destroy it, and set free from its threads the swelling fruit; but the potato-mould for instance, is the inception of the potato-rot, which is so dreaded.

The "moulds," then, are fearful parasitic plants, which riot on the tender tissues of the other plants, and eventually cause their death. It is estimated, that in Europe no less than ten different kinds of fungi are known as infesting the potato; and probably the number in this country is no less. It is on this account that those who have attempted to describe the potato disease among us have differed so widely from each other; and while each has thought the other wrong, all have attained some approximation to the truth.

The potato-mould is the *Peronospora infestans* Caspary, and were it not for its effects, would be regarded by every one of taste as a beautiful object. Were we flies or insects, which are so liberally endowed with sight and eyes, and quite unconcerned about the crops, the leaves of the potatoes would be quite a pretty set of objects to investigate, presenting handsome, white, many-branched, and beaded-twigged plants, with oval or egg-shaped seed bodies on the tips of each smaller branch. These vegetable growths issue from the breathing pores of the leaves, and, besides feeding themselves on the nutriment intended for the leaves, choke up the internal and external passages, and prevent the healthy action from being maintained. Soon the leaves become at first paler, or yellow; then discolored spots appear; then the stems are spotted with dark patches. Even the cellular tissue (or pulpy part of the stems or stalks, "potato-stalks" as we call them) is discolored, and filled with dark clotted substances; subsequently, sooner or later, the stalks putrefy, the skin separates from the harder or woody portions; next the tubers suffer, spots and decay appear in a more or less regular manner of concentric lines, the skin withers, a white mouldiness often occurs, especially if the potatoes lie in a moist place; the "rot" increases with fearful rapidity, the tuber has a disgusting odor, certain smaller insects help the process at this stage, and putrescence closes the scene.

A plant thus simple in its general structure, and capable of bearing on its rapidly growing branches three thousand two hundred and seventy (3,270) seed-like pods, each containing at least six seed-like bodies (*zoospores*) on one square line of the under surface of the leaves, and from each of which, in turn, a perfect seed-bearing "mould" is produced in eighteen hours, may be readily conceived to be capable, minute as it is, of incalculable mischief. The reader may, however, calculate, by reduction to fractions of an inch, the size of one of the seed-vessels (*acrospore*) containing these six or more seeds, when Prof. Caspary computes its breadth at 1-165 of a millimetre, and its length at 1-125 of a millimetre (*Monatsberichte der Konigl. Akademie, etc., fur Mai*, 1855). Seeds so minute can be readily absorbed by the roots, or even by the leaves, and in such abundance that the very atmosphere may be surcharged with them. A few of them placed in a drop of water and applied to the leaves, stems, and tubers, by Dr. DeBarry, produced, in a short time, brown spots, and eventually the disease.

The remedy or the prevention, what? Perhaps none, as yet discovered, which will be effectual; but the entire destruction by fire of all infected stalks and potatoes looks to a suggestive prevention. — J. L. RUSSELL: *American Naturalist.*

AGRICULTURAL ENGINEERING.

We notice in our foreign exchanges that a college in Scotland has recently decided to grant the titles of Bachelor and Master of Agriculture to those who shall pass a thorough examination in certain prescribed and appropriate branches of study, thereby raising agriculture to a recognized place among other industrial sciences, and giving to its educated practitioners the same prestige that belongs to similar practical professions. This may be considered a decided step toward a full recognition of the important truth that the extended introduction of machinery into farm operations, and the application of the principles of chemistry in the management and tillage of the soil, are producing what will constitute in reality a new department of engineering, a department including within its boundaries all those principles of mechanics embraced in the construction of farm apparatus and the structure of farm buildings, the nature of different soils, the requirements of different plants, and the reaction upon them and the ground on which they grow of mineral and organic manurial agents, and, not less than in any of these, requiring in its successful practitioner a full knowledge and correct appreciation of the possibilities and also the difficulties of introducing new motive forces in the place of those now employed in the operations of agriculture, and of the absolute necessity which often exists of materially modifying a class of machinery to suit the peculiar wants of different regions or districts. The conferring of the degrees above referred to does not, it is true, infer excellence in all of the points above indicated; but when the duties of the agricultural engineer become fully understood, as they may be twenty years hence, and his sphere becomes more exclusively his own, such, or even a more varied and extended, knowledge will be required at his hands, and if he properly fulfils his mission there will be fewer instances of such mistakes as those shown in the numberless attempts to produce a profitable steam-plough, in which agriculturists failed from their lack of knowledge of the mechanical art, and engineers succeeded no better because they knew little or nothing of the true requirements of the case, or of the trials to which the apparatus must be necessarily subjected in practice.

Among the problems the solution of which is most likely to be obtained at the hands of men specially educated for the prospective business or profession under consideration, the adaptation of steam to purposes of tillage holds a prominent but by no means all important place; as but slighlty secondary to this is the application of the steam, air, or some equivalent engine as a stationary motor for agricultural purposes; for, notwithstanding the multiplicity of portable steam-engines, there are as yet few or none which an unskilled attendant should feel safe in using. There might also be mentioned the production of compound machines for preparing by different changes of parts the food for animals, whether of grain or stalk or root; for disintegrating and preparing refuse mineral and vegetable substances for fertilizing purposes: for cleaning fields from stones; for the rapid and efficient construction of drains; and for many other purposes which would be developed in time, but can hardly be now foreseen.

We have thus briefly and hastily indicated the sphere

in which the agricultural engineer of the future will labor, when the unnumbered fag-ends of practical science that now help to make up the sum total of agricultural knowledge shall be fused and welded into a symmetrical whole, just as from the scattered and varying truths with which the millwright worked a hundred years ago has been formed the "mechanical engineering" of the present time. Although it may and probably will be a score of years before such a result will be even approximately reached, and even longer than this before men shall devote themselves wholly to its profession, there can be but little doubt that the time will sooner or later come when the practice of agriculture will require and secure the systematized employment of the highest grade of engineering skill. — *American Artisan.*

BONES FOR FOWLS. — Bones usually have attached to them a quantity of flesh and fat, which render them valuable. The fat enables the fowls to resist the cold; the flesh gives them muscle and material for the formation of eggs; the carbonate of lime furnishes egg-shells; and the phosphate yields materials for bones and for the tissues. A boy can, in a few minutes, chop up with a hatchet all the lesser bones that come from the table, and we regard them as very valuable. If we were to start a poultry establishment on a large scale, we should certainly make arrangements to procure all the fresh bones possible. It would not be difficult to devise a machine that would crack them into fragments the size of large beans, and we should get paid twice; first through the chickens, and secondly through the improved character of the manure. — *Farmer's Home Journal.*

A grindstone should not be exposed to the weather, as it not only injures the woodwork, but the sun's rays harden the stone so much, in time, as to render it almost useless; neither should it stand in the water in which it runs, as the part remaining in the water softens so much that it wears unequally and "out of true."

Boston Journal of Chemistry.

BOSTON, DECEMBER 1, 1868.

☞ Any one sending us the names of three subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For five subscribers we will send the Petite Microscope; for twenty-five we will send, in addition to the microscope, a copy of "Stockhart's Chemistry for Students," the best elementary treatise yet published; for one hundred subscribers we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stockhart's Chemistry.

☞ Physicians, students, clerks in drug-stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

Mr. B. R. DOWNES is Travelling Agent for the *Journal.*

We beg leave to call attention to the advertisement of Mr. George S. Chase in another column. An arrangement of this kind has long been needed.

We are almost daily in receipt of letters from correspondents at a distance, containing lists of articles which they wish us to purchase and forward to them. While we are always glad to be of service to our friends, we still find these commissions a serious tax upon our time, and we have at last concluded to turn them over to Mr. Chase, who has charge of the publishing department of the *Journal*, and who will make of this business a specialty; and we cordially recommend him to our friends, assuring them that any errands they may entrust to him will be carefully and speedily attended to.

Since the article upon burning-glasses was written, we learn that Mr. Parker, of London (presumably of the same house as the one mentioned), has just constructed another lens three feet in diameter, three inches thick in the centre, and weighing 212 pounds. We have seen no authentic statement of the results achieved by this lens, but shall look for them with great interest.

THE SOURCE OF THE SUN'S HEAT.

In a former article, on "The Origin of Force" [July number of the *Journal*], it was explained that all the varied forms of force which we see manifested in the physical world, with the single exception of the tidal wave, have their fountain-head in the *sun*. They are, in fact, nothing but transmuted sunbeams.

The amount of heat given out by the sun is enormous. Making allowance for that which is lost by absorption in passing through the atmosphere, it has been calculated that the heat received by the earth during a year would be sufficient to melt a layer of ice one hundred feet thick and covering the whole earth. But even this is but a small fraction of the heat actually given out by the solar orb. It must be borne in mind that the sun radiates heat into space in every other direction, as well as towards the earth. If, now, we imagine a hollow sphere to surround the sun, at the distance of the earth, our planet would cover only about $\frac{1}{2,300,000,000}$ of its surface. The sun, then, must radiate into space, 2,300,000,000 times as much heat as the earth receives. Sir John Herschel has calculated that if a cylinder of ice forty-five miles thick were darted into the sun with the velocity of light (about 190,000 miles a second), it might be melted by the heat radiated by the sun, without lowering the temperature of the sun itself.

What, then, is the source of this enormous amount of heat? Some have supposed that the heat is developed in the same way as in an ordinary fire; that is, that the materials of the sun are burning up, and thus producing the light and heat which it sends forth. And at first this theory appears very plausible. The sun is almost a million and a half times as large as the earth; and a body of such immense bulk might burn for centuries before it would be utterly consumed, or before its apparent size would be very much diminished. There are, however, no substances known to us which would produce so much heat for so long a time as we know the sun to have been shining. Carbon (of which the different kinds of *coal* are forms more or less pure) is one of the most combustible substances with which we are acquainted; but if the sun, large as he is, were a mass of pure carbon, and were burning at a rate sufficient to produce the light and heat which he is giving out, he would be wholly consumed in five thousand years. It is hardly possible, then, that the fires of the great central luminary of our solar system are kept up in this way which is so familiar to us.

A more satisfactory theory of the origin of the solar light and heat, and one which, with slight modifications, is adopted by the leading scientific men of our time, is known as the *meteoric* theory. It is sometimes spoken of as *Mayer's* theory, from its author, a German physician, who first published it in 1848.

In an article on the nature of force, in the June number of the *Journal*, we explained that a pound weight which has fallen through seven hundred and seventy-two feet, will, when its motion is arrested, generate a *unit of heat*, or, in other words, heat enough to raise the temperature of a pound of water one degree. A body falling that distance would acquire a velocity of about two hundred and twenty-three feet a second. Hence, a pound ball moving at the rate of two hundred and twenty-three feet a second, will produce a unit of heat when it is stopped in its course. We know, moreover, that the velocity with which a falling body strikes the ground is in proportion to the square root of the height from which it falls; that is, in order to double or treble its speed, a body must fall from four or nine times the height. A pound ball, then, moving at *twice* the speed of two hundred and twenty-three feet a second, will be able to generate *four* units of heat; one moving with *thrice* this speed, *nine* units of heat; and so on. If, therefore, we know the weight of a body, and the velocity with which it is moving, we can easily calculate how much heat will be generated on stopping it.

Now, the earth is moving in its pathway round the sun at the rate of more than sixty-eight thousand miles an hour, or more than one thousand miles every *minute*. It is also whirling round on its axis every twenty-four hours; so that a point on the equator turns more than a thousand miles an hour. If its motion were arrested, its elements would melt with fervent heat, and most of them would be converted into vapor. If the earth should fall into the sun, the heat generated by the shock would be sufficient to keep up the solar light and heat for *ninety-five years*. Luckily, we have no reason to fear that our planet is in any danger, at least for ages to come, of thus contributing to the "waning fires" of the King of Day. But that bodies are continually falling into the sun, we have every reason to believe. We know that countless swarms of meteors are revolving in spiral rings around the sun, and that they must eventually be drawn into that orb; and, from the velocity with which they must strike, it has been shown that they could fall in sufficient numbers to generate all the heat and light of the sun, without increasing his bulk enough to be detected, since accurate measures of his diameter were first made.

Such, in brief, is the *meteoric theory* of the origin of solar light and heat. First devised by Mayer, it was further developed, in 1854, by Prof. Thomson, who has published, in tabular form, the mathematical results of his investigations. Of some of these results, Prof. Tyndall remarks as follows, in the last edition of his lectures on "Heat Considered as a Mode of Motion:"—

"From the tables published by Prof. Thomson, I extract the following interesting data, firstly, with reference to the amount of heat equivalent to the rotation of the sun and planets round their axes — the amount, that is, which would be generated, supposing a brake applied at the surfaces of the sun and planets until the motion of rotation was entirely stopped; secondly, with reference to the amount of heat due to the sun's gravitation — the heat, that is, which would be developed by each of the planets in falling into the sun.

PLANETS.	Heat of Gravitation equal to Solar Emission for a period of		Heat of Rotation equal to Solar Emission for a period of	
	Years.	Days.	Years.	Days.
Sun	..	..	116	6
Mercury	6	214	..	15
Venus	83	227	..	99
Earth	94	303	..	81
Mars	12	252	..	7
Jupiter	32,240	..	14	144
Saturn	9,650	..	2	127
Uranus	1,610	..	..	71
Neptune . . .	1,890	..	..	..

"Thus, if the planet Mercury were to strike the sun, the quantity of heat generated would cover the solar emission for nearly seven years; while the shock of Jupiter would cover the loss of 32,240 years. The heat of rotation of the sun and planets, taken together, would cover the solar emission for 134 years; while the total heat of gravitation (that produced by the planets falling into the sun) would cover the emission for 45,589 years.

"Whatever be the ultimate fate of the theory here sketched, it is a great thing to be able to state the conditions which certainly would produce a sun; to be able to discern in the force of gravity, acting upon dark matter, the source from which the starry heavens *may* have been derived; for, whether the sun be produced and his emission maintained by the collision of cosmical masses or not, there cannot be a doubt as to the competence of the cause assigned to produce the effects ascribed to it. Solar light and solar heat lie latent in the force which pulls an apple to the ground. The potential energy of gravitation was the original form of all the energy in the universe. As surely as the weights of a clock run down to their lowest position, from which they can never rise again unless fresh energy is communicated to them from some source not yet exhausted, so surely must planet after planet creep in, age by age, towards the sun. When each comes within a few hundred thousand miles of his surface, if he is still incandescent, it must be melted and driven into vapor by radiant heat. Nor, if he be crusted over, and become dark and cool externally, can the doomed planet escape its fiery end. If it does not become incandescent, like a shooting star, by friction in its passage through his atmosphere, its first graze on his surface must produce a stupendous flash of light and heat. It may be at once, or it may be after two or three bounds like a cannon-shot ricochetting on a surface of earth or water; the whole mass must be crushed, melted, and evaporated by a crash, generating in a moment some thousands of times as much heat as a coal of the same size would produce by burning."

KEROSENE.

The error must not prevail, that kerosene oil of legal standard will ignite or burn if a lamp containing it is broken. Good oil, such as should be used in families, will *extinguish* flame when brought in contact with it. Oil heated to the usual point while burning in a lamp in the evening, should extinguish a lighted match when thrust into it. If the reader is using in his family unadulterated kerosene, he may take off the cap of the lamp, thrust in a lighted taper; he may turn it out upon the floor, and apply flame; and it will not take fire or explode. Standard kerosene, such as the law recognizes, is *perfectly safe.* We wish to state and re-state this fact, as it would be a great misfortune, especially to the poor, to have the erroneous idea prevail, that *all* kerosene is dangerous. A cheap light is too great a blessing to be deprived of through unjust prejudice. It is only the wretched adulterated oils, the naphtha fluids, that are dangerous.

We are almost discouraged in our efforts to explain the nature of the illuminating fluids, when we find, as we have during the past month, a daring, reckless fellow travelling through the towns about this city, selling recipes to make a cheap naphtha burning liquid. The discouragement does not arise from the fact that such adventurers are numerous, and attempt to deceive the people, but that they so easily *succeed* in their evil work. These frauds are not practised upon the uneducated alone, but upon the learned, the intelligent, — those who certainly ought not to be ignorant of the simplest facts in science. The recipe-peddler alluded to, succeeded in filching his dollar from lawyers, clergymen, a judge of a police court (who, instead of patronizing him, should have issued a warrant for his arrest), and many others who are reckoned among the educated classes. We have reason to think the country is full of these men, and our readers must be on their guard. Not only their own lives, but those of their neighbors and friends, are placed in jeopardy by these frauds.

We repeat, at the request of a new subscriber, the test for kerosene, as published in the *Journal* some time ago. Take a common quart bowl; fill it one third full of boiling water; now add cold water, a little at a time, until a thermometer placed in it indicates a temperature of 110° F. A tablespoonful of the oil to be tested may be turned into the water, and stirred about with the thermometer. It will float on top, and it may be touched with a lighted match or bit of paper. If it ignites or takes fire, the oil is dangerous, and the seller can be prosecuted under the United States law.

NITROUS OXIDE AS AN ANÆSTHETIC.

Nearly a year since, we took occasion to point out the errors and absurd statements found in the report of a lecture given by Dr. Richardson, of London, before the *Medical Society of London*, upon Nitrous Oxide. These absurdities were passing unchallenged through the medical press of our country, and we were the first to call attention to them. Since that time, a change has taken place, and the Doctor's manifest ignorance and presumption have been freely criticized by the journals. It will be remembered that Dr. Richardson asserted that the gas in question was an *asphyxiating* agent, — not an anæsthetic, — and was a dangerous poison. He represented it as peculiarly fatal to the lower animals when respired, and, in support of these views, pretended to give the results of experiments confirming them. Carefully conducted experiments here show that his statements are entirely false, and that he is most inexcusably ignorant of the nature and properties of nitrous oxide. Dr. McQuillen has recently verified the experiments of others, and presents the results in the *Dental Cosmos* for October. He put rabbits, kittens, and frogs under the influence of the gas repeatedly, and not the slightest injury resulted. He employed forty gallons in his experiments upon three or four of the animals, and kept them narcotized one or two minutes at a time; and yet, they not only recovered, but were lively and well when the influence of the gas had passed off.

Nothing is more apparent than that the views of the great men of England, as well as of our own country, upon medical and chemical matters, must be submitted to careful examination before being fully received and adopted. A great name may be instrumental in disseminating a great error; and all new views affecting important questions, no matter what may be their origin, should pass the ordeal of intelligent criticism and experiment before being admitted as correct.

LIVING GERMS IN THE ATMOSPHERE.

The air we breathe, the water we drink, are full of spores and organic germs, all of which seem to have a purpose to subserve in the economy of things. If any one doubts the statements of scientific men regarding the presence of these germs, they have only to become acquainted with the use of the microscope to convince themselves of their entire truthfulness. Separate from the bark of the common maple-tree a bit of the adhering dry lichen, or *moss*, as it is called, moisten it with water, and place over it a glass slide. The spores or seeds which lie dormant, when the lichen is dry, immediately become vitalized, and rising into the air are caught upon the glass, and with a power of 400 diameters can be seen and studied. This simple experiment will illustrate the origin and nature of what are called spores, and the air is filled with thousands of varieties, arising from as many sources.

Dr. Smith and Mr. Dancer of Manchester, England, have recently been examining the air of that city, and have found it loaded with them. The air was first washed by shaking it in a bottle with distilled water, and in a drop of the water it was reckoned that there were about 250,000 spores. In the quantity of air respired by a man in ten hours, there would be more than thirty-seven and a half millions. All these germs, floating in the air, are ready to spring into activity, whenever the conditions of growth are favorable. The varieties and sources of fungoid growths from which the spores arise are wonderful. A fungus is known which develops only on the corpses of spiders; another, which grows only on the hoofs of horses in a state of decomposition. The *isaria* has as yet been observed only on certain night butterflies; there are other species which invade the larvæ and chrysalides. Hooker has discovered a fungus which attains considerable dimensions (from ten to twelve centimeters), but which is found absolutely only on the neck of a certain caterpillar in tropical countries. It vegetates on the animal, fructifies on it, and the caterpillar buries it with itself in the the ground, whence it springs like a funeral plume. Still more, a singular vegetable is known, the *racodium cellare*, which has never been found except on the casks in wine cellars, and another which lives only on the drops of soot which the workmen let fall on the soil of mines. "Have the seeds of these vegetables remained without use from the origin of the world to the day that they found their proper soil?"

☞ Phosphorus obtained from bird guano is used for tipping lucifer matches in England.

OGDENSBURG WATER SUPPLY.

The citizens of Ogdensburg, N.Y., are moving in the matter of supplying their city with pure water. There are two sources to which attention is particularly turned; one the St. Lawrence River, the other the Oswegatchie River, a short distance from the city. Having been employed by the city to make analysis of these waters, with the view of ascertaining their comparative purity and excellence, we have returned the following results, which we here present in tabular form: —

ANALYSIS OF DIFFERENT WATERS AT OGDENSBURG, MADE BY JAMES R. NICHOLS & CO., CHEMISTS, BOSTON, MASS.

	St. Lawrence R.		Oswegatchie R. Above Dam.		Oswegatchie R. At Eel Weir.	
	Parts in 100,000.	Grs. pr. gall.	Parts in 100,000.	Gr. per gall.	Parts in 100,000.	Gr. per gall.
Total solid impurity..	1.1662	12.6	.8793	9.5	.8747	9.45
Lime as carb. or bicarb.	.5061	5.49	.2887	3.12	.2887	3.12
Lime as sulphate.....	.1092	1.18	.0740	.8	.0694	.75
Magnesia as phos. and carb.	.1157	1.25	.0786	.85	.0786	.85
Organic matter.......	.1878	2.03	.3609	3.9	.3609	3.9
Silicate soda & potassa,	.1943	2.1	.0518	.56	.0518	.56
Iron..................	trace.	....	.0185	.2	.0185	.2
Alumina..............	.....	....	.....	....	.....	....
Chloride sodium......	.0481	.52	.0027	.03	.0027	.03
Ammonia.............	.....	....	.....	....	.....	....
Nitrogen as nitrate and nitrites	.0027	.03	.0037	.04	.0037	.04
Hardness—Clark's test,	8 deg.	....	2½ deg.	....	2½ deg.	....
Hardness after boiling,	6 deg.	....	2 deg.	....	2 deg.	....

It will be seen, that the Oswegatchie River furnishes excellent soft water, well suited to all culinary and domestic purposes. The St. Lawrence water is remarkably clear and sparkling, but it holds a much larger amount of inorganic matter, which being made up of lime salts, renders it too hard for domestic uses. We presume the Oswegatchie will be called upon to quench the thirst of the good people of Ogdensburg.

QUESTIONS AND ANSWERS.

N. T. S., *Syracuse, N.Y.* — "Will you please inform me and many other curious inquirers regaring the probable origin or source of the salt-springs which are found in and about this city? If they come from dissolving salt-beds, is there not danger of undermining the country, and causing it to sink?"

It is obvious that a vast bed of impure chloride of sodium, or rock salt, reposes in the earth beneath your city, and that percolating rains from near and distant hills reach and gradually dissolve it; and, by hydrostatic pressure, it is forced up to the surface, charged with the saline constituents. This salt water is worth more than the rock itself; for if you could chisel or blast off the rock above ground, it would require to be dissolved to remove impurities, and this would be all extra work. Through the silent but mighty workings of nature, the rock is dissolved and brought to the surface, ready for the manipulations of the salt-makers. The second inquiry is of a somewhat startling nature. Is there not danger that, by removal of so much solid matter immense cavities may be formed below, and endanger the stability of the city and suburbs? It is true, a mass of rock salt is removed, every year, equal in size with the bulk of the manufactured article. How great is this? From the reports of the superintendents in past years, we learn that the amount abstracted is increasing each year; and during the present, it will reach as high as 6,000,000 bushels. The statute bushel contains 1.28 cubic feet; the yield, therefore, amounts to nearly 8,000,000 cubic feet. This amount, if piled up, would form a pyramid 290 feet square and 320 feet high. If spread out, it would cover, to the depth of 6 feet, 28 acres of land. The natural wear upon the rock, through the small springs, was comparatively insignificant; but the large number of borings made during the last fifty years have brought up immense quantities of the great saline bed. There can be no question, we think, of the forma-

tion of a huge cavity below, filled with salt water; but it is probable the depth is so great, the superincumbent earth is capable of keeping its position. At any rate, we think real-estate owners in that locality will not be likely to become so disturbed by the prospects of a collapse, as to force their lands upon the market at very ruinous prices.

Mrs. E. G. D., *Newark, N. J.*—The singular occurrences in your house, which you describe, and which created so much alarm, are unquestionably due to electrical excitation. Within a few years past, several house in the city of New York have exhibited electrical phenomena in a very remarkable degree. For months in succession, they have emitted sparks of considerable intensity, accompanied by a loud snap. A stranger, upon entering one of these electrical houses, in attempting to shake hands with the inmates, receives a shock which is quite noticeable and somewhat unpleasant. Ladies, in attempting to kiss each other, are saluted by a spark. A spark is perceived whenever the hand is brought near to the knob of a door, the gilded frame of a mirror, the gas-pipes, or any metallic body, especially when this body communicates freely with the earth. In one house, a child, in taking hold of the knob of a door, received so severe a shock that it ran off in great fright. The lady of the house, in approaching the speaking tube to give orders to the servants, received a very unpleasant shock in the mouth, and was very much annoyed by the electricity, until she learned first to touch the tube with her finger. In passing from one parlor to the other, if she chanced to step upon the brass plate which served as a slide for the folding-doors, she received an unpleasant shock in the foot. When she touched her finger to the chandelier (the room was lighted with gas by a chandelier suspended from the ceiling), there appeared a brilliant spark and a snap. In many houses the phenomena have been so remarkable as to occasion general surprise, and almost alarm. The electricity is probably created by the friction of the shoes of the inmates upon the carpets. If the carpets are all wool, and very heavy and dry, the house close and hot, sparks and slight reports come from persons scuffling over them. In winter, this phenomenon is more likely to occur than at other seasons. There is nothing in the occurrences which should create alarm.

M. C.—"What is the process of curing sheepskins, etc., with the wool on?"

First wash the wool thoroughly with soap and warm water, until all dirt and grease is removed; then either

First, immerse it for three or four weeks in the handling vat of a tanyard; second, sew it up in the shape of a bag, with the wool outside; cram it full of tan bark, pour in as much water as it will hold, and hang it up for two or three weeks; or, third, lay it upon the floor, flesh side up, and plaster it over, half an inch thick, with a composition of one half salt and one half alum, both finely pulverized; double it over and let it stay three weeks. The first two processes will stain the wool somewhat; the last will leave it beautifully white and clean.

B. W. K.—"Can you tell me how to reduce hair to a state suitable for manure?"

Hair resists decay more powerfully than any other organic substance known. It has been found in a perfect state after lying in tombs or graves for centuries. We know of no better way than to incorporate it with your compost heap, and let it undergo fermentation through the winter.

J. S. C.—"Can I use with safety and advantage, as a fertilizer, the marble-dust, whiting, carbonate of soda, etc., which has been employed in obtaining gas for soda fountains, mixed, of course, with oil vitriol?"

First, ascertain which predominates—the carbonate of soda, or the sulphuric acid. If the former, mix it with your compost heap; if the latter, mixed with ground raw bones, it makes a most valuable fertilizer.

D. M.—"1. Would logwood (after boiling) be beneficial, applied to heavy clay land? 2. Would any benefit result from the application of the refuse of chloride of lime to land?"

1. No more than any other sawdust. 2. No more than common marl.

A. K.—"How can I make a good rubber cement that will adhere to cloth, leather, or rubber? I have tried benzine, and find it does not work."

We think your benzine was made from petroleum. You should have taken that made from coal-tar. In case that fails, try chloroform.

L. O. H.—"What power has your petite microscope?"

The one at seventy-five cents, twenty diameters; that at one dollar and twenty-five cents, forty diameters.

S. A. D.—"Please inform me what will remove white paint from broadcloth."

Coal naphtha or benzine.

L. D.—"What will remove stains of iron rust from marble? What will erase ink-spots from marble?"

An aqueous solution of oxalic acid.

F. R. G., *St. Joseph.*—"Can you give me a recipe for indelible ink to be used with a stencil plate?"

Nitrate of silver ground up with India ink.

Yale.—"What is the best study light and study lamp?"

Kerosene in a German student lamp.

Rev. Mr. Milburn, the well-known blind preacher, has hopes of recovering his sight. He is under the care of Prof. Von Græfe, at Berlin.

☞ A gentleman of high scientific attainments, a resident of one of our large cities, in a note ordering two full volumes of the *Journal* to be sent to him, remarks as follows:—

"The practical character of the *Boston Journal of Chemistry* pleases the members of my family; and the only regret expressed is, *that there is not more of it. Silliman's Journal*, the *Journal of the Franklin Institute*, etc., are just glanced at when received; but your *Journal* is *read*."

Medicine and Pharmacy.

STUTTERING OR STAMMERING.

Editor Boston Journal of Chemistry:—

The most common case of stuttering is not, as has been almost universally believed, where the individual has a difficulty in respect to some particular letter or articulation, by the disobedience to the will or power of association, of the parts of the mouth which should form it, but where the spasmodic interruption occurs altogether behind or beyond the mouth; viz., in the glottis, so as to affect all the articulations equally.

To a person ignorant of anatomy, and therefore knowing not what or where the glottis is, it may be sufficient explanation to say, that it is the slit or narrow opening at the top of the windpipe, by which the air passes to and from the lungs, being situated just behind the root of the tongue.

It is that which is felt to close suddenly in hiccup, arresting the ingress of air, and that which closes to prevent the egress of air from the chest of a person lifting a heavy weight or making any straining exertion; it is that also, by the repeated shutting of which, a person divides the sound in pronouncing several times in distinct and rapid succession, any vowel, as *o, o, o, o*. Now, the glottis, during common speech need never be closed, and a stutterer is instantly cured, if, by having his attention properly directed to it, he can keep it open. Had the edges or thin lips of the glottis been visible, like the external lips of the mouth, the nature of stuttering would not so long have remained a mystery, and the effort necessary to the cure would have forced itself upon the attention of the most careless observer; but because hidden,—and professional men had not detected in how far they were concerned, and the patient himself had only a vague feeling of some difficulty, which, after straining, grimace, gesticulation, and sometimes almost general convulsion of the body, gave way,—the uncertainty with respect to the subject has remained. Even many persons who by attention and much labor had overcome the defect in themselves, as Demosthenes did, have not been able to describe to others the nature of their efforts, so as to insure imitation; and I doubt very much whether the quacks who have succeeded in relieving many cases, but in many also have failed, or given only temporary relief, really understood what precise end in the action of the organs their imperfect directions were accomplishing.

Now a stutterer, understanding of anatomy only what is stated above, will comprehend what he is to aim at, by being farther told, that when any sound is continuing, as when he is humming a single note or a tune, the glottis is necessarily open, and therefore, that when he chooses to begin pronouncing or droning any simple sound, as the *e* of the English word berry (to do which at once no stutterer has difficulty), he thereby opens the glottis, and renders the pronunciation of any other sound easy. If then, in speaking or reading, he joins his words together, as if each phrase formed but one long word, or nearly as a person joins them in singing (and this may be done without its being at all noted as a peculiarity of speech, for all persons do it more or less in their ordinary conversation), the voice never stops, the glottis never closes, and there is of course no stutter.

I have given this explanation or lesson, with an example, to a person who before would have required half an hour to read a page, but who immediately afterwards read it almost as smoothly as was possible for any one to do; and who then, on transferring the lesson to the speech, by continued practice and attention, obtained the same facility with respect to it. There are many persons not accounted peculiar in their speech, who, in seeking words to express themselves, often rest long between them on the simple sound of *e* mentioned above, saying, for instance, hesitatingly, "*eIe* . . . . think *e* . . . . you may,"—the sound never ceasing until the end of the phrase, however long the person may require to pronounce it. Now, a stutterer, who, to open his glottis at the beginning of a phrase, or to open it in the middle after any interruption, uses such a sound, would not even at first be more remarkable than a drawling speaker, and he would only require to drawl for a little while, until practice facilitated his command of the other sounds. Although producing the simple sound which we call the *e* of berry, or of the French words *de* or *que*, is a means of opening the glottis, which by stutterers is found very generally to answer, there are many cases in which other means are more suitable, as the intelligent preceptor soon discovers.

Were it possible to divide the nerves of the muscles which close the glottis, without at the same time destroying the faculty of producing voice, such an operation would be the most immediate and certain cure of stuttering; and the loss of the faculty of closing the glottis would be of no moment.

The view given above of the nature of stuttering and its cure, explains the following facts, which to many persons have hitherto appeared extraordinary. Stutterers often can sing well, and without the least interruption,—for the tune being continued, the glottis does not close. Many stutterers also can read poetry well, or any declamatory composition, in which the uninterrupted tone is almost as remarkable as in singing.

The cause of stuttering being so simple as above described, one rule given and explained may, in certain cases, instantly cure the defect, however aggravated, as has been observed in not a few instances. And this explains also why an ignorant pretender may occasionally succeed in curing, by giving a rule of which he knows not the reason, and which he cannot modify to the peculiarities of other cases. The same view of the subject explains why the speech of a stutterer has been correctly compared to the escape of liquid from a bottle with a long narrow neck, coming "either as a hurried gush or not at all;" for when the glottis is once opened, and the stutterer feels that he has the power of utterance, he is glad to hurry out as many words as he can before the interruption again occurs.

Should my future experience enable me to simplify, or render more complete, the views of the nature and cure of stuttering which I have given above, so as to facilitate the cure in every variety of case, I will not fail to publish my remarks. D. J. Lyster, M.D.

CARBOLIC ACID IN TONSILLITIS.

BETHEL, Ky., Oct. 31, 1868.

DR. NICHOLS:—I read with pleasure, in the last number of the *Journal*, your remarks upon carbolic acid and its therapeutic applications. Judging from its chemical nature, I concluded, some time ago, to test its value in angina, tonsillitis, and other affections of the mouth and throat. I found it very beneficial. I was recently applied to by a gentleman suffering from severe mercurial stomatitis; and as a mouth-wash, I never found its superior. The unpleasant fetor was at once destroyed, and the entire ulcerative process checked. With a desire to benefit all, through the pages of the *Journal*, I concluded to forward this note.

With sentiments of high regard, I remain,

Yours truly, J. L. RICHARDSON, M.D.

QUININE MIXTURE.

Editor Journal of Chemistry:—

I wish to give to your readers the following formula, which I have used very satisfactorily for the last two or three years, viz.:—

℞	Sulphate quinine	grs. xx
	Tannic acid	grs. x.
	Comp. spts. lavender	fl. ℥ i.
	Aqua	℥ i.
	White sugar	q.s.

Mix.

By this combination the bitter taste of quinine is neutralized by the acid, while its medicinal character is not in the least impaired. Even children make no objection to taking it, so far as taste is concerned. The dose can be regulated by the amount of quinine the physician may wish to give in a given time. In intermittents and remittents, I generally give to an adult the above amount between each paroxysm, divided into three doses and given every two or three hours.

L. D. MCKINLEY, M.D.

E. MELROSE, Monroe Co., Io.
Nov. 3, 1868.

CARBOLIC ACID IN CONJUNCTIVITIS AND DIARRHŒA.

Dr. Ten Brook, of Paris, Illinois, has been using carbolic acid in obstinate cases of conjunctivitis, both acute and chronic. He writes to the *Medical and Surgical Reporter*, that its action was prompt and comparatively painless.

Dr. Fergus, in the *British Medical Journal*, describes a case in which he gave carbolic acid for excessive diarrhœa. The patient was a child not two years old, suffering from an attack of fever of the enteric type. The form used was the crystallized acid dissolved in a little sugar and water, commencing with doses of a half grain, afterward increased to two thirds grain every three hours. The diarrhœa was checked in less than two days, and the patient recovered. Two older children were attacked, but a prompt treatment with the acid cured them at once.

SUN-BATHS

Cost nothing, and are the most refreshing, life-giving baths that one can take, whether sick or well. Every housekeeper knows the necessity of giving her woolens the benefit of the sun, from time to time, and especially after a long rainy season or a long absence of the sun. Many will think of the injury their clothes are liable to from dampness, who will never reflect, that an occasional exposure of their own bodies to the sunlight is equally necessary to their own health.

The sun-baths cost nothing, and that is a misfortune, for people are still deluded with the idea that those things only can be good or useful which cost money, and they will cheerfully pay away their dollars for Turkish and Russian Baths, when they could get any number of sun-baths, which would be far more beneficial to them, for nothing.

Let it not be forgotten, that three of God's most beneficent gifts to man—three things the most necessary to good health—sunlight, fresh air and water are *free* to all; you can have them in abundance, without money and without price, if you will. If you would enjoy good health, then see to it that you are supplied with pure air to breathe all the time; that you bathe for an hour or so in the sun-light; and that you quench your thirst with no other fluid than water.

In regard to sun-baths, let any invalid … and who has been housed for some time, ta… sional walk in the sun, if it should be only on the piazza … and observe the effect. In our opinion, he will find it the most healthful bath he has ever taken.

Sleeping-rooms should be selected in such parts of the house as have the most benefit from the rays of the sun; the bed and bedclothes should be thoroughly aired and kept in the sun as long as possible every day. Many of the sleeping-rooms in our hotels are so situated as never to feel the influence of the sun's rays, and those who occupy such rooms for any length of time, are simply committing suicide. We have in mind, now, a large hotel in the vicinity of New York city, where not less than two hundred persons are usually located for the winter, in which a large proportion of the bedrooms are in the centre of the building, into which the sunlight never penetrates. As a corollary, the doctors' gigs are seen standing before the house at all hours of the day.

The Italians have a proverb, which says, "*Dove non entrar il sole deve andar il medico;*"* and with them, the first point to be considered in the selection of a house, is: *What is its exposure to the sun?* and they are careful to locate their sleeping-rooms on the side of the house where there will be the most sun.

Again: too many houses in most of our cities, and very many in country villages, are completely buried from the sun by shade-trees. Elegant establishments, these houses, whose occupants can command every luxury within the reach of wealth; saloons into which rank, beauty and fashion are welcomed, but from which the sunlight of heaven is totally excluded by shade-trees!

At the risk of being denounced as an iconoclast, we would lay the axe to the root of at least two thirds of the shade-trees which surround our houses and line our streets.—*Jour. of Health.*

REMOVING AMALGAM.—Dr. J. Payne writes to the *Am. Jour. of Dental Science*, that, in removing old amalgam fillings, he finds it a saving of much time and labor to first soften the amalgam by the addition of a little fresh mercury. A portion of quicksilver is taken up on the point of a piece of silver wire, and brought in contact with the plug. Having a stronger affinity for the amalgam than for silver, it immediately leaves the wire, and incorporates itself with the plug, which, in a few minutes, it reduces to as soft a state as when first made. The instrument should be well scoured after using, to prevent the silver from oxidizing.

RELATIVE MORTALITY FROM SMALL-POX.—Thirty years before vaccination was introduced into England, the mortality from small-pox was 3,000 to the million of population; now it is only 171 to the million. The mortality in the small-pox hospital is ascertained to be, in non-vaccinated cases, 37 per cent; while that of the vaccinated was only 6½ per cent. It seems, that in the great majority of instances, to have been vaccinated renders one proof against the contagion, as though one had passed through the original disease itself.

POISONING BY ABSORPTION OF CARBOLIC ACID.—E. S. Machin, Esq. (*British Med. Jour.*) refers to three cases of itch where the parts were dressed with carbolic acid and symptoms of poisoning ensued, consisting of smarting pain at the point of application, headache, and coma. Two of the patients actually died, and the third was only rallied with considerable difficulty. The acid used was that known as Calvert's, and about six ounces were employed upon the three cases.—*Med. and Surg. Journal.*

THE PROTOXIDE OF AZOTE is being employed as an anæsthetic by Dr. Seymour in the extraction of teeth, producing complete insensibility in two minutes. It is said to be perfectly innocuous, and to be respired without difficulty or repulsion.—*La France Medicale.*

IN INDURATED HEMORRHOIDS, M. Hillairet employs suppositories containing one tenth part of iodoform. In a few days the hemorrhoids soften and wtiher.

* Where the sun does not enter the doctor must.

…CURE FOR RHEUMATISM.

…, L. C. P. L., writes to the *Medical Press* …, that he has tested with most gratifying results … efficacy of valerian, in the form of a bath, in arresting the most violent attacks of acute rheumatism.

The bath is made by gently boiling one pound of valerian root for a quarter of an hour in one gallon of water, straining, and adding the strained liquid to about twenty gallons of water in an ordinary bath-tub. The temperature should be about ninety-eight degrees, and the time of immersion from twenty minutes to half an hour. After coming out of the bath, the patient should be rubbed till completely dry. If the inflammation continue in any of the joints, apply poultices made of linseed meal, wet up with a strong decoction of valerian root.

TURPENTINE AS AN ANTIDOTE TO PHOSPHORUS.—The *Archives Gén de Médecine* calls attention to the custom of the workmen in a match factory at Stafford, who apply phosphorus to the matches, of carrying on their breast a tin cup, containing essence of turpentine. This precaution is said to be sufficient to prevent any ill effects from the action of the phosphorus. It was previously known that the vapor of turpentine prevents the ignition and even the phosphorescence of phosphorus, but the practical application of this knowledge is not so generally adopted as it should be.—*Med. and Surg. Journal.*

STARVATION OF INFANTS.

It is very certain that infants other than those designedly starved to death, suffer from an insufficient supply of nutriment, and often die in consequence of withholding a proper amount of food, by kind but ignorant mothers and nurses. Modern mothers, from some reason, have but imperfect development of those functions upon which their offspring are expected to depend for nourishment during the tender period of infancy. Nearly or quite one half the children born, need other support than that obtained at the maternal fountain, and physicians and nurses cannot be too careful or vigilant in regard to this matter. Cow's milk, as furnished through ordinary sources of supply, is not pure and reliable, and if it were, cream properly diluted is usually better; cream mixed with thin arrowroot, is most excellent food for infants, and they thrive upon it wonderfully.

Our object in introducing this subject is, to call attention to some sensible views found in an article contributed by Dr. Hiram Corson, of Montgomery County, Pa., to the Transactions of the State Medical Society of Pennsylvania. Dr. Corson is of the opinion that a majority of infants fed by hand are underfed, and their milk given far too dilute.

"Thirty-two years ago it became necessary to rear his own child by hand, and then he discovered how ignorant he had been in relation to the *quantity of food* necessary for an infant, and was also able to observe the effect of an insufficient amount of food. Subsequent observations, continued through those many years, have convinced him that there is not more than one woman in five or ten who knows what amount of milk a child should have. Nor is there one physician in very many who can tell the mother or nurse what quantity it will need in twenty four hours. He has repeatedly questioned mothers, nurses, and physicians, and it has been rarely that they ever approximated the truth; guessing, as they did, from a teacupful or less, up to a half-pint or more, of one half to two thirds water, and one half to one third milk.

"Now, scarcely any child of one month will be satisfied with one pint of pure milk daily; many will take a quart; the average is between the two. It needs from twenty-four to thirty-two ounces of milk daily, and will starve on three half-pints of fluid, two thirds of which are water; for then it will only get eight ounces of milk per day. Such an underfed child will be hungry, peevish, fretful; will moan, start in its sleep; look pale, have an acid stomach, be colicky, be considered sick, be dosed with medicine, for the food is still insufficient in quantity and defective in quality, and will finally die. Thousands upon thousands of infants suffer thus daily, both in the

country as well as in the cities. It is not u[...] see children who have thus been dosed an[...] weeks, have their diet still farther reduced by [...] physician, who fears that the babe's stomach is too weak to bear much food. Such a babe becomes thin, pale, sad looking, moans much, and its mother becomes wearied out with it. If the weather is warm diarrhœa may set in; in cold weather it may be very costive. Sometimes it looks blue, as in cyanotis, and its face is always shrivelled, and its arms and legs thin; next it will break out in sores over its arms, face and legs, and its blood is supposed to be impure. But it is merely starving slowly; and its blood is only thin and scanty.

"In other cases it may be supposed to have disease of the heart. But its little, pinched up old face, with the fat all gone, and the attenuated muscles, standing out like strings when it cries or whines, will satisfy the observing physician that the child is starving. It gets only one or two teacupfuls of half milk and half water a day, when it ought to have more than a pint of pure milk, and over a quart a day, if it could take it, although it is only two months old.

"Cases of bowel complaint caused by water and milk should not be treated with medicine; merely give the babe as much good milk as it can take, and it will soon be well. But there is great difficulty here, for the mothers are generally impressed with the idea that cow's milk is very strong, even when they are giving this miserable sloppy water and milk mixture. Suppose that, instead of using half or a whole pint of this miserable stuff, the mother should give her babe even a whole quart daily; even then her child will be most wretchedly starved. It continues to be weak and pale, and be sick and puny; restless, both by day and night, wearing its mother out with its misery. If its condition is attributed to disease, and medicine is given, its fate will be sealed. Vomiting is apt to set in, and cold water is withheld, from fear of weakening the stomach; but little children not only need plenty of good food, but also a little cold water occasionally.

"These cases are still more difficult to understand and treat if the mother nurses her child in part, and feeds it also. It will generally be found that the babe gets little or nothing from the maternal fount, and then is kept on very low diet, from fear of surfeiting it. It will become sickly, puny, break out in sores, and become scorbutic.

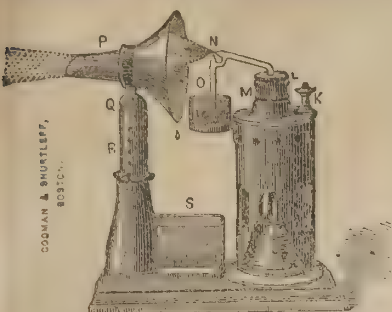
"The major part of the colic, crying, and restlessness of new born babes, for the first few days or weeks of their lives, comes from starvation. Cream and water will cure them far quicker than catnip, or aniseed, or chamomilla tea, or carminatives, or anodynes of any kind.

"Corson feels quite certain that it is almost as easy to raise children by hand, if they have an abundant supply of good, undiluted cow's milk, as it is by the breast. But the bottle should always be used instead of the spoon; and as much milk may be given as the child can take, and as often as it wants it, provided it is always made as warm as breast milk. To accomplish this it is only necessary to put two tablespoonfuls of boiling water to a pint of cool milk, and sweeten it moderately. A healthy child, one month old, will take nearly two pints in twenty-four hours; and some children, between one and two months old, will take more than a quart.

"It is not only flabby and flaccid breasts which give but little milk, but it frequently happens that stout women, with very large, fat breasts, have no milk at all. It is easy enough to notice the error when the little hungry creature is seen tugging at flaccid, milkless breasts, but it is far more difficult to detect the sham when it is seen struggling with a mountain of fat and flesh.

"It is not merely the children of the poor who are thus starved. Who has not seen the poor little emaciated child of the rich, dragged about in its superb little wagon, or lying on the nurse's lap as the large carriage rolled along, to give it an airing, by direction of the physician, under whose very precise orders it had been fed only every four hours, on two thirds water and one third milk. Day after day, and week after week, he has visited and prescribed, not for the starvation, but for debility, colics, sourness of stomach, irregular or disordered bowels. Under the impression that the child's stomach was weak, he has still further reduced its nourishment, and given it lime, or mint-water, chalk, bismuth, anodyne, etc. *This is starvation in the midst of plenty — starvation by prescription.*

Local Anæsthesia and Atomization of Liquids.



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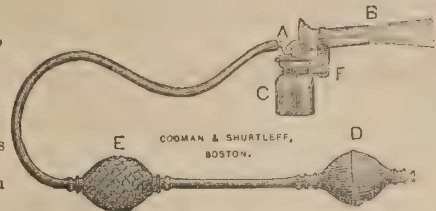

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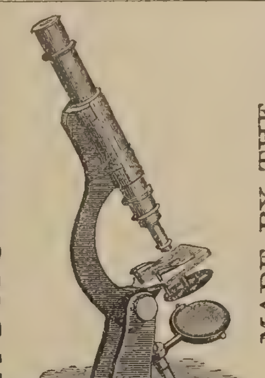

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BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. III.—No. 7.] BOSTON, JANUARY 1, 1869 [ISSUED MONTHLY, AT FIFTY CENTS PER ANNUM.

THE **Boston Journal of Chemistry** IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

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Contents.

Familiar Science.

IMPURITIES OF WATER.

Chemically speaking, pure water does not exist. Rain-water always contains ammonia or nitrous compounds. Ordinary distilled water also always contains traces of ammonia or other organic substances. We can, however, by observing certain precautions, obtain distilled water very nearly chemically pure; but then it becomes almost impossible to keep it so, for water may be said to resemble, to a certain extent, the alchemists' Universal Solvent, inasmuch as it dissolves greater or less quantities of almost all substances. The expressions *soluble* and *insoluble* in water are therefore usually only relative. We have substances of all degrees of solubility, from those dissolving in any proportion, to those requiring fifty or a hundred thousand parts of water for solution. To this cause is due the difference in natural waters. These always hold various mineral salts in solution, derived from the soil or rocky strata through which they have passed. When these salts are present only in moderate quantity, they do not injure the water for ordinary purposes; or, in other words, they are not practically impurities. In large quantities, they make mineral or saline waters. We have also the division of well, spring, and lake waters into hard and soft, according to the amount of lime they contain. But, besides the mineral substances, that, as they are always present, may be termed essential, our waters are liable to be contaminated with various accidental impurities. These are of a more important character, since they are not always easily recognizable, and are often injurious to health. From a variety of causes, these impurities have not attracted much attention; but, at the present time, their importance is acknowledged, and the determination of their nature and effects has become one of the most difficult of chemical problems. We propose, in the present article, to touch upon some of the salient points of this subject, without entering into its minute details. It is a matter which especially affects the dwellers in cities. A man living under his own vine and fig-tree may also have his own well or spring; but the inhabitants of a large city depend upon a common source for their supply of water, and when this becomes impure, all must experience its evil effects. It is soluble organic impurities that are most to be dreaded, and especially the presence of some forms of decaying organic matter in drinking water. We will take up this point again farther on.

Water-supply is usually obtained from lakes or rivers. Lake water of course is to be preferred, when obtainable. Especially is it the best when the lake is so situated that it is fed only by springs or brooks, and does not receive the drainage of towns or factories. In this way, it is certain that, under ordinary circumstances, it will not be contaminated by organic matter. Occasionally, fungoid or other vegetable growths may be found in it; but such causes will produce only transient effects. River water always holds in solution more organic matter than lake water. Often it holds in suspension, mud, largely organic; and, beyond all, it is likely to receive the drainage of the towns, villages, and farms along its banks. Muddy or turbid water can be easily freed from suspended matter by settling or filtration; but, of course, the soluble constituents are not affected by either operation. We have said above, that it is soluble organic impurity that is most to be dreaded. This is true, with the qualification that the effect upon the water depends upon the kind of organic substance present. Here, we at once meet with difficulty; for we have not yet a satisfactory way of determining this point in every case. Quantity gives no certain indication; for, of two specimens of water, one may perhaps contain three times as much organic matter as the other, and the first be harmless, while the second may be positively poisonous. Neither the taste nor appearance is of much value. One English writer says that he examined some water from a well near a churchyard, that was loaded with organic matter of a most dangerous character, and yet was beautifully clear, and of a fresh, pleasant taste. We remember drinking water, ourselves, for several months, that was distinctly yellow, and yet perfectly good. Chemists have not yet been able to satisfactorily explain these differences, although one thing seems to be tolerably certain—that nitrogeneous substances are much more dangerous than non-nitrogeneous; and this brings us naturally to the most important of the questions relating to water and water-supply—the contamination of water by drainage and sewage. Many cities obtain water from rivers, along whose banks, towns, villages, and manufactories have been built; such water must become more and more impure and unwholesome every year. Any one who has stopped a short time in Cincinnati must be convinced of this. Buildings reach for some distance along the banks of the river (the Ohio), directly above the pumping works; while, farther up, numerous towns and villages are found, increasing in number and size every year. The drainage of all these places must, of necessity, deteriorate the water. The inhabitants may become accustomed to its use; but, judging from our own experience, it affects strangers very unpleasantly. In London, this evil has become very great. A large part of the metropolis is supplied with water from the Thames; and as the population along its banks has increased, its water has grown worse and worse. Water that may contain sewage never should be used. Nothing seems more likely to breed a pestilence or produce putrid diseases. Prof. Frankland, in a lecture before the Royal Institution, said:—"This hurtful matter is believed, on very strong evidence, to consist of spores or germs of organisms, which are capable, under favorable circumstances, of producing in man such diseases as cholera, typhoid fever, and dysentery." Such spores or germs will be better able to resist decay than unorganized

matter, and so can retain their powers of mischief for a longer time. In London, the matter of future water-supply has become of great importance, and, in connection with it, examinations and analyses of a large number of waters have been made. The attention of chemists has been drawn to the subject, and a thorough revision of water-testing and analysis is now going on. Wankhyn, Smith, Chapman, Frankland, Armstrong, and many others are engaged upon it; and, although some of them seem to have done, so far, more quarrelling than work, it is to be fervently hoped that they will place water analysis upon a surer foundation. Finally, we would say that, in testing the goodness of waters, any sample containing much organic matter should be at once condemned, even though it seems to be very good; and also that, in choosing a water for household purposes, it is important to see that it comes from a source that does not receive the drainage of houses, manufactories, swamps, or graveyards.

BAD HABITS OF THE ROBINS WHEN AWAY FROM HOME.

Editor Journal of Chemistry:—

I do not remember having seen it noticed in print, that the robins which leave their northern homes to winter at the South, fall, while there, into very bad habits.

They are exceedingly fond of the berries of the "Pride of India," a tree which is grown extensively for ornament and shade in some localities of Georgia and Florida. As this tree bears its fruit abundantly,—somewhat after the manner of the Mountain Ash in northern latitudes,—the birds collect upon it in great numbers, and, after feeding a while, many of them become so intoxicated that they can neither fly nor remain perched on the branches, but fall to the ground. Here they are picked up by the colored population, who esteem them very nice materials for "pot pies." If left undisturbed, the little creatures soon recover from the effects of their indiscretion; but, like some human beings, learning no wisdom from experience and consulting appetite at the expense of safety, they again return to the tree and indulge themselves with its delicious but dangerous fare.

We are not aware that any evil effects are experienced by those who eat of the birds thus captured; but may there not be some valuable *medical* properties in the fruit which thus affects the robins? S.

Dec. 1868.

Arts.

CLEANSING COD-LIVER OIL BOTTLES.

It is not unusual with the pharmaceutist to take back the empty bottles from consumers of cod-liver oil, and the corks being left out, the air causes the rapid oxidation of the small portion of oil left in each bottle, which becomes semifluid, and sometimes nearly solid, and is very troublesome to remove. This is also true of the exterior, which frequently is badly soiled with oxidized oil entirely solid. The junior whose duty it may be at intervals to cleanse the accumulated store of bottles preparatory to refilling, has frequently been worried by the tedious task. The most usual way is to boil the bottles in water containing soda, potash, or soft soap, which, when a large kettle is used, greatly facilitates the process, especially if the alkali employed is caustic; but this involves much space and a fire, and the handling of the bottles is difficult, so that the following plan will be found more convenient in the shop:—

Provide a pint of good *benzine*, half a pound of pearlash (or a pound of sal-soda), a quarter of a pound of lime, and half a gallon of boiling water. Slake the lime with a part of the water, and add it to the balance containing the potash in solution, and agitate them. These quantities for half a gross of pint bottles. Put about two fluid-ounces of benzine in a bottle, agitate it well, and in a few moments it will have dissolved all the oil, when it may be poured into another oily bottle, drained a moment, and then four ounces of the liquor potassæ cum calcæ is introduced (which should be warm), a good cork used, and the bottle well agitated. By means of a small sponge tied on a twisted wire, apply the alkaline liquid to the exterior of the bottle, standing in a shallow tin dish capable of supporting four or five bottles. Now pursue a regular order of sequence with the benzine and alkali inside and the alkali outside, shifting the benzine from bottle to bottle until it gets too foul for further use, and then the alkali from bottle to bottle, until it also is exhausted. The interior is soon cleansed, and a thorough rinsing with water completes the work. When the exterior of the bottles is very foul, it will be most convenient to apply the alkali externally *after* the benzine has been used, which enables the operator to see when all the oil is dislodged from the interior, when the alkali is subsequently used inside. Finally, rinse with alcohol.

Care should be used to reject and throw away the benzine solution of the oil before it gets so foul as to lose its thin consistence favorable to draining, which, when the bottles are dirty, will occur with the eighth or tenth bottle.

It is a good plan, when many bottles are thus taken back, to clean them partially with a little benzine before putting them away, and wiping the exterior with the same, which renders the subsequent labor very easy. These remarks apply to castor-oil and other oil bottles or cans. The latter often become very impure, so as to contaminate fresh oil put in them temporarily for transportation, and it would be well for *druggists* who habitually supply cod-liver oil to their pharmaceutical customers in cans, to make a rule systematically to drain them, and occasionally to cleanse them as above, observing to get them absolutely dry before using. Such cans should always be kept corked, and when the corks become foul they should be rejected. These remarks may be considered superfluous by many. For such they are not intended; but if a few only are benefited by the hints, they will have answered a useful end.—WM. PROCTOR, JR.: *Amer. Journal of Pharmacy.*

CHEMICAL LABORATORIES.

Prof. Frankland, in his address to the chemical section of the British Association, complains that the great science schools of the continent have no parallels in England, and contrasts the "discouraging way in which scientific studies are being introduced into our older universities" with the hearty co-operation which public opinion and governmental power yield to continental science. New and magnificent laboratories for chemical instruction have been erected at Heidelberg, Zurich, Bonn, Berlin, Leipzig and Carlsruhe, while the universities of Munich, Giessen, Vienna, and other cities, have scarcely less splendid, though not so recent, provision for the same objects. Some notion of the value set by foreign governments upon national scientific education may be gathered from the fact that the laboratory at Zurich cost a sum equivalent to \$68,000 of American coin, that of Bonn \$90,000, that of Leipzig \$58,000, and the estimates for the Berlin laboratory, with its seventy-four rooms, amount to nearly \$231,000.

Is it cause for wonder that both English and American students are still obliged to go away from home for thorough instruction in chemistry, to countries where science receives due nourishment and support? The Anglo-Saxon race is characterized by the activity of its individual members, and its forms of government leave as much as possible to the individual enterprise of the citizen. We hope the future will prove that democratic America, at least, is determined not to lag behind monarchical Europe in the earnest cultivation of science. The liberality and public spirit of our citizens must take the place of the paternal government. There has been a great progress in this direction. Men are more likely than they were to leave money for educational institutions; and when they outgrow the childish desire to found new and feeble colleges, and begin to endow adequately the old ones, Young Science in America will lift up her head without shame before her sisters beyond-sea.

In England, the second-hand blue postage-stamps are bought up for the indigo contained in the coloring. A Frenchman has just patented a process for extracting the indigo from blue rags.—*Journal de Chimie.*

HARD AND UNYIELDING CEMENTS.

To four or five parts of clay, thoroughly dried and pulverized, add two parts of fine iron filings free from oxide, one part of peroxide of manganese, one half of sea salt, and one half of borax. Mingle thoroughly, and render as fine as possible; then reduce to a thick paste with the necessary quantity of water, mixing thoroughly well. It must be used immediately. After application it should be exposed to warmth, gradually increasing almost to white heat. This cement is very hard, and presents complete resistance alike to red heat and boiling water.

Another Cement.—To equal parts of sifted peroxide of manganese and well pulverized zinc white, add a sufficient quantity of commercial soluble glass to form a thin paste. This mixture, when used immediately, forms a cement quite equal in hardness and resistance to that obtained by the first method.—M. SCHWARTZE, in *Chemical News.*

PHENOMENON RELATING TO HEAT.

MR. EDITOR:—In the hope of eliciting comment from some of your readers, I beg leave to present a theory in regard to a phenomenon of which I have yet seen no satisfactory explanation.

Every one must have noticed the peculiar *something* which begins to show itself over and around a stove when heated. The same thing is often seen on looking across the top of a chimney, or even the surface of a field, on a warm summer's day. Transparent as air, but really comparable to nothing else in nature, it is popularly supposed to be due to minute particles of dust, vibrating under the disturbing influence of heat; and we know at least one man, eminent in science, who is tenacious of the same opinion. To me it seems an easy matter to account for it on more philosophical principles.

It must be borne in mind that the phenomenon is visible only under certain circumstances. If the background, whatever it is, upon which we look, beyond the heated body, is made perfectly plane, or at least of any *uniform* shade or color, the appearance in question is at once arrested. Why is this? Evidently, to me, because the results of changeable refraction, on which the phenomenon depends, are no longer visible; the continual shifting in the apparent position of objects seen through the unequally heated, and of course unequally refracting atmospheric medium, being apparent only when such objects are dissimilar, and hence incapable of being blended, to the eye of the observer, with each other. Produce some irregularity of surface or of shade in the background, and at once the phenomenon reappears.

If I have made myself sufficiently plain for just criticism, I shall be pleased to see it in the *Journal.*

Yours truly, W. J. ORTON, M.D.

LISLE N.Y., Nov. 10, 1868.

RECTIFYING ALCOHOL BY MEANS OF GELATIN.

Whilst witnessing the manipulations of the Eburneum process in the studio of Mr. Burgess, at Norwich, Mr. Burgess mentioned a curious circumstance. When the gelatin and pigment forming the layer of eberneum is quite dry, it is coated with collodion to render it impervious to moisture. This operation, he noticed, always rendered the eburneum soft and limp, so that it required placing in the drying-box again. The greediness of the gelatin for moisture causes it to absorb the trace of water in the solvents of the collodion, and so become damp. This suggested to us a possible use for rectifying small quantities of alcohol, or removing water from collodion in which the use of imperfectly-rectified solvents has caused a tendency to give crapy films. Place a little pure gelatin in the spirit to be rectified. There is no danger of any portion of it dissolving, but it will absorb the water and gradually swell; it may then be removed, carrying the water with it. This will be found more convenient than the plan sometimes recommended of agitating with carbonate of potash, and after subsidence decanting.—*Chem. News.*

GLYCERINE IN MOULDING IN PLASTER.—Dr. Hoffman, in the *Journal de Chimie*, recommends the addition of a coat of glycerine to the ordinary soap coating used in moulding in plaster. For some time past, the separation of the proof from the mould has become more difficult, from the deterioration of soap.

Effect of Position on Sleeplessness in Acute Diseases.—Dr. Kennedy, of Dublin, alluding to the relation of our nervous systems to the great electrical currents of the earth, has often observed a beneficial effect from placing children in a north and south direction.—*Dublin Quarterly.*

The Tree-Beetle, or May-Bug, made Useful.—In Switzerland, an oil is extracted from beetles, and said to be "excellent for salad dressing and greasing machinery." In Prussia, a powder is made, which is mixed with food for fattening poultry. In France, a young chemist has obtained a coloring matter which is a fixed yellow, varying from a chrome to a golden. Each beetle yields several tenths of a grain.—*Journal de Chimie.*

Valuable Preparation of Glycerine.—Four parts, by weight, of yolk of egg, to be rubbed in a mortar with five parts of glycerine. This compound has the consistency of honey, is unctuous, like fatty substances, but is easily removed by water. Applied to the skin, it forms a varnish which effectually prevents the action of air. It allays the itching in cutaneous affections. It is unalterable, and can be exposed to the air for an indefinite period.—*British Med. Journal, from Phil. Journal of Pharmacy.*

Gold Quartz in New York State.—An auriferous quartz vein has been discovered near Clinton, N. Y. The vein is traceable on the surface for three thousand feet, and varies in width from six inches to one foot. The quartz is bluish, and a portion of it next to the walls decomposed. It is well defined, and pitches at an angle of seventy-five degrees. An assay of samples of the quartz rock shows that it contains $15.45 of gold to the ton, and about 20 per cent of silver.

The Russian government has granted a concession for the construction and working, within the Russian territories, of a direct line of telegraph between London and India, to Messrs. Siemens Brothers, of London, and Messrs. Siemens & Halske, of St. Petersberg and Berlin. The concession is granted for twenty-five years, dating from the commencement of the line's effective working.

Artificial oil of bitter almonds is manufactured from the benzole of coal-tar. A fine stream of benzole and another of fuming nitric acid are allowed to run together in a worm kept well cooled. The liquids react on each other on coming in contact, heat is disengaged, and the artificial oil collected at the end of the worm is first washed with water, then with a solution of carbonate of soda, and lastly again with water.

Preserving Wood.—The following method of preserving wood has recently been patented in England:—A solution is made of 10 pounds of powdered potassa and 10 pounds of powdered lime in 50 gallons of boiling water, and another of 150 gallons of cold water and 40 pounds of sulphuric acid. These two liquids mixed together form what is called compound No. 1. Next, 50 gallons of crude petroleum, 40 pounds of asphaltum, 30 pounds of powdered lime, and 20 pounds of zopissa are boiled together, and mixed with a pint of sulphuric acid, to form compound No. 2. The timber to be preserved is immersed in compound No. 1 for a quarter of an hour, and then dried for a day or two, and afterwards it is, by the aid of a tar-brush, coated on all sides by compound No. 2.

Action of Iodide of Methyl upon the Vegetable Alkaloids.—One of the most interesting of recent discoveries connected with physiological chemistry, is that made by Drs. Brown and Fraser, of the change in the properties of the vegetable alkaloids, brought about by directly adding to them iodide of methyl. They have so far examined iodide of methyl with strychnine, nicotine, morphia, brucine, codeine and thebaia. As an example of their results they have found that in the strychnine compound the toxic properties of the alkaloid are diminished about one hundred and forty times, and that its physiological action is of an entirely different character. Instead of the spasmodic convulsive effect of strychnine, this compound, like curare, produces paralysis of the end organs of the motor nerves, the muscles remaining flaccid. Combining iodide of methyl with the other alkaloids affects them in a similar manner. In the case of morphine, its convulsive power is destroyed but its soporetic effect remains.

Agriculture.

ARTIFICIAL MANURE.

The following address to the chemists of Great Britain, appears in a recent number of the *Chemical News*, and is signed by William Little, in behalf of the South Lincoln Tillage Association. The views presented and statements made are such as ought to engage the attention of every farmer in the United States.

"To the Chemists of Great Britain.

"Gentlemen,—I take the liberty of addressing to you a request of the greatest importance to the progress of agriculture in this country; and my excuse for taking this liberty is, that any opinion in reference to the science of agriculture that bears the sanction of your authority will be accepted by farmers and others, as not only of the highest order, but in the most perfect faith of its being given sincerely and purely in the interest of agriculture.

"The request I have to make to you—not alone in my own name, but in the name of an association formed to protect and promote agriculture—is that you will favor us with your opinion on the principles we have adopted in the choice and purchase of artificial manure.

"In this country the trade and manufacture of artificial manure is assuming gigantic proportions. At certain seasons of the year our corn exchanges are inundated with makers and their agents; every kind of 'specific' in the shape of manure is offered for sale by all sorts of people and for every kind of crop; and I need scarcely inform you that, in proportion as these artificial manures are good and useful, so are they associated with an alarming amount of deception and fraud; so much so, indeed, that unless some very active measures are taken to expose and counteract this evil, the employment of the good and useful manures will be seriously affected, and the progress of agriculture seriously checked.

"We are doing all we can to meet this large and growing evil, by the formation of an association of practical farmers, and hope by combined effort to secure to agriculture all the advantages that science has bestowed upon it, and at the same time protect ourselves against the various costly and comparatively useless 'nostrums' and fraudulent mixtures that are prepared by mean and insignificant makers under the various titles given to artificial manures.

"That an association such as we have formed was most urgently required will be seen by the following facts:—Only a few months ago I was paying to a most respectable firm £6. 10s. per ton for manure, which I am now able to purchase, of even better quality, at £4. 2s. 6d.; but this reduction in the cost of manure is not, after all, the most important fact. It is still more satisfactory to know that, at all times, we may rest assured that through the watchful agency of our association any manure received will certainly have the quality and strength bargained for. Just to show the great change and progress that have been made in the manufacture and supply of phosphatic manures within a few years, I will quote from a card which gives the analysis and value of manure as supplied by one of the most honorable and respectable manufacturing firms. This manure was stated by six eminent chemists to contain an average of 18 per cent of soluble phosphate, and was valued at between £9 and £10 per ton. Now, by the rule of three, if 18 per cent costs £10, the value of the manure as now supplied through our association, and containing 26 per cent, should be something over £14 per ton. Again: the value of soluble phosphate was estimated at £35 per ton; at this moment, the pure soluble phosphate contained in our manure, and delivered free to our members, costs about *twelve pounds* per ton; but is it unreasonable to expect a still further reduction in the price, and improvement in the quality of these manures? Hitherto the great source from which our phosphatic manures have been procured has been the wonderful coprolite beds of Cambridgeshire, Bedfordshire, Suffolk, etc.; but recently there have been discovered phosphatic rocks in Spain and Canada, containing not less than 80 per cent of phosphate of lime. Surely it is only a question of time when these immense stores of phosphorus will be imported into this country in quantities without limit, and thus enable us to restore, not only to our arable soils, but to our grass lands as well, the phosphatic elements which for so many years have been taken from them, and the loss of which I have no doubt has been one of the chief causes of the exhaustion of our soils; and is it not probable that this immense trade will shortly fall into the hands of our large sulphuric acid makers, who will use these minerals as a convenient means for disposing of thousands of tons of sulphuric acid?

"An important principle in the conduct of our association is this—no exclusive or individual interest or profit can exist; whatever advantage we can secure by co-operation is entirely for the benefit of the general body of our members. Another important principle is that we purchase only one kind of artificial manure—'Superphosphate of Lime;' and we do this in obedience to what we believe is nature's simple and beautiful law,—Return to the soil in some shape that which you take from it. We say the crew yard with the food consumed by stock, together with a system of cultivation that enlarges and deepens the lungs of the soil, thus enabling it to inhale and more completely nourish itself by the action of rain and the atmosphere, will in general supply every thing else that can be *profitably* employed. Consequently every shilling that a farmer has to spend in artificial manures is spent with the greatest advantage in the purchase of phosphatic manures only.

"We do not deny that 'special manures' may be useful in 'special cases,' but such manures must always be expensive, since there can be no competition in their supply; each maker has his own secret or patented process, in neither of which have we any faith; therefore the cost of such mixtures to the consumer must be just what the maker may be inclined to charge; but we further protest against farmers purchasing or using at any time artificial manures of the composition of which they are completely ignorant, and by so doing put themselves blindly into the hands of the manure-makers. Every farmer should know what he buys, and for what purpose; without this knowledge he is no longer a farmer, but simply an agent—the manure maker usurps the intelligence of the farmer; besides such a position at all times exposes the farmer to the grossest deceptions and frauds. These very serious objections cannot occur in the purchase of phosphatic manures; their composition is well understood, and a large amount of experience has proved the many ways in which they may be profitably employed; they are besides prepared by numerous makers, and are at all times under the control of the 'Golden Economic Law' of free competition—supply and demand. In the purchase of these manures the farmer knows exactly what he buys, and by becoming a member of an association such as we advocate, he insures for himself a phosphatic manure of certified quantity at the very lowest cost.

"I hope that I have clearly explained the purpose of our association, in its chief principle, which we earnestly advocate, viz., the use and function of one kind of artificial manure. We believe we are only putting into practice the laws and opinions which have been long advocated in the many works and contributions to the science of agriculture. Should these observations be successful in eliciting the opinions of chemists, I hope they may be of a thoroughly practical character. It will be of no use to say certain materials would be valuable additions to the simple phosphatic manure unless they can be procured in any quantity and at prices that will make it worth while. Manure-makers are too ready to talk of the absence of nitrogen or ammonia, potash, magnesia, etc.; but supposing these substances to be necessary or useful, can they be purchased to pay, and does not Nature supply the most important of them—nitrogen—free of all cost, if man will only perform his part in the preparation of the soil? Do we not always find, when we read Nature aright, that all the large requirements for the sustentation of vegetable and animal life are ever at hand? If this is not the case, why have we six million pounds of nitrogen constantly pressing on every acre of land? and why have the wonderful discoveries of the spectroscope revealed to us that the salts of the ocean, especially soda, is to be found everywhere, even on the tops of our highest mountains?

"In conclusion, allow me to observe that, should the objects of our association have the valuable support of your favorable opinion, it will then only remain for time, patience, and perseverance to complete our task and to make our association an example to be usefully and

profitably followed by every other part of this great agricultural country. I have the honor to be, Gentlemen, in the name of the South Lincoln Tillage Association, your obedient servant, WILLIAM LITTLE."

THE APPLE CROP.

We are glad to find that an interest is still felt in the apple crop, although it has been so sadly deficient for several years past. It may flourish again, and afford us a large surplus for foreign markets. Wholesome, nutritious, and palatable as the apple is, thousands of families among us have undoubtedly been without it—unless in the most limited quantity—for four or five years past. During this period, less attention has been paid to the setting of new orchards; those of middle age have been greatly neglected, and old trees have been cut down by hundreds and given to the flames.

Another and prime cause of rapid decay and loss has been occasioned by thoughtless, careless, and injudicious pruning. Few of the duties of the farm are so badly performed—bad in the *manner* in which it is done, and in the *season* usually selected for the operation. Trees are living things, and must be treated as such. Their young bark is as vulnerable to hobnail boots as the back of the hand, and as easily mutilated by a dull saw or knife. No skilful surgeon would amputate a limb with dull instruments, or leave the bleeding wound exposed to the air; but many farmers who have pruned for forty years, and think they "know a thing or two about it," do both.

Every wound made in pruning that is half an inch across should be covered. If the tree is vigorous it will probably grow over without help, but covering greatly aids the effort of the tree in healing up any damage done to its outer garment. The best covering is gum shellac dissolved in alcohol; but as alcohol is quite expensive at present, paint of any color will answer the purpose, if care is used not to let it get upon the bark.

There is need of but very little pruning where an orchard has been properly managed from the start; no large limbs will ever need to be taken away, unless broken by winds or injured in some other way. *Prune but little*, is a good motto, but prune *annually*. Do not allow suckers or limbs that are crossing each other to grow several years before they are removed. Suffer the shoots that start out in spring to remain until the leaves have fallen in autumn, and then cut them smoothly off. The tree needs them for a time, and Nature, ever ready with a helping hand, sends them out to aid the leaves of the top in elaborating the sap and increasing the whole growth of the tree.

As to the best time for pruning apple-trees we have not a particle of doubt. From a long series of personal experiments running through twenty years, from reliable books recording the experience of others, conversations with practical men, and an extensive examination of orchards, we are fully of the opinion that the *middle of the month of June* is the most appropriate time. But as the ground is covered with grass or other crops at that season, and hoeing and other work is pressing, it is not always convenient to engage in it then. The next best time is in *October, after the trees have shed their leaves;* and this may be extended into November or December, if the operator can keep himself sufficiently warm to do the work well.

Where we have carefully pruned at either of these times, it has seldom been followed by a flowing of the sap and the black discoloration of the bark which so often follows spring pruning. The wounds become dry and hard on the surface, a lively growth commences in a few weeks if the pruning is done in June, and early in the following spring if the work is done in the fall, and the tree seems to sustain no check or injury whatever.

The question may be asked, *Why* is it best to prune at the seasons mentioned? We answer, Because the tree is then *in a comparative state of rest*. The sap has ascended through the sap-vessels in the trunk, followed out the extremity of the smallest twigs, and into the leaves, there to be worked over by the wonderful alchemy of Nature into thicker and more substantial substances. This thickened, or inspissated sap, as it is called, then passes down directly under the bark, and gives the trunk and branches their annual growth in diameter. Now, then, when the tubes or sap-vessels are nearly empty, or are comparatively so, is the time to prune. This occurs, for about fifteen days in midsummer, and after the trees have cast their leaves in autumn, until a succession of sunny and warm days sets the sap in motion again. Such days occur some time in midwinter, and it would then be unfavorable for pruning.

In pruning in June or October the saw soon becomes so much covered with gum that it is moved with difficulty, and it becomes necessary to wash it. This has never occurred in March, April, or May, in our experience. The sap is then thin and abundant, and the saw remains clean and bright.

In pruning, the aim should be to keep the head of the tree open to the air and light, and free from limbs that are crossing and rubbing against each other. Cut out these and the occasional dead limbs which may be found, and the orchard which has been well managed will need little more in the way of *pruning*. Each tree should be examined annually, and whatever is needed for it done.

N. E. Farmer.

SHELTERING ANIMALS.

The old Connecticut teaching was, that it renders young animals tough to confine them in the open field with the snow-banks for their bed, the starry canopy for the covering of their shed, and a rail fence for the side. But, experience assures us that such a system of management, with stock of any kind, is the most expensive mode of keeping domestic animals that can be adopted; because, when they are not protected properly from the pelting storms of our Northern winters, they will not be in as good flesh. A hundred pounds of fat and flesh on a good cow are worth more—pound for pound—than a hundred pounds of prime butter; because, if a good cow lose one hundred pounds of fat and flesh during the foddering season, Nature will make a desperate effort during the grazing season to reproduce the lost portions of the animal system; and the food required in making these secretions would otherwise have been converted into milk and butter-producing material. The same fact is true in regard to the fat and flesh of young cattle and sheep. When young cattle are maintained on an allowance of food too small to supply the requirements of their bodies, they lose flesh; and when they are falling away, it is quite impracticable for them to develop the proper form and symmetry of their bodies. Therefore, the farmer who requires animals of any kind to draw upon the flesh that has accumulated during the growing season, for the purpose of keeping them alive during the inclemency of the weather, will find that such a practice is not only exceedingly expensive, but ruinous to the health and vigor of his stock.

Sheep that are allowed to lose ten to twenty pounds of fat and flesh, each, during the winter months, cannot be expected to yield as many pounds of wool as if they had been properly fed and protected, and their fat and flesh retained.

Teams are often allowed to lose one or two hundred pounds of flesh during the foddering season, which cannot be reproduced at a cash expense of less than ten to fifteen cents per pound. Saying nothing of the loss incurred, or the expense of reproducing a hundred pounds of flesh, a heavy team for most agricultural purposes is far superior to a light one. A horse that weighs ten hundred pounds will suffer much less fatigue while hauling a heavy load over a rough road than another animal that weighs only eight hundred pounds. This may be inferred from the fact that the *momentum* of a heavy horse overcomes resistances which a light horse must meet with *muscular* force. These hints, we trust, will be sufficient to induce such care of teams that none of their flesh or muscle shall be lost.—*N. Y. Observer.*

ESSAY UPON FERTILIZERS.—It having been stated in several papers that the prize for essay upon the use of special fertilizers, had been awarded us by the Essex Agricultural Society, many inquiries have been made regarding its publication and where it can be procured. It will appear in the *Transactions* of the Essex Society in February, and we shall endeavor to find a place for it in the February number of the *Journal.*

Boston Journal of Chemistry.

BOSTON, JANUARY 1, 1869.

THE JOURNAL.

Our patrons will please remember that the new volume, or Vol. IV. of the *Journal*, does not commence until July next. To new subscribers we are sending the back numbers, so as to have all subscriptions expire together at the end of the present volume.

Our present design is to enlarge the paper, and modify its form, so as to render it more elegant, useful, and desirable. We shall make it a journal of *twenty-four* pages, reducing the size so that it will be more convenient for reading and binding. The price also will be raised to *one dollar* per annum. It will still be, as it has been in the past, *the cheapest scientific journal published in the world.* Our next issue will contain the Prospectus for the New Volume.

ERRATA.—In the article upon "Zodiacal Light" in our last issue, page 64, column 2, line 66, for "exterior" read "extensive," and in column 3, commencing with line 21, read, "But by actual observation the zodiacal light is found to always have the greatest breadth and intensity at F and G, and to decrease both in breadth and intensity from F toward H, and from G toward I; and under ordinary circumstances," etc., instead of as it now stands.

ERRORS AND ABSURDITIES.

The blunders made on scientific subjects in the newspapers of the day, and in many of the most popular elementary text-books, are often very ridiculous. During the past season, a little paragraph went the rounds of the papers, not excepting some of the best of our city journals, informing the public that mosquitos will not enter a room through an open window, if a rag "saturated with *carbonic acid*" is hung up in the window. A rag soaked for some hours in strong moonshine would probably answer the same purpose. The original statement was, doubtless, "*carbolic* acid," and it is strange not one of the editors who copied the paragraph was able to correct the error.

The makers of school-books are too frequently men who have no knowledge of the sciences which they attempt to teach, and who, in their "paste-and-scissors" compilation from better authors, blunder into very preposterous statements. One of the most popular school "Chemistries," in describing the conversion of starch, woody fibre, etc., into sugar, says: "Indeed, Prof. Pepper

speaks of eating a fine quality of grape-sugar made out of an old flannel shirt he had outgrown." What Prof. Pepper *does* say is this: "If, however, oil of vitriol is first added to the *linen* rags, then the rags are converted into sugar (the author has seen a specimen made of an old shirt)," etc. The American book-wright was not satisfied to take this simple statement, but must attempt (as he has done in many other cases of the kind) to embellish it. He must make it "a fine quality" of grape-sugar; and Prof. Pepper must not only see it, but eat it; and, to improve the joke of the thing (but unluckily at the expense of the science), it must be an "old *flannel* shirt" that has undergone the sweet metamorphosis. The absurdity of trying to convert *wool* as well as linen into sugar did not occur to him.

The same book gives "analine" three times in seven successive lines instead of *aniline*, and "coffeine" for *caffeine*, and adds "anguintum" as a synonym for *mercurial ointment*. In speaking of chemical names, it states, that "the equivalent of oxygen combined in the base is omitted," and gives three illustrations of the omission — sulphate of *soda*, sulphate of iron, and sulphate of *lime*. It will be seen, that only one out of the three is in point. The author derives the name *protein* from the Greek *proteno*, "I am first," but discreetly refrains from any attempt to show the connection in meaning between the word and its Hellenic source. Of course, every school-boy knows, that *protein* takes its name from the old god Proteus, who used to assume so many different forms in order to dodge the troublesome people who wanted him to play the prophet; and that the substance (if indeed there be such a substance) is so called from the protean forms in which it appears.

These are but a few out of dozens of similar errors in a single school-book (and a book used even in a school of so high rank as the Girls' High School in Boston), but they will serve to show that there is a sad want of *accurate* knowledge on scientific subjects, even among those who presume to write on such subjects for the instruction of others.

AERONAUTICAL SCHEMES AND THEIR FEASIBILITY.

There is a popular impression that all attempts to navigate the aerial ocean which surrounds our globe are wild and visionary. Scientific men have, for the most part, denied the possibility of constructing balloons that should have sufficient buoyancy to sustain the weight of the engines and other machinery, with the supplies of fuel, etc., which would be the necessary outfit of an air-ship. But recent investigations appear to show that the prospect of aerial voyages, with other motive power than the capricious winds can supply, is not a hopeless one. The Aeronautical Society of London has done a great deal in this direction, and gives promise of doing a great deal more in the future.

This society offered a prize (of one hundred guineas, if we remember aright) for the engine best adapted to aeronautical purposes. A number of very ingenious machines were offered in competition for this prize; and among them was one which weighed only sixteen pounds, and had a capacity of one horse power. One of the engines was propelled by a composition similiar to that used for filling rockets.

Those who have denounced all schemes of this kind have known scarcely any thing of the mechanical conditions on which flight depends. Scientific men have demonstrated that birds do not, in flying, exert the prodigious force usually ascribed to them, but when once risen from the earth, and started in a horizontal direction they can sustain themselves in the air by a very moderate exertion. They have shown also that large heavy birds can be sustained in rapid flight by wings very small in proportion to those of lighter and smaller birds. Thus, a pigeon weighing ten times as much as a sparrow, has only half the *proportional* surface of wing. The stork weighs eight times as much as the pigeon, and has only half the spread of wing. The Australian crane, with three hundred and thirty-nine times the weight of the sparrow, has but one seventh the wing-surface The same is true of insects. The gnat weighs ninety-seven thousand times less than the pigeon, with forty times the proportional wing-surface, and three million times less than the Australian crane, with one hundred and forty times the wing-surface. These and many similar facts prove that, to carry great weights at great speed through the air, it is *not* necessary to have immense pinions with a spread proportional to the weight, and requiring powerful engines to work them. The *possibility*, therefore, of aerial locomotion by flying machines capable of carrying great weights must be admitted by all; though it may be a long time yet before the thing is actually accomplished on a large scale.

DIVISIBILITY OF MATTER.

The communication of Dr. Merrick, which appeared in the last number of the *Journal*, is calculated to awaken some inquiry upon an interesting point in chemical theory. This theory is based upon the supposition that all substances are made up of atoms, and it is inferred that when any substance is in perfect solution it is resolved into a condition representing a separation of the atoms. Each atom is supposed to be indefinitely small. What may be the actual dimensions of such particles of matter, is a question no one is capable of answering. It is difficult to conceive of ultimate atoms; in fact we do not understand how such a thing can be, and when we speak of the separation of a body, by being diffused throughout a solvent, we are remarking upon a physical condition of matter of which we know but little. The belief is entertained by many distinguished chemists, that atoms have no dimensions, in fact that no such thing as an ultimate atom exists. What we call atoms are truly mathematical points, whence proceed attractions and repulsions, and upon which all chemical changes depend. How small must an atom of bromine be, when by placing a single drop in a *million* drops of water, we can detect its presence by a class of reagents recently discovered! But the point brought out in Dr. Merrick's inquiry is, whether there is not a limit to the divisibility of matter? If the drop of bromine is placed in *two* million drops of water, we lose all trace of it; no known reagent is capable of demonstrating to our senses its presence in the water. What is its condition in the two million drops of water? Is it split up into ultimate atoms, and then so widely separated by the mass of the solvent as to be unable to respond to the action of the disturbing chemical test? If we regard a drop of bromine but an aggregation of positive atoms, and these having fixed dimensions, some idea of its condition in the two million drops of water may be formed. We can conceive of the atoms floating about, their proximity to each other depending upon the amount of the solvent in which they are held or diffused. Whether this view be strictly correct or not, it certainly harmonizes with nearly all the facts observed in chemical manipulation, and since we cannot better express our ideas of the nature of a solution, we may as well adopt it. There is manifestly a limit to the divisibility of matter.

The largest laboratory in the world is at Berlin.

LUMINOSITY OF FLAMES.

Sir Humphrey Davy first propounded the theory that the light of flames was caused by the presence of incandescent solid particles. Professor Frankland gives some reasons for doubting the correctness of Davy's hypothesis. For instance: metallic arsenic burning in oxygen is intensely luminous, yet both metallic arsenic and the result of its combustion (arsenious acid) are volatilized at a temperature much below that of this flame. Every one knows how brilliant is the light of phosphorus burnt in oxygen, but since phosphoric acid is volatile at a red heat, it is evident that it cannot be due to the presence of solid particles. Again: bisulphide of carbon vapor burning in oxygen or nitric oxide gas, is remarkably luminous; yet it would be absurd to suppose the existence of any solid body in such a flame. For these and other reasons Prof. Frankland concludes that the luminosity of gas and candle flames is due to radiation from dense, but transparent hydrocarbon vapors.

FRAUDULENT KEROSENE.

The 29th section of the amended U. S. Internal Revenue Laws relating to illuminating oils, is as follows: —

SECT. 29. *And be it further enacted*, That no person shall mix for sale naphtha and illuminating oils, or shall knowingly sell or keep for sale, or offer for sale such mixture, or shall sell or offer for sale oil made from petroleum for illuminating purposes, inflammable at less temperature or fire test than one hundred and ten degrees Fahrenheit; and any person so doing shall be held to be guilty of a misdemeanor, and on conviction thereof, by indictment or presentment in any court of the United States, having competent jurisdiction, shall be punished by a fine of not less than one hundred dollars nor more than five hundred dollars, and by imprisonment for a term of not less than six months nor more than three years.

This is clear and explicit. Under the act the whole class of mixers and adulterers, wherever they may be found in the United States, can be arrested and promptly punished. The sellers of recipes for naphtha fluids, the travelling villains who are jeopardizing the lives of thousands, the mixers and dishonest dealers, all should be brought to feel the full force of law. To our readers we say: Do not let one of them escape.

QUESTIONS AND ANSWERS.

M. M. M. "What is the best material for coating tools and steel instruments to keep them from rusting?"

Answer. A preparation composed of three parts lard and one part rosin, melted together.

A. B., *Cincinnati*. — "Can you give me a recipe that will stick labels upon tin?"

We find the following in the *Druggists' Circular*: "Dissolve two ounces of common resin in a pint of alcohol, and allow nearly all the alcohol to evaporate, after coating the tin, before applying the label."

H. T. T. — "How can I repair India-rubber boots so that they will not leak?"

Cover the hole with a patch cut from another boot, using a cement made by dissolving pure India-rubber in either bisulphide of carbon or benzine. Use benzine made from coal-tar, not the hydro-carbon liquid from petroleum.

M. J. R. — 1. The percentage of potash in wood ashes is, by weight, as follows: —

Oak	12	Pine	13.6
White beech	19.22	Wheat straw	10
Red "	16.3	Rye "	19.47
Birch	16	Potato vines	4.2
Fir wood	25.7	Bean "	33
" charcoal	50	Pea "	27.8

The branches and bark of trees give a larger per cent of potash than the wood, probably because they contain more sap, which holds the potash in solution. 2. Crude potash is certainly a valuable fertilizer to apply to lands; but it is much cheaper and better to apply the ashes when they can be procured. 3. Our price for making an analysis such as you mention is twenty-five dollars.

SPECTRUM ANALYSIS OF A COMET. — Mr. Huggins, well known for his labors upon the spectra of stars and comets, has made an examination of the spectrum of the second comet of 1868, which turns out to be more satisfactory than any he has before made. In the first place, he finds that the spectrum is not continuous, but consists of three broad bright bands, and is therefore due to a gas. In the second place, noticing that this spectrum resembled very closely that of carbon (obtained by passing a spark through olefiant gas), he was led to compare them one with another, and found that they exactly coincided. This would seem to prove that carbon existed in this comet in a state of vapor. Such a case is irreconcilable with the laws governing terrestrial phenomena.

☞ We have received quite a number of valuable books for notice from publishers, but owing to the illness of the Editor of the *Journal*, they must remain over until our next issue.

In our last number, we published a recipe for a new solder of aluminum. Since then, we have received a letter from Dr. Geo. O. Starr, of New York, claiming that Dr. Alfred Starr is the inventor of the same, and has obtained letters patent upon it.

Medicine and Pharmacy.

FLORIDA AS A WINTER RESORT FOR INVALIDS.

REV. DR. SEELEY, of Haverhill, Mass., who has spent considerable time in Florida, sends us the following interesting and important statements regarding the climate:—

Editor Journal of Chemistry: —

I was much interested in the papers of Dr. Mattocks, published in the September and October numbers of your *Journal*, on "Minnesota as a Climate for Consumptives." I do not feel qualified to judge as to the correctness of all the theories stated by Dr. M.; but they seem very reasonable, and it is pleasing to think there is, at least, a *chance* for the consumptive to gain a prolonged lease of life and physical comfort by residing in Minnesota.

I would not have it understood that what follows is intended to controvert the statements of Dr. Mattocks; and if I thought the effect would be to divert any one who might be benefited by a visit to Minnesota from the purpose of going thither, I would withhold this communication.

But it is possible that there are invalids for whom the extreme cold of that State would prove too severe. This can be decided, not on general principles, but by the family physician, who is acquainted with the peculiarities of the case and the idiosyncrasies of the individual concerned.

If there be instances in which the medical advisers think the climate of Minnesota might prove too severe, it is well for such that the neighborhood of the St. Johns River in Florida presents a climate of an entirely opposite description, and one which numerous and long-continued experiments prove to be exceedingly favorable for those who have weak lungs.

This noble stream rises about midway between the 27th and 28th parallels of latitude, and, running in a northerly direction, winds through a carbonaceous and sandy soil, which is covered, for the most part, with pine forests, at an average distance of twenty miles from the Atlantic coast, until it reaches its extreme northern point near Jacksonville. Not far below (i.e. north of) this city, the river sweeps round to the east and empties into the sea at "Fort George Island," a few miles north of the 30th degree of latitude, and twenty-five miles from Jacksonville.

The St. Johns thus extends from a perfectly tropical climate, which is never reached by the frost, and in which the orange, lemon, citron, banana, pine-apple, and other tropical fruits grow luxuriantly, until, at its northern extremity the temperature, during the two months' winter, resembles that of a New England October. The flowers disappear, the temperature frequently falls sufficiently low to form ice on the surface of water left out of doors during the night in tubs or pails, and a good blazing fire on the hearth is quite desirable at morning and evening. But even here the orange, lemon, fig, and olive are cultivated with great success, the degree of frost ordinarily experienced doing them no injury; * and the evergreen foliage of the trees and shrubbery is a pleasant indication that summer has withdrawn to no very great distance.

It must not be overlooked that, sometimes, changes of temperature occur which (considering the latitude) may be regarded as both sudden and severe. So far as the writer's observation enables him to judge, these changes are due to easterly winds setting in from the sea. Nevertheless the distance inland of the St. Johns, at Jacksonville (and, indeed, all along its banks) is such that the inconvenience caused by these sea-changes must be much less than it is on the coast, or even at such a place as St. Augustine; and, at the same time, the cold humidity of those places in the more westerly portions of the State, which, like Tallahassee, are on a tenacious, clayey subsoil, is not experienced.

Among the advantages afforded by the St. Johns must be reckoned the ease and facility with which the several towns and settlements on its banks can be reached and the varieties of climate they afford. One can take a steamer at New York and in three days be at Savannah, cost of passage and fare twenty-five dollars. Thence lines of steamers run to Jacksonville and up the St. Johns almost daily; the time from Savannah to Jacksonville, about eighteen hours, cost of passage and fare ten dollars; and farther up the river in like proportion.

Board can be secured at reasonable rates (say about fifteen dollars a week) at almost any of the settlements, hotels, and boarding establishments on the banks; the best places thus far being at Jacksonville, Hibernia (Fleming's Island), Green Cove, and Enterprise.

The invalid can thus select the climate which best suits his case — whether that of a perpetual summer at Enterprise, two hundred miles up the river, or the cooler temperature of Jacksonville, near its mouth, or that of some place between the two. Wherever he goes he will find many northern people; some, like himself, in search of health, others taking advantages of the openings for business which are numerous in that almost virgin territory, and all of them, as well as many of their southern fellow-citizens, attentive to visitors, courteous, and hospitable.

All things considered, the undersigned is disposed to think the region above mentioned is preferable to Cuba, Nassau, or any of those localities in the South of Europe which have been most esteemed as winter resorts for invalids; and is confident that as its merits are made known multitudes of those who are affected with weak lungs and throat affections will escape from our harsh northern climate and spend the winter months on the attractive and health-giving banks of the St. Johns.

It should be added that those who reside in the locality and who are best qualified to judge what is advisable, deem it necessary to remain in Florida not only through an entire winter, but also during the following summer and winter, in order to secure the highest advantages afforded by the climate. There are those who, finding it impossible to spend a winter at the North, have become permanent residents in the neighborhood of the St. Johns; and they declare themselves as well pleased with the *summer* as with any other season of the year. Meanwhile they enjoy excellent health in all respects.

If convenient, the invalid, escaping from the approaching cold of the North, should stop a while at Savannah, until the temperature of Florida shall be somewhat modified by the autumnal change, and then proceed to Jacksonville, or farther South, as his plans or his comfort may dictate. In *leaving* Florida great precaution should be taken. In no case should an invalid proceed directly to the North, except in summer. The transition from one temperature to another is so great at other seasons as to shock the system and lead to evil results. The better way is to leave the St. Johns in the latter end of April and spend the month of May in Savannah, where the climate is then most delightful; and so arrange as to reach the North in June, after the lingering chill of spring has finally taken its leave.

The undersigned has known invalids who in this way have prolonged life for years; some who have received permanent benefit, and others who are evidently improving, with fair prospects of recovery. One gentleman met in Florida (a New York merchant), said his lungs were, and for twelve years had been, completely pervaded with a severe bronchial inflammation, and that he had lengthened out his life for that period by spending his winters in Florida, and keeping in a summer temperature while there and in his journeyings to and fro. A lady (resident of New Jersey), also met in Jacksonville in the winter of 1866–7, and who was then afflicted with a most distressing cough and the other usual symptoms of consumption, and who took these precautions in passing to and from the South, was again in Florida during the winter of 1867–8, much improved in health, and apparently with a fair prospect of recovering entirely. A member of the writer's own family, having annually suffered from attacks of acute bronchitis for several years, was left, in the spring of 1866, with a severe cough which no remedies sufficed to check. Several distinguished physicians (among them Dr. Bowditch, of Boston) pronounced the case one of incipient phthisis; and, as a forlorn hope, it was resolved to try a winter's residence in Florida. The place at first selected was Tallahassee, but this was soon exchanged for Jacksonville. Here the cough began to improve after a few weeks, and the patient reached home in June apparently cured, with no marked symptoms remaining or since returning.

The undersigned can not close this paper without expressing his obligations to Dr. J. D. Mitchell of Jacksonville, to whose skill and attention the cure must, in part, be attributed. Dr. Mitchell is a northern man whose own health renders it necessary for him to reside in the South, and he may be commended to all who visit that locality in search of health and in need of professional services, as a skilful physician and a Christian gentleman.

R. H. S.

* In 1836 the frost was so severe as to kill the oranges and lemons; but since then no such extreme of temperature has occurred; and now the orange groves are becoming quite numerous and flourishing.

IMPORTANCE OF A KNOWLEDGE OF CHEMISTRY TO THE PHYSICIAN.

As with a knowledge of anatomy, so too with a knowledge of chemistry and materia medica; they must be equally minute. The effects of poisons upon the system, the influence of various remedies upon the various secretions must be minutely investigated, so as to be thoroughly understood. To obtain this knowledge, requires the most careful and devoted study, and can only be obtained by constant labor in the chemical laboratory. So, too, in regard to the actions and effects of the various drugs and medicines upon the human frame. A knowledge of them all must be equally minute, and can only be obtained by a careful study of the materia medica, and in order to comprehend it, a knowledge of botany, is also necessary. As an instance of the necessity of this knowledge, and its importance, allow me to refer to a case which recently occurred. Summoned in haste to a fashionable hotel, to see two gentlemen who were supposed to be dangerously intoxicated, I found them with feeble pulse and the greatest muscular prostration, with dilated pupils and partial loss of vision, in a recumbent posture, apparently perfectly well, with the exception of the feeble circulation and want of muscular power before mentioned, with the intellect unclouded, and exhibiting no signs of intoxication. In an erect posture the heart almost ceased to beat, and they fell almost lifeless to the ground, exhibiting, in fact, all the symptoms of poisoning with prussic acid. Both were affected in a similar manner, but the one more seriously than the other; the symptoms being of the same character, only differing in degree. The question now was, how had the prussic acid been administered; whether by accident or design? A friend present, who was perfectly sober, stated that he had dined with them, and that previous to the dinner, they were in perfect health; that they had all drank of the same wine, in apparently nearly equal proportion; and as he was entirely unaffected, that what they had drank could not have been the cause of their present condition. He stated that these two gentlemen who were sick, had dined upon partridge, whilst he had partaken of a different dish, and that the one whose symptoms were the worst, had eaten more of the partridge than the other, and the symptoms began to develop themselves in both gentlemen, very

nearly at the same time, about forty minutes after the commencement of their dinner.

Finding no source of poison in any thing else that had been partaken of by them, I naturally inferred that it was obtained from the partridge. How did it get there? Happening to be a long winter, when there had been seven weeks of continuous snow, and the ground constantly covered, these birds had been prevented from obtaining their ordinary food, and had been compelled to feed upon the berries of the laurel; therefore, their flesh had become charged with the potent poison of prussic acid, which in a minute quantity, is found in the berry of the laurel. Then looking at the characteristic symptoms presented, paralysis of the heart, dilated pupil, peculiar weak faintness, and yet the clear intellect indicative of prussic acid, cause and effect were rightly understood; and by administering the antidote of prussic acid, both gentlemen were speedily restored to perfect health.

Take another case, as an example of the necessity of an accurate knowledge of chemistry, as well as anatomy and physiology, and the influence of poisonous drugs upon the general system. A person affected with paralysis of the exterior muscles of both fore-arms, supposed to have been dependent upon a disease of the spine, and for which she had been treated with a spinal brace, which she had worn for two years, and described by a recent author, as a case of "carnomania" or "insanity of the flesh," if any of any one knows what that means, came to me a short time since.

She had been treated for disease of the spine; a brace had been supplied, and she had been assured that the paralysis of the arms would be removed in two or three months, or at all events in a very short time, so soon as the disease in the spinal column had been cured. She was sent to her distant home, and for two long years has worn the spinal brace, with still increasing deficiency of the power of the fore-arms, until within the last few months; she had become perfectly paralyzed, and was helpless, unable to pin her clothes, comb her hair, or feed herself, or indeed do any thing else, than simply to close her fingers. Upon making a most careful investigation of the case, I could find nothing of disease in any part of the body that would justify this peculiar condition of the fore-arms, except the potent influence of the poisonous power of lead.

The peculiar characteristic of lead poison is, that the hands drop, and are incapable of being extended, although the power of flexion exists. We have other varieties of paralysis, attacking different limbs; but there is no other characteristic paralysis of the hand that simulates the action of the lead. I gave it as my diagnosis, that this was a case of lead palsy. The next question was to ascertain how the lead got there. It is a common thing in New York, where we drink water through leaden pipes, to see these cases. Others are poisoned by drinking champagne from bottles that have been washed with leaden shot, and the lead left in the bottle.

In this instance no lead had been obtained in that way; the mother stated that the water was brought from a spring, kept in a bucket, and drank from a gourd. I wanted to know if the house had been painted recently. No; "she had not been exposed to lead in any way." So, I was unable to ascertain any source from which lead could be obtained. I found the lady had ridden a horse which had run off with her for some distance, one or two miles, and she was disposed to attribute the loss of power to excessive muscular action. Still the peculiar characteristics of lead being so marked, I could not give up my hunt for the poison, which had been, in some way, so insidiously introduced. After two or three days of close questioning, the lady very innocently asked me "if whiting would do it." When I asked her what it was, she handed me a beautiful little bottte and said "it was this," and on looking at the label I found it was "Laird's Bloom of Youth," a cosmetic, which you will see advertised on all the curbstones, which had been used upon the face, and here was the practical result. Taking the bottle to Prof. Doremus, I received an analysis the following day, stating that it was highly charged with lead. I immediately administered to her the proper antidote for lead. And collecting some of the secretions for a number of days, gave them also to Prof. Doremus for analysis. And I am happy to state that distinguished chemist has presented to me a specimen of the lead in its metallic form, obtained from these secretions; thereby fully corroborating the accuracy of my diagnosis, and the correctness of the treatment. As the lead is being eliminated from the body, I am happy to state that muscular contractions are returning to the paralyzed limbs; and thus ends our case of "carnomania."

This case shows you the necessity of an intimate knowledge of chemistry, and the superior advantage of its appreciation, in the removal of disease, as compared to the plan of mechanical support. It might, in fact, be called a case of lead *versus* steel. The lead to paralyze, the steel to support; and as soon as the lead is removed, the steel is not required. — *Prof. Sayers.*

PEPSINE IN DIPHTHERIA.

In the December number of the Richmond and Louisville *Medical Journal*, is a most interesting communication from Prof. Doughty, of the Georgia Medical College at Augusta, Ga., describing the treatment of a case of false membrane from diphthéria with an acidulated solution of pepsine. We have only room for a synopsis of the case.

Having first tried cauterization with nitrate of silver, and a gargle of chlorate of potash, then tincture of iodine diluted, in place of the chlor. potash, then both, and finally inhalations of atomized lime-water without success, the membrane continuing to form and the general symptoms aggravated, Prof. D. abandoned them all and ordered the constant application, by means of a hair pencil and atomization, of the following wash: —

℞ Pepsine (Boudault's)	ℨj
Muriatic Acid dilute	gtts x
Water Q. S. to make	℥ iij m

The compound was filtered to separate the insoluble starch with which the pepsine is incorporated, and the Professor adds in a note, —

"Boudault's preparation of pepsine is made from the stomach of the calf; perhaps that of Bullock's, made from pigs' stomach (pepsina porci) would be best. If substituted for the above it will require not more than 15 grains, as it is said to be four or five times stronger. Again, lactic or phosphoric acid may be preferred by some; if so, only a slight excess of free acid is needed, and either of the several acids (muriatic, lactic, and phosphoric) might be used. Perhaps the lactic is the best, as recent investigations indicate that as probably the free acid found in the stomach during digestion."

In this case the patient died, but not till the false membrane had entirely disappeared, being coughed up in lumpy masses partially dissolved, death taking place apparently from constitutional depression, and not until sufficient time had elapsed to prove the success of the local measure.

Hypophosphite of Lime in Abscess. — Dr. W. S. Searle (*N. E. Med. Gazette*) has cured many cases of superficial abscesses, vulgarly called "cold boils," by a treatment of hypophosphite of lime. Dose, in very violent cases, as large as five grains every three hours. It will not do to use it in acute abscess attended by fever, at least not in so low a preparation; but in torpid, scrofulous abscess, it will, he thinks, always prove efficient.

FREE HYDROCHLORIC ACID IN THE GASTRIC JUICE.

At the meeting of the American Association for the Advancement of Science, held at Chicago on the fifth of last August, Prof. E. N. Horsford, of Cambridge, Mass., read a paper on "The Source of Free Hydrochloric Acid in the Gastric Juice." He said the long-disputed position of Prout, that the gastric juice contains free hydrochloric acid, was at length established by Schmidt, who, in an absolute quantitative analysis of the juice, found about as much hydrochloric acid as was required to neutralize all the bases present. The prolonged discussion of this subject, now since 1823, has brought to light, through the researches of Lassaigne, Tiedemann and Gmelin, Berzelius, Lehmann, Cl. Bernard, Blondlot, and numerous others, the unmistakable evidence of the presence of lactic acid and of acid phosphates in the gastric juice, which might or might not be due to the presence of lactic acid or hydrochloric acid. A point of special interest to the chemist and physiologist still remained, and was this: How could free hydrochloric acid be secreted from the blood, which is an alkaline fluid? This question was submitted to experiment with entirely satisfactory results.

The blood freshly drawn consists of a fluid (the plasma) in which there are swimming about myriads of exceedingly minute irregular spherical bodies (the corpuscles). The plasma consists of two bodies, one of which, the fibrine, spontaneously separates from the other, the serum. The corpuscles are little sacs of delicate animal membrane inclosing a fluid. This fluid has an acid reaction, and its ash contains a monobasic alkaline phosphate. The fibrine of the plasma contains a monobasic phosphate of lime, though the plasma, as a whole, has an alkaline reaction, and contains a great excess (11 per cent) of chloride of sodium (common salt.)

The moist corpuscles constitute about one half of the blood.

The relations of the fluid within the corpuscles to the plasma which surrounds them, is the same as that of the yolk to the white of the egg, and the ratio of fixed base to phosphoric acid is alike in both cases:

1 : 1 in blood corpuscles,
1 : 1 in egg yellow.

The ash of albumen contains nearly one third of its phosphoric acid as monobasic phosphate (3.79: 1.15), according to Poleck, while the same analyst gives for the analysis of the yellow 66.70 per cent of phosphoric acid, of which 41.33 per cent are free. (*Liebig's Jahrs Bericht*, 1850, p. 559.)

Under pressure, the fluid contents of the corpuscles pass through their membranous walls, and through the walls of the nutritive capillaries. Such pressure exists when the bloodvessels of a particular organ are engorged, as the bloodvessels of the stomach always are in healthy digestion. Under such pressure, the areolar tissue under the mucous membrane is charged with the mixed fluids of the corpuscles and plasma. This mixture contains, therefore, acid phosphates and chloride of sodium.

The mucous membrane of the stomach presents on its inner surface the mouths of numerous microscopic tubes, which, like a stocking, are sometimes single fluid sacs, or, like a glove, terminate in several fluid sacs, like the glove fingers. In the bottoms of the tubes and along their sides are several closed, spherical sacs, containing other lesser sacs and fluid within.

The tubes, as a whole, dip down into the spongy tissue that underlies the mucous membrane, where they are surrounded by the fluid poured from the surrounding rich work of nutritive capillaries, which fluid contains acid phosphates and chlorides.

Now by pressure and osmosis, a portion of this fluid will pass through the wall of gastric tubes, and the question is whether the fluid that goes through will contain free hydrochloric acid.

The experiments I have made are conclusive on this point.

By employing acid phosphate of lime and common salt, I had this advantage, that as increased acidity on the one hand is a just inference from increased alkalinity on the other, and as increased alkalinity would be shown by the precipitation of phosphate of lime — a visible white powder — I could determine the qualitative fact without the difficulties and delay attendant on accurate quantitative analysis of the solutions before and after the refinement, on both sides of the membrane.

With acid phosphates of lime in my earlier experiments, I was embarrassed with the presence of sulphate of lime in the powder, so that what was at first supposed to be pure phosphate of lime, was found to be in part sulphate of lime. This sulphate was due to imperfectly washed parchment paper, employed as a dialyser. This difficulty overcome, the experiments were made with parchment paper prepared from German and Swedish filter paper, as well as with goldbeater skin.

I employed acid phosphate of lime successively with chloride of sodium, with chloride of potassium, with chloride of ammonium, with chloride of calcium; with all of which there was the same kind of evidence of increased alkalinity on one side, and of course corresponding increased relative acidity. The same effect took place on the other with acid phosphate of soda and chloride of calcium. It follows, then, from what we know of the composition of the blood, its condition in the walls of the stomach, and the structure of the gastric tubules, that free or uncombined hydrochloride acid must find its way into the sacs at the bottoms of the tubules. It is of course mixed with acid phosphates and alkalin

chlorides. The sacs at the bottoms of the tubules, by a secondary dialysis, concentrated the acid solution. Swelling by endosmosis, and corroded by the acid and juice, at length they burst, and the liquid contents, together with the disintegrated and partially digested membrane of the sacs, pass out to the stomach to constitute the gastric juice — the free hydrochloric acid and the disintegrated tissue (the pepsine?) to act in the liquefaction of the food.

CARBOLIC ACID.

Editor of the Boston Journal of Chemistry: —

Your remarks, in the last number of the *Journal*, on carbolic acid and the duty of calling the special attention of physicians to this important agent, that a clear understanding of its nature and the character of its solutions may be secured, appear appropriate and important. I could wish that the terms of that, and some other articles, were better understood and used with more precision. Permit me, in the interest of the public welfare, to mention, through your *Journal*, a recent case that may illustrate, somewhat, the importance of the subject.

The writer of this note received a prescription for two ounces of "carbolic acid," without any qualification. Learning that it was to be mixed with linseed oil by the patient or by the attendant, the carbolic acid, in liquid form, was put up, in precise compliance with the prescription. It was not satisfactory to the physician, and was set aside, and a "*solution of carbolic acid*" procured. This was *the article intended* by the prescription. It contains, as stated in the *Journal*, precisely *five* per cent of pure acid, being a very different article from "carbolic acid" of about *ninety-five* per cent.

If the physician had required camphor water he would not have written for camphor, nor should he have ordered carbolic acid when he intended the aqueous solution of carbolic acid.

Certainly, in dispensing an agent of such potency as that under consideration, the apothecary should not be left to conjecture the intentions of the physician. The question of safety in the use of that article as in others, usually, is not cognizable by the apothecary, excepting, of course, obvious mistakes, should such occur, and there appears no safe or proper rule but to follow strictly the directions of a written prescription.

I have, not unfrequenetly, within a few months, dispensed carbolic acid in liquid form, as well as that in form of crystals, in obedience to the prescriptions of intelligent physicians. With the more prominent and reliable apothecaries in Boston, the usual practice is when carbolic acid is required, and when he is guided only by what appears on the face of the prescription, to furnish the article in the form of crystals.

This remedy having been so recently introduced into use, it is not surprising that its exact nature is not fully understood by all, and that its different terms should sometimes be confounded. J. L. H.

HINGHAM, Nov. 1868.

DR. LEMBKE ON COPPER. — Touissart relates, in the *Wiener Wochenschrift*, that laborers in verdigris are colored green, even to the bones, and yet enjoy good health. Second, that no combination of copper corrodes the mucous membrane of the stomach; for even nursing babies take, in croup, several grains of salts of copper without any detriment. Third, all salts of copper, with the exception of the innocuous sulphite of copper, produce only vomiting and purging. Fourth, during a longer sojourn in the body, they change to sulphite of copper and albuminate of copper, but not to acetate of copper. Fifth, it is not certain, yet, in which form they get excreted through the kidneys. Sixth, fatal cases of poisoning by copper have never been observed. Seventh, copper colic and chronic copper diseases are found in books, but not in reality. Eighth, workers in copper are, next to workers in iron, not only the most healthy laborers, but in general enjoy good health.

Still, in spite of all these remarks, manifold experience has shown that a substance may produce on the healthy only insignificant manifestations, pointing to certain diseased states, and yet be able to have great remedial power against the established and seated disease; as cuprum for cholera, nervous diseases, etc. We prefer the cuprum aceticum to the metallicum.

THE MARRIAGE AND DEATH-RATE.

It is a curious and instructive fact, that out of every 100,000 married persons (including widowers) at the age of 20, 626 die before attaining the age of 25, while out of a similar number of persons unmarried at the same age, no less than 1,231 die before attaining the age of 25. The following table, founded on the vital statistics of Scotland, shows the comparative death-rate of married and unmarried males from 20 to 85: —

Ages.	*Husbands and Widowers.*	*Unmarried.*
20 to 25	6.26	12.31
25 to 30	8.23	14.94
30 to 35	8.65	15.94
35 to 40	11.67	16.02
40 to 45	14.07	18.35
45 to 50	17.04	18.35
50 to 55	19.54	21.18
55 to 60	26.14	28.54
60 to 65	35.63	44.54
65 to 70	52.93	60.21
70 to 75	81.56	102.71
75 to 80	117.85	143.94
80 to 85	173.88	195.40

Dr. Stark, the Register-General of Scotland, infers, from these figures, that "bachelorhood is more destructive to life than the most unwholesome trades, or than residence in an unwholesome house or district, where there never has been the most distant attempt at sanitary improvement of any kind." We do not question the opinion that matrimony may, in a thousand ways, exercise a healthful influence on the human race, by ennobling its habits and enforcing sobriety, etc., but we think Dr. Stark exceeds the legitimate conclusion consequent on the premises. It must be remembered that married men are generally of a more robust and healthy constitution than bachelors, who frequently are deterred by ill-health from undertaking the support of families. This important element in the calculation has been forgotten by Dr. Stark and reasoners of his class. — *World.*

ORIGIN OF HEPATIC SUGAR.

DR. NICHOLS. — Dear Sir: I hail the monthly visit of your journal as that of a scientific friend, and never fail to find something in it of great interest. May I hope to see in the next issue of it, a solution of the following surmise, in reference to the origin of hepatic sugar — "glycogene," as it has been called. This substance is supposed by leading authorities on physiology to be similar to glucose, or the sugar of starch, and to be formed from amyloid substances in the blood or in the tissue of the liver. I am inclined to take a different view of the matter, and beg your opinion of it. In its more prominent mechanism, the liver is a bile making organ; it is moreover, *incidentally*, a syrup making organ, and the latter action I look upon as a mere result of the former, in this way. In its main constitution bile is a liquid soap, formed by a combination of a fat-acid, choleic acid, as it is called, and soda. The materials are supplied by the circulating fluid and chemically combined by the cell development of the liver. The fat is probably but the ordinary combination of stearine, magarin, and elain with glycerine; and in the formation of bile, as in ordinary soap-making, the fatty principle is released from its sweet base, becomes a fat-acid and combines with soda, forming a saponaceous solution which is poured out by the hepatic ducts, while the emancipated glycerine, or the most of it, flows out with the blood through the portal veins. The tendency to form this soap is so strong in the cell action of the liver, that even when drained of its blood, the formation of the soap goes on out of the substance of the liver itself, which contains both the fat and the soda; and of this action, the formation, or rather separation, of the sweet principle is but the natural result.

Respectfully, PHILIP HARVEY, M.D.

DR. J. G. PINKHAM, of Lynn, Mass., tells in the Boston *Medical and Surgical Journal* that he cured a case of chronic catarrh of twelve years' standing, by a simple douche of water and common salt. The douche was blood warm and the salt in the proportion of one half an ounce to two quarts of water. At first, the patient suffered from pain in the back of the head during the operation, but after a time that ceased; and after two months of daily application, all symptoms of the disease disappeared.

ADULTERATION OF CREAM TARTAR AND SODA.

DR. NICHOLS. — Dear Sir: Thinking that the *Journal* has a larger circulation among families than any other of the kind, I wish you would give some practical directions for detecting impurities in *Cream Tartar* and *Soda*, articles which many will persist in using, in spite of their known deleterious influences upon health. Inclosed I send you a sample of *Cream Tartar*, which has produced (in my own practice) seven or eight cases of serious *colitis*, followed by bloody evacuations. These cases occurred after eating pastry in which this cream tartar was used. In all of these cases the *colitis* ensued in about *six hours* after meals. Please answer through the next number of your *Journal*, and oblige, yours truly,

GEORGE D. STANTON, M.D.

STONINGTON, Conn., Dec. 5th, 1868.

NOTE. — The substance sent to us with the above proved, upon analysis, *not* to be bitartrate of potassa, or cream of tartar, but a *mixture of phosphoric acid with starch*. It is almost or quite impossible to procure through the ordinary sources of supply pure cream of tartar, or, indeed, any other of the substances or condiments used in households. If cream of tartar is adulterated with flour or starch, a drop of a weak solution of iodine instantly detects it by affording a deep-blue reaction. If it contains ground pumice-stone or rice, hot water turned upon it takes up the salt, and leaves behind the insoluble impurities. It is seldom that *poisonous* admixtures of cream of tartar are found in the market.

SALTS OF MORPHIA. — We have been engaged, for several months, in perfecting arrangements for supplying to our wide circle of medical friends and druggists, the *pure salts of morphia*, of our own brand. We can probably furnish the sulphate, acetate, muriate, etc., of morphia, of *very superior quality*, by the middle or last of the present month of January. All the alkaloidal and acid principles of opium, in their utmost purity and excellence, we shall be able to supply in any quantities desired. Our list of reliable therapeutic agents, we intend to make as extensive and complete as possible, to meet the pressing demands constantly made upon us.

J. R. N. & CO.

COD-LIVER OIL WITH HYPOPHOSPHITES OF LIME AND SODA. — The attention of physicians is called to the advertisement of this valuable combination, which will be found upon tenth page of the *Journal*. The association of pure cod-liver oil with the hypophosphite salts meets with the approval of a large number of our most distinguished medical men.

THE FUNGUS THEORY OF DISEASE. — In a short communication to the *Centralblatt*, Drs. Bergmann and Schmiedeberg describe a crystalline substance, to which they have applied the name "sulphate of sepsin," obtained from putrefying materials, and which they believe represents the proper poison of organic substances undergoing this kind of fermentation. It is obtained, says the *Lancet*, by diffusion through parchment paper, precipitation with corrosive sublimate from an alkaline solution, removal of the mercury by silver, of silver by sulphuretted hydrogen, evaporation, and purification of the residue. Large, well-defined, acicular needles are thus obtained, which are deliquescent in the air, and, exposed to heat, melt and carbonize. They possess a powerfully poisonous action. A solution containing scarcely more than one hundredth of a gramme was injected into the veins of two dogs. Vomiting was immediately induced, and after a short time, diarrhœa, which in the course of an hour became bloody. After nine hours the animals were killed, and on examination their stomachs and large intestines were found ecchymosed and the small intestine congested. Frogs could be killed in the same manner.

IRON REMEDIES.

A considerable knowledge of chemistry is requisite in order to understand how and when to prescribe and take remedies. This is especially true of the metals and their salts. Preparations into which iron enters as a constituent in any form should never be taken upon an empty stomach. Quacks have a stereotype way of directing that their bitters and decoctions should be taken "half an hour before meals." Many invalids, unless specially directed by their physicians, commence to take iron at such periods, and are greatly distressed in consequence. We have known this class of agents to be thrown aside when the patient greatly needed the remedy, because it was taken at improper times, and caused disturbance. Iron should not be taken fifteen, ten, or even five minutes before meals, but during, or immediately after. It will then be mingled with the food, and go through the process of assimilation in connection with it.

It should not be taken with any meal at which tea is used, as the tannic acid of the tea promotes decomposition, and forms in the stomach tannate of iron, which is *ink*. Physicians cannot be too careful in directing patients how and when to take the preparations of iron.

Apoplectic Tendencies.—It is a delusion, that persons of a certain configuration are prone to apoplexy. It is said that the pattern of body which is most prone to apoplexy is denoted by a large head and red face, shortness and thickness of the neck, and a short, stout, squat build. A man with a red face has no more blood in his brain than another; it is a mere idle fancy. It is the associating two things together in our imagination which have no real connection. Apoplexy is a pouring out of blood in the brain from a ruptured vessel. The person in whom the vessels are diseased is the one in whom apoplexy is most likely to occur. Such a person is often pale and thin, with a long neck.—Dr. Samuel Wilks, *in the Medical Times and Gazette.*

Danger Arising from the Exhalations of some kinds of Fruit.—It is a well known fact that the perfume of some kinds of flowers is injurious to health, and even causes death, if flowers are kept in a confined space frequented by men at the same time. One of the local papers of the city of Lyons now records the fact of death by asphyxia, suffered by a lady who slept in a room wherein a large quantity of quinces were kept. According to scientific evidence, given in this instance, the air of the room was largely vitiated with a peculiarly suffocating perfume, and a very considerable amount of both carbonic acid and carbonic oxide gas. The room in question was always used as a bed-room; no fire had been lighted in it, nor was any other discernible cause for the death of this lady found but the exhalations of the fruit.

Microscopic Germs in the Air.—An interesting experiment was recently tried at the Manchester (Eng.) Royal Infirmary. An ounce of distilled water in a pint bottle was thoroughly ærated with the atmosphere of one of the wards, until, from being transparent, it had become slightly opalescent. In the deposit thus thrown down, after forty-eight hours, distinct evidences of the presence of organic life were perceptible under the microscope; and on the fifth day there were numerous actively moving vorticelli, with abundance of monads in ceaseless motion. From this it may be inferred, if the same experiments were repeated under varying circumstances, it might be shown that the presence in the air of microscopic organic germs is a constant condition easily detectable.

Sulphate of Nickel in Neuralgia.—Palmer, in *The Medical Record*, No. 56, Vol. 3, 1868, reports a cure with this remedy. The disease had resisted treatment for three years, and during the last two months had become very severe. Half grain doses were given thrice daily, and in eight days the paroxysms were reduced to one in twenty-four hours. With this amelioration of the disease, the pulse diminished in frequency, and sound sleep was procured. The medicine was then continued until a perfect cure was effected.

ADULTERATION OF MEDICINES.

"There is no species of fraud so universal as that which, prompted by a sordid desire after filthy lucre, cheats mankind out of life and health."

Such was the expression of a writer who, more than a score and a half of years ago, published "Notes on Falsifications and Adulterations," hoping thus to prevent the sale of imprue drugs and medicaments.

Any one examining the present condition of the drug market, will readily come to the conclusion, that the attempts to falsify and adulterate have since then rather increased; for it has become almost as difficult to procure reliable medicines as it is impossible to discover the philosopher's stone. Under these circumstances, it is a duty to expose such frauds, in order to enable those who are interested to protect themselves against them. With this view, I propose to publish, from time to time, in these columns, such adulterations as have come to my notice in the Chicago drug-market. I am convinced the honest druggist, who strives to offer nothing but reliable goods to the public, and the physician who naturally expects certain results from rationally prescribed medicines, will assist me in my efforts.

Epsom Salts.—There is a large quantity of a spurious article in the market, which is nothing more than finely crystallized glauber salt. It does not contain a trace of sulphate of magnesia. It may be recognized by the circumstance that it is perfectly free from bitterness to the taste, and that its aqueous solution produces no precipitate on adding first phosphate of soda and afterwards aqua ammoniæ.

Sal Rochelle.—An article purporting to be sal rochelle is now offered for sale, which contains at least 25 per cent of sulphate of soda. This can be discovered by adding to a somewhat dilute solution of the suspicious salt a few drops of a solution of either nitrate of baryta or chloride of barium, and afterward c. p. nitric acid. The precipitate produced by the baryta salt must disappear on the admixture of the nitric acid if the salt is pure.

Vienna Glycerine.—I had occasion to examine this really beautiful-looking article, and found it contaminated with sulphate of lime (gypsum) and chloride of sodium (salt). It contained also considerable quantities of sugar.

The presence of the sulphuric acid of the gypsum can easily be made manifest, by adding to one sample a few drops of a baryta salt solution, and afterwards diluted nitric acid; that of the lime, by admixing to another sample a solution of oxalate of ammonia. The chlorine of the salt is discovered by the appearance of a white precipitate on the addition of nitrate of silver solution.

It is a little more difficult to demonstrate the fradulent admixture of sugar. In order to do so, it is necessary to add about fifteen or twenty drops of diluted sulphuric acid to two or three drachms of the glycerine, previously diluted with its own bulk of water. This mixture is boiled over the spirit lamp for several minutes, when it is allowed to cool down. It is then mixed with a few drops of a solution of sulphate of copper, and as much caustic potassa (liquor potassa) as is neccessary to redissolve the blue precipitate which at first made its appearance. The whole is then gently heated over the spirit lamp, when a copious brick-red deposit of suboxide of copper is thrown down. Pure glycerine will, under such treatment, not produce these phenomena.

Black Sulphuret of Antimony.—A quantity of powdered black sulphuret of antimony, purchased from one of our wholesale houses, was boiled with hydrochloric acid, in order to prepare the officinal "solutio antimonii terchloridi" (butter of antimony). It was but incompletely acted on, and the solution, after cooling, was filled with numerous crystals, which on examination were recognized as chloride of lead. A portion of the black residue not taken up by the hydrochloric acid was also examined; it consisted mainly of sulphuret of lead (galena).—F. Mahla, Ph. D.: *The Pharmacist* (*Chicago*).

SUICIDE BY CHARCOAL.

A contemporary mentions that a Paris periodical states that "suicide by charcoal fires in a close room [would it be possible in an open room ?] is purely a literary invention, first used by M. Crosnier, in a drama produced in 1825;" adding, "Since then, it has been the fashion for working-girls bent on self-destruction to accomplish their end in this way." This statement is ridiculous, suicide by charcoal fires being one of the "sad sentences of an ancient date" passed by unfortunates on themselves before the beginning of the Christian era; and it was one of the many modes of self-destruction resorted to by classic ladies and gentlemen who left the world "after the high Roman fashion." The story that Porcia, daughter of Cato and wife of Brutus, filled her mouth with coals from a burning brazier, and so died, after the defeat and death of her husband at Philippi, means that she inhaled the fumes of charcoal. This was more than nineteen hundred years ago; and, more than forty years earlier, Quintus Lutatius Catulus, one of the victims of Marius, committed suicide "by swallowing fire" (*ignis haustu*), according to Florus; but Velleius Paterculus says that he "shut himself up in a place lately plastered with mortar, had fire brought in to raise a strong smell, and then, by inhaling the noxious vapor, and holding in his breath, he found a death agreeable to his wishes," etc. No one could swallow fire; and the statements that Catulus and Porcia did so are as absurd as the story that Cranmer stood up and coolly put his "wicked hand" in the flames till it was burned before his body was consumed,—a proceeding utterly impossible in any man, and not to be thought of in the case of so weak-nerved a man as Cranmer was throughout life, and which, had it been possible in him, his enemies would not have allowed him to do; for the offence of which the archbishop's hand had been guilty was committed at their persuasion. In modern times, deaths by inhaling the fumes of charcoal, as well accidentally as purposely, occurred long before 1825; and, as this form of death is painless, it is a favorite with self-killers. That women resolved on dying should prefer it, is natural; for the sex have strong ideas on decorum, even in death; and thus to die, leaves the features undistorted, and the body as if the suicide were in the enjoyment of a profound and dreamless sleep,—as, in one sense, it is. Persons who have been accidentally smothered by the fumes of charcoal, and then resuscitated, say that they had no more recollection of what happened to them than men have of the process of falling asleep.

Vaccine Virus from Kine.—Arrangements have been completed by which we are able to furnish physicians pure vaccine matter from kine. The heifers from which the crusts are obtained belong to herds owned in the country, and none are vaccinated not perfectly sound and healthy. The crusts are secured while fresh, and inclosed in hermetically sealed packages, and will reach the physician in perfect condition. Price of a whole crust $3.00; half a crust $2.00. We can also supply vaccine matter from perfectly healthy children. Price of whole crust $2.00; half do. $1.50.

Physicians, by inclosing to us the money for a whole or half crust, will receive the virus by return mail; and the utmost reliance may be placed upon the statement that it is procured from the purest sources.

Two more beautiful frescoes have been found at Pompeii, supposed to be portraits of the master and mistress of the house in which they were discovered. The woman is represented as seated, and preparing to write. The frescoes have been sent to the museum at Naples.

Hippophagy has not met with success in Paris. The government was willing; the *savans* urged the people to eat and set the example; the storekeepers added horse-flesh to their stock; but customers were lacking, and there are indications that the movement will be abandoned.

Nitrate of Amyle in Nervous Pains.—Inhalation of the vapor of nitrate of amyle has been known to cure some of the worst of nervous pains, such as tic-douloureux, sciatica, etc.

Blood Soups.—A writer in the *Medical Times and Gazette*, strongly recommends blood soups as far more nutritious and supporting than those made from the ordinary extracts, in cases of exhaustion from typhoid fever and other prostrating diseases.

At a meeting of the London Medical Society, Dr. Blake, a distinguished practitioner, said that he was able to cure the most desperate case of toothache, unless the disease was connected with rheumatism, by the application of the following remedy:—Alum, reduced to an impalpable powder, two drachms; nitrous spirits of ether, seven drachms; mix, and apply to the tooth.

Directions for Using Cod-Liver Oil.—Dr. C. J. B. Williams, a high authority on phthisis, says that the best time for the administration of the oil is immediately after, or, to those who prefer it, at or before a solid meal, with which the oil becomes intimately blended, and is less likely to rise by eructation than when taken upon an empty stomach. The dose of oil should rarely exceed a tablespoonful twice or thrice daily; when a larger amount is taken at a time, it generally either deranges the stomach or liver, or some of it passes unabsorbed by the bowels. In conclusion, Dr. W. says that, in many cases of consumption, life may be prolonged for many years in comfort and usefulness; and in not very few cases, the disease is so permanently arrested that it may be called cured.

Effects of Tobacco Smoking on Children.—The usage of smoking tobacco by children causes paleness, loss of flesh, palpitation of the heart, derangement of the digestion, and all the symptoms of impoverished blood. No treatment is effectual as long as the habit is continued. The intelligence is diminished, and a tendency to strong drink excited. These symptoms disappear, where there is no organic lesion, with the discontinuance of the habit. In twenty-seven out of thirty-eight cases observed in children between nine and fifteen, some or all of these symptoms were observed.—Dr. E. Ducaisne: *Gazette des Hôpitaux.*

Cough Mixture in Chronic Bronchitis.—Flint.

℞ Linseed oil........................ 1 oz.
Simple syrup........................ 1 oz.
Fl. peppermint........................ 2 to 4 drops.

M. Two teaspoonfuls three times a day.

Carbolic Acid Collyria.—Dr. Markey, in the *Lancet*, recommends the following formula in purulent ophthalmia:—

℞ Carbolic acid........................ 1 drop.
Glycerine........................ 5 drops.
Rose-water........................ 1 oz.
M.

Dr. Gadberry's celebrated tonic is prepared according to the following formula:—

℞ Pulv. sulph. of iron........................ ʒj.
Nitric acid........................ f. ʒj.
Sulph. of quinine........................ ʒij.
Citrate of potash........................ ℈ij.
Cinnamon water........................ f. ℥viij.

M. Put the acid and iron together, add the quinine gradually, and then, having previously dissolved the potash in water, mix all well together.

S. A teaspoonful every four hours.

Dr. McGugins's treatment for epilepsy is worthy of reproduction:—

℞ Hydrocyanate of iron........................ ʒj.
Powdered valerian........................ ℥ij.
Extract of Indian hemp........................ ʒj.

M. 120 pills.

S. One pill three times daily, gradually increasing to four.

Dr. Weigenheim, of Berlin, gives the following formula for administering ipecac:—

℞ Pulv. ipecac root........................ gr. iij.
White sugar........................ ʒij.

M. Twelve powders.

S. One powder every five minutes until vomiting is produced.

Dr. Bemiss recommends the following in acute alcoholism:—

℞ Bromide of potash........................ ʒss.
Tinct. of lupulin or hydrociamus........................ f. ʒj.
Water........................ f. ℥j.

M. S. The whole at one dose.

BOSTON JOURNAL

OF

CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. III.—No. 8.] BOSTON, FEBRUARY 1, 1869. [ISSUED MONTHLY, AT FIFTY CENTS PER ANNUM.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Science.

MOUNT VESUVIUS.

A very general waking up of the slumbering volcanic forces of our planet characterized the year 1868, and rendered it remarkable for mutterings and thunderings, and overflow of lavas at all the great volcanic centres. Mother Earth, we suppose, must have her gripes and colics at certain periods, and the points of discharge or relief at such times, afford scenes of grandeur and sublimity, as well as of terror, which have no parallel in any of the operations of nature. Vesuvius and Ætna have been greatly agitated. We happened to visit Vesuvius shortly after the great eruption of May, 1855, and a danger was experienced not soon forgotten. During this eruption a new crater was formed upon the side of the mountain, towards Monte Sommo, at a point some two hundred feet below the great central abyss of fire. From this orifice an immense mass of molten lava flowed out, and running down the side of the mountain reached its base, and spread itself out upon the beautiful campagna, burning and destroying every living thing, over an area many miles in extent. At the time of our visit, the lava was still glowing and smoking in its rocky bed a mile from the point of its emission. A solid crust, resembling ice formed upon water, and from which the liquid had been drained away, was observable for a long distance. Over this crust we were compelled to pass several times, and through orifices, the fiery liquid was seen reposing below. Cooled lava is a very imperfect conductor of heat, and when a mass has cooled or solidified upon its surface, the interior may remain liquid for many months. The scene of utter desolation, the burning, fusing, calcining effects observable in the region of a volcanic vent recently excited, is almost painful to the eye and depressing to the mind. A horrible blackness of darkness overshadows every thing, and the visitor is in a sea of cinders, dust, lava, pumice-stone, and sulphur. A most welcome relief are the green fields, and orange groves, which are passed on the return to Naples from Vesuvius.

In ascending to the edge of the great crater, we turned aside to examine the smaller one opened a few months before. It was in a state of comparative quiet, and it was possible to climb up the ragged lava formed rim, and look directly down into the horrible cavity. It resembled a huge chimney, connected with a smelting furnace, and from it there was issuing smoke and suffocating gases. A detached mass of solid lava rested upon the edge; this was toppled over, and went thundering down into the bowels of the mountain. Out of this orifice, not more than ten feet in diameter, the great river of lava had flowed, which caused so much damage. The great crater or vent was still considerably agitated, and explosions were occurring which caused the cone to tremble to its base. Large stones, or fused masses of lava, were thrown high in the air, and in the curves described they fell far up towards the outer edge of the crater. It was evidently unsafe to venture far while this unusual agitation continued; nevertheless, our guide was prevailed upon to attempt to take us around to the opposite side of the crater, that a better opportunity might be had for observation. In this attempt we narrowly escaped death, from causes similar to those which caused the death of Pliny the elder, in A.D. 79, at the time of the great eruption which destroyed Herculaneum and Pompeii. Not more than a third of the distance had been gone over, when, by a sudden change of wind, the vast column of smoke, gases, and cinders settled down upon us, and we were instantly plunged in midnight darkness. The vapors were charged with the most dreadful gases; sulphurous, sulphydric, carbonic acids, and carbonic oxide, and there was danger of instant asphyxia. Placing handkerchiefs over our mouths, we lay down upon the cinders, hoping the cloud would lift and free us from its embrace of death. Fortunately in a space of time which seemed an age, but which was probably not more than a single minute, it rose, the light came; gasping and faint we managed to drag ourselves to a point of safety. Nausea and vomiting followed, but no permanent injury was sustained. During the time we were immersed in the cloud, the acid gases, acting upon a silk hat, changed it to a bright red color, and some portions of the clothing were similarly changed. This experience may serve as a caution to those disposed to be too venturesome, in exploring volcanoes, at a time of unusual agitation.

THE NEBULAR HYPOTHESIS.

Everybody has heard of the Nebular Hypothesis of Laplace, the great French astronomer; but we presume that the great majority of non-scientific people have a very vague notion of the famous theory. We will endeavor briefly to sketch its main features, and to show its connection with some of the facts and theories which we have given in our little series of articles upon the nature, origin, and conservation of force.

According to Laplace, the material of our solar system was once a nebulous mass, of extreme tenuity; and the sun, moon, and planets were formed by its gradual condensation. Let us suppose such a nebulous mass slowly rotating, and gradually cooling by radiating its heat into surrounding space. As it cools, it must begin to contract; and as it contracts, it must rotate more rapidly, since the matter at the surface must be moving faster than that which is nearer the centre, just as the rim of a wheel moves faster than the hub. It will thus go on contracting, and rotating with increasing velocity, the centrifugal tendency becomes so great that and gravity can no longer hold it together. W hardly refer to the familiar illustration of this tendency which we have in turning a commo stone faster and faster, until the water can

adhere to its surface, but flies off in all directions. In the case of our whirling nebulous mass, a ring of matter would be detached from the circumference, and would continue to rotate by itself. The central mass still goes on shrinking, and turning with ever-increasing speed, until it throws off a second ring; and thus ring after ring is detached, and all these rings continue to rotate round the central mass, in the same direction. But the rings themselves would keep on condensing, and, at last, they would be likely to break up, each forming one or several globular masses; for into this form the matter of the fragments of the ring would, by a simple law of attraction, gather itself. These globular masses would, of course, all revolve about the central mass, in the same direction, and their condensation would cause them to rotate on their axes; and it has been proved that (with the exception of one or two of the outer ones) they must all turn on their axes in the same direction in which they revolve in their orbits.

But, as these masses condensed, their rotation would be accelerated, and they would be very likely to throw off rings, which would either remain as rings, or break up and gather into secondary masses revolving about their primaries.

The central mass, of course, forms the sun; the rings which it throws off become the planets; and the rings whirled off from the planets constitute their moons. In the case of Saturn, a part of the rings remain uncondensed, while a part appear as his eight moons.

The rings thrown off by the central mass are usually condensed into one body; but, in the case of the *minor planets*, or *asteroids*, we see a ring broken up into many bodies; and the same is true of the meteoric rings which are the source of meteoric showers.

It will be seen that all the great facts in the astronomy of the solar system are explained by this theory. The sun turns on his axis from west to east, and all the planets revolve about him and turn on their axes in the same direction. Most of these planets have one or more moons revolving about them; and these moons, with the exception of those of the two most distant planets, have both axial and orbital motions from west to east. The rings of Saturn, which have a rotation independent of that of the planet, but in the same direction, are no anomaly, according to this hypothesis; and the recent discovery (now demonstrated, we believe, to the satisfaction of all the most eminent astronomers) that the rings are steadily shrinking and approaching the body of the planet, is only a further confirmation of the theory. The ring of minor planets, of which at least one hundred and six have already been discovered between the orbits of Mars and Jupiter, is far more naturally explained by this hypothesis than by the well-known theory of Olbers, that they are the fragments of a large planet shattered by some tremendous internal explosion, or by collision with some heavenly body that crossed its track. The phenomena of meteors, also, as we have intimated, are thoroughly consistent with this view of the origin of all the bodies in our system. We need not wonder, then, that the nebular hypothesis is now accepted by the great majority of scientific men, as by far the most satisfactory theory that has ever been devised to account for the great facts of astronomy.

The nebular hypothesis explains also the internal heat [illegible] the earth and the heat of the sun; for, as the particles [illegible] nebulous mass were drawn nearer and nearer [illegible]r, their "possible energy"* must have been con[illegible] into heat. The celebrated Helmholtz has made this the basis of his theory of solar heat, which is not inconsistent with that of Mayer, described in the November *Journal*. Helmholtz assumes, with Laplace, that the nebulous matter was of almost inconceivable tenuity, and determines by calculation the heat which would be generated by its condensation to the present solar system. Supposing the *specific heat* of the condensing mass (that is, the heat which it would take to raise the temperature of one pound of it one degree) to be the same as that of water, he finds that the heat of condensation would be sufficient to raise the temperature of the mass, or the masses formed from it, more than 50,000,000 degrees Fahrenheit.

Some one may fancy that there is an inconsistency in this supposition that the cooling and contracting of the nebulous mass can generate this intense heat, and that the mass nevertheless goes on contracting. But it must be borne in mind that the heat is continually radiated off into space; and it can, moreover, be proved that, as the particles come nearer together, the force of gravity, which tends to draw them towards the centre, increases more rapidly than the repulsive force of the remaining heat, which tends to drive them *from* the centre.

Of course, we can have no conception of a temperature of fifty millions of degrees. The most intense heat which we can produce by any means at our command, is only about 3,600 degrees. How is it possible for us to conceive of a temperature thirteen thousand times greater than that at which iron and other metals are dissipated into vapor? If the whole solar system were composed of pure coal, and were burned up, the heat given out by the great conflagration would amount to only 1-3500th of that produced by the condensation of nebulous matter by which that system was formed. Helmholtz supposes that this condensation is still going on, and that this continued shrinking of the sun causes a continued development of heat within his mass. He shows, by calculation, that a shrinkage amounting to 1-10000th of the sun's diameter would generate as much heat as the sun radiates in two thousand years; and that a contraction of the sun's mass from its present density (which is about one quarter that of the earth) to the density of the earth, would develop an amount of heat equal to the solar emission for seventeen million years.

We have said that Mayer's theory of solar heat is not inconsistent with that of Helmholtz. It is rather supplementary to it; since it merely assumes that the meteors and planets which were thrown off from the nebulous mass, as it condensed, are slowly falling into it again. When these shall all have fallen back, and the condensation shall have ceased, our sun will cease to shine, like many other stars which have disappeared from the heavens.

* [illegible] article entitled "What is Force?" in the *Journal* for [illegible]

HOW THE ANCIENTS DINED.

Dr. Letheby, the celebrated writer upon dietetics, has been giving a course of lectures upon food, etc., in London, which, in many respects, are very interesting. We give below a few extracts from one of the lectures, showing how the old Romans and also how the more "modern ancients" dined: —

Among civilized nations, and until comparatively recent times, there were but two meals a day; viz., dinner and supper. These were the meals of the Romans; the prandium or dinner being for the most part a light refreshment, eaten while standing, at about nine o'clock in the morning, and it generally consisted of the cold remains of yesterday's supper. It was commonly taken without wine; and, in fact, there was so litle ceremony about it, that Plautus, in his comedies, has facetiously called it *caninum prandium*. The great meal of the day was the supper, or *cœna*, which was taken about three or four o'clock in the afternoon, and to which friends were invited. This was the ceremonious meal for which the wealthy and high families of Rome exhausted the resources of luxury and art. It always consisted of three parts — the *gustus* or antipast, which was intended as a mere smack or relish to whet the appetite. Then came the main part of the feast; consisting of many courses, with a chief dish, or *caput cœnæ*, and when in thrifty families it was the only dish which went the round of the frugal board, it was aptly termed the *cœna ambulans*. After this there came the second course, or *mensa secunda*, composed of fruits and pastry, like a modern dessert.

The sums of money expended by the wealthy Romans on this meal were often ruinous. Vitellius is said to have spent as much as 400 *sestertia* (about £3228 of our money) on his daily supper; and the celebrated feast to which he invited his brother Lucius cost no less than 5000 *sestertia*, or £40,350 sterling. It consisted, according to Suetonius, of 2000 different dishes of fish and 7000 of fowls, with other equally numerous meats. His daily food, says our classical writer, was of the most rare and exquisite nature; the deserts of Libya, the shores of Spain, the waters of the Carpathian Sea, and even the coasts and forests of Britain, were diligently searched for dainties to supply his table; and had he reigned long he would, says Josephus, have exhausted the great opulence of the Roman Empire. Ælius Verus, another of those worthies, was hardly less profuse in the extravagance of his suppers; for it is said that a single entertainment, to which only about a dozen guests were invited, cost above 6,000,000 sesterces (6000 *sestertia*, or nearly £48,500); and we are told by historians that his whole life was wasted in eating and drinking; being spent in the voluptuous retreats of Daphne, or else at the luxurious banquets of Antioch. So profuse, indeed, was the extravagance of those times, that to entertain an emperor at a feast was to encounter almost certain financial ruin — one dish alone at the table of Heliogabalus has been known to cost about £4000 of our money; no wonder, therefore, that these imperial feasts were lengthened out for hours together, and that every artifice, often revolting in the extreme, was used to prolong the pleasure of eating, or that Philoxenus should have wished that he had the throat of a crane with a delicate palate all the way down.

Hardly less extravagant were the dining propensities of our own forefathers, who in every way copied too closely the luxurious habits of their Roman conquerors. In fact, no circumstance, as Mr. Wright observes, is more remarkable in ancient history than the readiness with which the people who came under the sway and influence of Rome, abandoned their nationality, and followed the luxurious habits of their rulers. Even so late as the time of Holinshed, the famous chronicler of the sixteenth century, the manners of the English were the subject of severe comment; for he tells us that "in number of dishes and changes of meat, the nobility of England (whose cooks are for the most part musical-headed Frenchmen and foreigners) do most exceed; sith there is no day in manner that passeth over their heads, wherein they have not only beef, mutton, veal, lamb, kid, pork, cony, capon, pig, or so many of them as the season yieldeth, but also some portion of the red and fallow deer, beside great variety of fish and wild fowl, and thereto sundry other delicates, wherein the sweet hand of the seafaring Portingale is not wanting, so that for a man to dine with one of them, and to taste of every dish that standeth before him, is rather to yield unto a conspiracy with a great deal of meat for the speedy suppression of natural health, than the use of a necessary meal to satisfy himself with a competent repast to sustain his body withal." He adds, too, "that gentlemen and merchants keep much about the same rate; and when they make their ordinary or voluntary feasts, it is a world to see what great provision is made of all manner of delicate meats from every quarter of the country, wherein, beside that, they are often comparable herein to the nobility of the land; so that they will seldom regard any thing that the butcher usually killeth, but reject the same as not worthy to come in place. In such cases, also, geliffes of all colours, mixed with a variety in the representation of sundry flowers, herbs, trees, forms of beasts, fish, fowls, and fruits; and thereunto march-pane, wrought with no small curiosity, tarts of divers hues and sundry denominations; conserves of old fruits, foreign and homebread; suckets, codiniacs,

marmalades, sugarbread, gingerbread, florentines, wildfowl, venison of all sorts, and sundry outlandish confections, altogether seasoned with sugar, besides infinite devices, not possible for me to remember."

The learned Caius, also, in his "Counseill against the Sweat" of the same century (1552), comments in severe terms on the gluttony of his time, saying that the reason why the disease attacks the English more than others is, that they have "so moche sweating stuffe, so many euille humoures laid up in store, fro this displeasante, feareful, and pestilent disease, cause of their euille diet, whiche destroy more meates and drynckes withoute al ordre, conveniet time, reason, or necessite, the either Scotlande, or al other countries under the sunne."

Gradually, too, as the dinner got to be later in the day, and reached noontime, there was necessity for a light early meal, or *breakfaste*, as it was called; and as the dinner became later and later still, a fourth meal was added — the lunch or luncheon, which literally meant a slice of bread. In process of time, also, with the introduction of tea and coffee into England, there came a fifth meal; but all along the dinner was the great feast of the day; and the rule in using it, was pretty much as Dr. Kitchener, in his time, advised; viz., to eat until there was a sense of satiety, the stimulus of every fresh dish being but as a whip to the appetite, so that the sense of satiety might come and go a dozen times. "It is produced in us," says Christopher North, "by three platefuls of hotch-potch, and to the eyes of an ordinary observer our dinner would seem to be at an end; but no — strictly speaking, it just going to begin. About an hour ago did we, standing on the very beautiful bridge of Perth, see that identical salmon, with his back fin just visible above the translucent tide, arrowing up the Tay, bold as a bridegroom, and nothing doubting that he should spend his honeymoon among the gravel-beds of Kinnaird or Moulenearn, or the rocky sofas of the Tummel, or the green marble couches of the Tilt. What has now become of the sense of satiety? John — the castors! — mustard vinegar — cayenne — catsup — peas and potatoes, with a very little butter — the biscuit called "rusk" — and the memory of the hotch-potch is as that of Babylon the great." Sense of satiety, indeed! — "We have seen it for a moment existing on the disappearance of the hotch-potch; dying on the appearance of the Tay salmon; once more noticeable as the last plate of the noble fish melted away; extinguished suddenly by the vision of the venison; again felt for an instant, and but for an instant, for a brace and a half of as fine grouse as ever expanded their voluptuous bosoms to be devoured by hungry love."

We smile at the accounts given of the gormandizing powers of the natives of Arctic regions and the savages of Southern Africa, but our own habits in eating and drinking are scarcely less preposterous. Look at a modern dinner; beginning with soup, and perhaps a glass of cold punch; to be followed by a piece of turbot or a slice of salmon with lobster-sauce; and while the *caput cœnæ*, the venison or South down, is getting ready, we toy with an oyster paté or a bit of sweet-bread, and mellow it with a bumper of Madeira. No sooner is the venison or mutton disposed of, with its never-failing accompaniments of jelly and vegetables, than we set the whole of it in a ferment with champagne, and drown it with hock or sauterne. These are quickly followed by the wing and breast of a partridge, or a bit of pheasant or wild duck; and when the stomach is all on fire with excitement, we cool it for an instant with a piece of iced pudding, and then immediately lash it into a fever with undiluted alcohol, in the form of cognac or a strong liqueur; after which there comes a spoonful or so of jelly as an emollient, a morsel of ripe stilton or *pate de foie-gras* as a digestant, a piquante salad to whet the appetite for wine, and a glass of old port to persuade the stomach, if it can, into quietness. All these are more leisurely succeeded by the *mensa secunda*, or dessert, with its ices, its preserves, its bakemeats, its fruits, its geliffes, codiniacs, and suckets, as Holinshed would call them, and its strong drinks; to be afterwards muddled with coffee, and complicated into a rare mixture with tea, floating with the richest of cream.

On the 29th of March, 1868, a bronze cooking-pot, filled with water, was found at Pompeii. Vessel and contents were eighteen centuries old.

HANDBOOK OF CHEMISTRY FOR SCHOOL AND HOME USE.

This is the title of a little manual of chemistry, by Messrs. W. J. Rolfe and J. A. Gillet of the Cambridge High School, which is just published by Woolworth, Ainsworth & Co., of Boston. We make a few extracts from its pages, to illustrate the pleasant, familiar style in which it is written: —

RUSTING.

The slow combustion of metals is called *rusting*, and the oxide formed is called *rust*. All the familiar metals, except silver, gold, and platinum, are tarnished on exposure to the air; that is, they become covered with a film of rust, or oxide.

That *heat* is developed by rusting, as by other kinds of slow combustion, is shown by the fact that if a large pile of iron-filings be moistened and exposed to the action of the air so that they rust rapidly, the temperature rises perceptibly.

A remarkable case of heat developed by rusting occurred in England during the manufacture of a submarine electric cable. The copper wire of the cable was covered with gutta-percha, tar, and hemp, and the whole inclosed in a casing of iron wire. The cable, as it was finished, was coiled in tanks filled with water; these tanks leaked, and the water was therefore drawn off, leaving about 163 nautical miles of cable coiled in a mass 30 feet in diameter (with a space in the centre 6 feet in diameter) and 8 feet high. It rusted so rapidly that the temperature in the centre of the coil rose in four days from 66° to 79°, though the temperature of the air did not rise above 66° during the period, and was as low as 59° part of the time. The mass would have become even hotter had it not been cooled by pouring on water.

THE FOOD OF PLANTS.

Plants get their food from the earth and the air, but much the greater part from the air. We know that there are plants which flourish in the most barren soil, or even upon the naked rock, and that some live and grow suspended in the air, and having no contact with the earth. Even those which demand a rich soil are indirectly indebted to the air for what they draw from the earth. The soil owes its fertility to the decomposition of organic matter; and this organic matter was originally produced by plants which had no rich soil to draw from, but were dependent mainly upon the air.

The atmosphere, then, is the storehouse from which plants directly or indirectly obtain nearly all their food. The portion which is purely of earthy origin is always insignificant, and often it is nothing at all. In fact, plants give to the earth far more than they get from it. This is illustrated by the accumulation of vegetable organic matter in the soil wherever vegetation is undisturbed from year to year. In uncultivated fields and in primeval forests we often find a great depth of rich mould. The more rank and luxuriant the vegetation, the more rapidly this deposit increases, showing that the plants not only restore to the soil all that they have drawn from it, but are continually transferring fresh matter from the aerial storehouses to the earth.

But while the soil is enriched by undisturbed vegetation, it is impoverished by agriculture. The farmer carries away the crop from the field, with all that it has taken from both the earth and the air. The land cannot yield in this way year after year, unless he follows the example of nature, and restores to the soil an equivalent for what he removes. This he can do by the use of *manure*.

THE EARTHY PORTION OF THE PLANT.

If we burn wood or any other vegetable substance, almost all of it is dissipated into air. But a little ashes will remain; and these represent the earthy or *inorganic* portion of the plant. They consist mainly of alkaline chlorides, potash, soda, silica, metallic phosphates, calcic and magnesic carbonates, and ferric and maganic oxides. These are dissolved in the water which soaks through the soil and which is taken up by the roots of the plant. Much of the water is evaporated through the leaves, but the substances which it held in solution remain behind, and thus gradually accumulate in the tissues of the plant.

Since the plant must obtain from the soil the inorganic materials it needs, it is evident that it will flourish only in a soil containing those materials. This explains why certain plants thrive only in certain situations. A locality may be fertile for some species of vegetation and barren for others. The pines, which need little alkaline matter, will flourish in a sandy soil containing little alkali; but the maples and elms, which require a good deal of potash, cannot live in such a soil.

We have said that the farmer, who carries away the produce of the field with all that it has drawn from the soil, must restore in the form of manure an equivalent for what he removes, or the field will soon become impoverished. . . . .

This renewal of fertility is sometimes attained by letting the field lie *fallow*, or uncultivated, for one or more years. The inorganic materials of the soil are mainly furnished by the gradual disintegration of the *rocks*; and while the field lies fallow this process is going on, under the influence of the oxygen and carbonic acid of the air, aided by the rains and changes of temperature. In this way, fresh portions of the rocks or of their ruins are rendered soluble and thus fitted for the nourishment of plants.

An *alternation of crops* may answer the same purpose as letting the field lie fallow. For instance, wheat and potatoes may be raised on the ground in alternate years. The wheat requires a large amount of silica and alkaline matter, while the potatoes take up no silica. The renewal of the soluble silica in the soil therefore goes on while the potatoes are growing, as it would if the field were fallow.

Some soils abound in silicates so readily decomposed, that in every one or two years a sufficient supply for a crop of wheat becomes soluble. In Hungary there are large districts where wheat and tobacco have been raised alternately upon the same soil for centuries, the land never receiving back any of the mineral matter which is carried away with the crops. On the other hand, there are fields in which the amount of soluble silica required for a single crop of wheat is not separated from the insoluble masses in the soil in less than three or four years.

Arts.

HELMHOLTZ ON SOLAR HEAT.

We have elsewhere given a sketch of Helmholtz's theory of solar heat. The following remarks upon some of the relations of the theory to the past and future history of our globe, are translated from this eminent German philosopher, and will doubtless be of interest to our readers: —

"Though the store of heat in our planetary system is so immense that it has not been sensibly diminished by the incessant emission which has gone on during the period of man's history, and though the time which must elapse before a sensible change in the condition of our planetary system can occur is totally beyond our comprehension, the inexorable laws of mechanics show that this store, which can only suffer loss and not gain, must finally be exhausted. Shall we terrify ourselves by this thought? We are in the habit of measuring the greatness of the universe, and the wisdom displayed in it, by the duration and the profit which it promises to our own race; but the past history of the earth shows the insignificance of the interval during which man has had his dwelling here. What the museums of Europe show us of the remains of Egypt and Assyria we gaze upon with silent wonder, in despair of being able to carry back our thoughts to a period so remote. Still, the human race must have existed and multiplied for ages before the Pyramids could have been erected. We estimate the duration of human history at 6,000 years; but, vast as this time may appear to us, what is it in comparison with the period during which the earth bore successive series of rank plants and mighty animals, but no men? — periods during which, in our own neighborhood (Konigsberg), the amber-tree bloomed, and dropped its costly gum on the earth and in the sea; when in Europe and North America groves of tropical palms flourished, in which gigantic lizards, and, after them, elephants, whose mighty remains are still buried in the earth, found a

home. Different geologists, proceeding from different premises, have sought to estimate the length of the above period, and they set it down from one to nine millions of years. The time during which the earth has generated organic beings, again, is small compared with the ages during which the world was a mass of molten rocks. The experiments of Bischof upon basalt show that our globe would require 350 millions of years to cool down from 2000° to 200° Centigrade [or from 3600° to 360° Fahrenheit]. And with regard to the period during which the first nebulous masses condensed, to form our planetary system, conjecture must entirely cease. The history of man, therefore, is but a minute ripple in the infinite ocean of time. For a much longer period than that during which he has already occupied this world, the existence of a state of inorganic nature, favorable to man's continuance here, seems to be secured; so that for ourselves, and for long generations after us, we have nothing to fear. But the same forces of air and water, and of the volcanic interior, which produced former geologic revolutions, burying one series of living forms after another, still act upon the earth's crust. They, rather than those distant cosmical changes of which we have spoken, will put an end to the human race, and perhaps compel us to make way for new and more complete forms of life, as the lizard and the mammoth have given way to us and our contemporaries."

WATER-GLASS, OR SOLUBLE SILICATES.

Water-glass, or soluble silicate of soda, has come into use for a great variety of purposes. It is a most useful substance, and its nature should be better understood. We have recommended its use in the *Journal* for coating the inside of water cisterns, to prevent the cement from acting upon the water. This is an excellent application. It may be made of great service in many ways, which our readers will understand from the nature of the article.

There are four kinds of soluble silicates, namely, *potash, soda, double, and clear.* The first is composed of 15 parts pulverized quartz (a pure sand), 10 of purified potash, and 1 of powdered charcoal. These substances are first well mixed and exposed to a strong heat in a glass melting-pot for five hours, until the whole fuses uniformly; the heat required being about the same as that which melts glass. It is now lifted out, and when cool, it is broken in pieces and dissolved in about five times its bulk of boiling water. It is kept boiling for about three hours before it is all dissolved, and water is added as evaporation proceeds, so as to keep up the original quantity. It now becomes slimy, and in that state, or more diluted, is fit for use in many operations. It should be placed in well-stoppered bottles for use.

The second silicate is composed of 45 lbs. of pure quartz, 23 of anhydrous carbonate of soda, and 3 of powdered charcoal. This is fused in the same manner as the other. By substituting anhydrous sulphate of soda for the carbonate of soda, and using about eight times more charcoal, a cheaper silicate is formed, and both are soluble by boiling in water. Rectified alcohol precipitates the potash silicate from its water, and converts it into a solid silicate, which is dissolvable in water. The potash and the soda silicates mix freely with one another.

The double-soluble silicate is composed of 100 parts quartz, 28 purified potash, 22 neutral anhydrous carbonate of soda, and 6 of powdered charcoal. This mixture fuses much easier than the other two, but three measures of the potash silicate and two of the soda silicate described, when mixed together, will answer for all practical applications.

The fourth silicate, which is applied to fixing the colors of pictures, is made by fusing 3 parts pure anhydrous carbonate of soda with 2 parts of powdered quartz, which is boiled as described for the other silicates. This is kept in a concentrated solution, and one measure added to four parts of concentrated potash silicate completely saturated with quartz. By this means, silica and an excess of alkali are obtained, which, although more soluble, is clear, and not rapidly decomposed. This soluble silicate should only be employed in stereochromy-painting.

The first two soluble silicates, when mixed together, form an excellent cement with sand, and convert it into a stone-like mass. It is also excellent for filling up cracks in walls, as it acts very much like mineral glue.

When marble dust or chalk is made into a paste with water, then dried, and afterwards saturated with the silicate, it forms a compact mass, and acquires a hardness little inferior to solid marble, and it is capable of taking a fine polish, and water will not soften it. A mixture of marble-dust and the silicate of soda forms a cement which adheres either to wood or stone.

The oxyd of zinc and soluble glass combine with great energy, and form a paste capable of being rolled out and made into sheets to cover substances, such as wood, with a coat resembling polished slate. A patent has been taken out by a Mr. Hoard, of Providence, R. I., for writing-slates made of this composition.

One of the most important applications of water-glass is to painting. It enables the colors to adhere, renders them almost indestructible, and is therefore calculated to supersede fresco-painting. Some splendid mural paintings in the museum at Berlin have been treated with the soluble silicate; they are stated to be splendid works of art, and far in advance of fresco-painting for durability. Artificial sulphate of baryta, applied to glass by means of silicate of potash, imparts to it a milk-white color of great beauty; in a few days the silica is found intimately combined with it, and the color resists washing with warm water. By the action of strong heat, this silicious varnish is transformed into a fine white enamel. Blue ultramarine, oxyd of chromium and pulverized colored enamels may be applied. Silicious-painting upon glass is destined to find advantageous employment in the construction of church windows; while silicious-painting upon stone will serve for mural decoration.

The oxyds and metallic salts which enter into the composition of silicious colors or of cements have the property not only of combining with the silica of the silicates, but also of fixing, in an insoluble state, variable quantities of potash. The colors which act most energetically in this respect are the ochres; oxyd of manganese, oxyd of zinc, oxyd of lead, and artificial sulphate of baryta.

INTERESTING EXPERIMENT IN ELECTRICITY.

Procure four glass tumblers or common glazed teacups, and having wiped them dry as possible, hold them over the fire to evaporate any moisture which may still adhere to their surface; for if there is the least moisture it makes a connection, and spoils the experiment. Place them upon the floor in a square, about one foot apart; place a piece of board upon the tumblers, and have a person standing upon the board. This person is now completely insulated, the glass being a non-conductor of electricity. Now take a common rubber comb, and having wound a piece of silk around one end of it, rub it briskly through your hair, and draw the teeth parallel to the insulated person's knuckles, leaving a little space between the comb and the person's hand. The result will be a sharp, crackling noise, and if dark, there will be seen a succession of sparks. Repeat the process until the phenomena cease. The person is now "charged" with electricity, the same as a Leyden jar. To draw off the electricity, approach your knuckles to the person's hands or his nose (being careful not to allow any portion of your body to come in contact with his), and there will be a loud snap and the sparks will be very brilliant. If a cat be held so that the charged person can place his knuckles in proximity with the animal's nose, it will suddenly appear as if it were in contact with an electric battery. A glass bottle may be used in lieu of the comb, but it is not so well adapted for the purpose. Much amusement may be derived from this extremely simple experiment, and some of our numerous young readers will hasten to try it for themselves.

Defects of Building Materials in Relation to Health.—The author of an article in the *British and Foreign Medico-Chirurgical Review*, dwells upon the dangers of buildings constructed of materials saturated with saline matters. Among these materials are mortar mixed with sea sand, and imported lumber. Wood absorbs moisture very rapidly, and upon a sea voyage becomes charged with the saline deposits. The walls of buildings constructed of these materials are continually absorbing moisture, and by their dampness predispose rheumatism, phthisis, etc., etc.

Preparation of Litmus-Paper.—I have had much trouble in obtaining a thoroughly satisfactory litmus-paper. When used with blotting-paper, it is not as delicate as could be wished; and, on one occasion, when attempting to make it with sized paper, the blue tincture persistently turned red when it touched the paper. The latter reaction seemed to be due to the sizing material; and it occurred to me, that, if I sized some paper myself with pure gelatin, my object would be obtained.

I can recommend the following receipt:—"Digest 20 grm. litmus with 100 c. c. water for some time, shaking occasionally; then filter. To the filtrate add a slight excess of nitric acid, and boil; then neutralize exactly with potash. Now make a weak solution of gelatin, by boiling one part of isinglass with fifty parts of water; draw white blotting-paper through this, and hang it up to dry. When dry, paint one side with the above solution of litmus."—A. Vacher: *London Chem. News.*

Varnish for Iron-Work.—Dr. Lunge has published a method of making an excellent black varnish for iron-work. He distils gas-tar until nearly all the volatile products are got rid of. He then stops the distillation, and dissolves the residual pitch either in the heavier oils, or, if a very quickly drying varnish is required, in light oils or naphtha. This varnish is, of course, the original tar, minus the ammonia, water, carbolic acid, and other things which give it its disagreeable odor, and make it so long in drying.

Agriculture.

COMMERCIAL FERTILIZERS.

The season of the year is rapidly approaching when the attention of farmers and gardeners will be called to the important matter of providing fertilizing substances for their gardens and fields. The manufacturers of different substances, called phosphates, superphosphates, and artificial guanos, poudrettes, ammoniated mixtures, etc. etc., are actively engaged in filling their warehouses with heavy bags and barrels, in anticipation of an active demand for their products. Flattering certificates, so easily obtained, from governors, ex-governors, senators, officers of agricultural societies, well-known farmers and horticulturists are printed in handbills and widely distributed; and the advertising columns of agricultural journals are beginning to be filled with most enticing descriptions of new and wonderful fertilizing agents; each manufacturer representing his mixtures to be better than any others that have been, or can be produced. In all this, there is much to embarrass and confuse the purchaser, and often to lead him into unprofitable expenditures.

While it is true many commercial fertilizers have considerable value, or actually contain some of the mineral food which plants require, it is equally true that others are almost or quite worthless. The business of making and vending these products, as conducted in this country, is wholly empirical and wrong. There is no standard of value to any article, no formula by which, as a class, they are required to be compounded; and consequently every manufacturer follows his own caprices or cupidity, and is entirely irresponsible to custom or law. As between the manufacturer and consumer, the advantage is wholly on the side of the former, the latter having no means of detecting fraud. If a man buys a barrel of bad flour, its nature is ascertained upon first trial, and it is promptly sent back to the grocer; but if he buys a barrel of factitious superphosphate, he is never fully acquainted with the extent of the cheat. A manufacturer may continue the business of making worthless fertilizers for many years, and grow immensely rich, and yet escape detection. Indeed, he may gain even a *comfortable reputation* by adroit management in sending

good samples to prominent agriculturists for trial, and to chemists for analysis, and widely publishing the favorable results. There is in the products of many manufacturers great *inequality* in the fertilizing value of even the best specimens. This shows palpable and inexcusable carelessness, or else a design to maintain a reputation by introducing confusion in the results of trials; some proving good and others bad, the praises coming from the good specimens drowning the complaints arising from the others. Our husbandmen ought not any longer to be left in this unprotected condition. The thousands and tens of thousands of dollars wasted on valueless "superphosphates" and mixtures of powdered clam-shells and bones (the former often greatly preponderating), would be better employed in draining and reclaiming waste lands, improving farm buildings, or in securing materials for the compost heap. What is the remedy? We reply, every package of commercial fertilizing material offered for sale, should be *inspected* by a competent chemist, and its exact fertilizing value stamped upon it. The amount of nitrogenous, phosphatic, or potash value it may contain, should be distinctly stated, and a clear understanding of its chemical nature presented. Whenever a manufacturer has one hundred, or one thousand barrels of his products ready for the market, let the chemist take from each package a uniform specimen, and by mingling them together obtain a fair average of the whole, and then by analysis learn its value, and stamp the results upon each package. This would not involve much labor or expense, and would remove all chances of fraud, and greatly benefit the agricultural community. Laws ought to be passed this present winter, by every legislature, having in view the protection of farmers in the purchase of fertilizers. A plan can be devised, by which this desirable end can be reached, and it is high time it was entered upon.

PROGRESS IN AGRICULTURAL SCIENCE.

It is only fifty-eight years since the first accurate analysis of a vegetable substance was made, and about forty years since Liebig commenced to make reliable and systematic determinations of the chemical nature of plants and soils. The fact is almost incredible, that up to 1838 so little positive knowledge existed concerning the agricultural value of *ashes*, that the Gottingen Academy offered a prize for a satisfactory solution of the question, "*Whether the ingredients of ashes are essential to vegetable growths.*" How accurate, how minute is our knowledge of agricultural chemistry at the present time! and yet, it must be remembered, it has all been acquired in about thirty years. Who will venture to predict concerning the results of progress in the next thirty years? We are living in a remarkable age; and the laggards and dolts upon the farm or in the workshop have but poor chances in the race of life. Read, study, observe, experiment; many a valuable secret is yet to be extorted from nature, and the successful student is sure of his reward.

"HOW CROPS GROW."

How Crops Grow. By Samuel W. Johnson, M.A. New York: Orange Judd & Co. 1867.

American authors and writers are charged, by trans-Atlantic critics, with a want of originality in their productions. However true this may be of the contents, it ought not to apply to the *names* or titles of our books. Some years ago, Prof. Gray, of Cambridge, prepared a work with the title, "*How Plants Grow.*" This little treatise, so clear in its descriptions and statements, so simple, yet so thorough, has instructed and delighted thousands of readers. The taking title of the book drew attention to it on the part of those not usually interested in the topics of which it treated, and thus was secured a wide circle of readers. Now, we have another book, from Prof. Johnson, in "How *Crops* Grow." As "crops" are *plants*, the slight variation in name is hardly sufficient to distinguish it from Prof. Gray's book. We are sorry to see this appropriation of an attractive name of a work which rightfully belongs to another. It may be said that the books are essentially different—one being a botanical, the other a chemical treatise. This may be true; but it is a poor apology for the use of a name long associated with the work of another author.

Prof. Johnson's treatise, while presenting but few facts or principles new to students or readers of agricultural literature, is nevertheless a valuable work. It brings together, in convenient form for reference, much that is scattered through the periodicals and journals of this country and Europe; and the general arrangement of the matter is admirable. In preparing treatises useful to those engaged in the cultivation of the soil, it is important that writers should have practical acquaintance with farm labors and employments. When this experience is combined with high scientific accomplishments, the best possible qualifications are possessed for aiding with the pen the great interests of agriculture.

PLANT CORN.

In remarking that corn is a profitable crop to raise, we state what we know to be true. The knowledge is derived from fair and careful experiment, extending over a period of five years. We have grown corn under favorable and unfavorable circumstances; and, from accurate records and experiments, are fully convinced that small farmers and large farmers, those having good soils and poor soils, can raise Indian corn at a profit. Farmers are very apt to overlook the great value of the *corn-fodder* in forming their opinions of the importance of the crop. We estimate the value of this to be nearly or quite equal to the whole expense of cultivating the crop. It is certain, a ton of well cured corn-fodder will make as much milk when fed to milch-cows as a ton of good upland hay; and it is also certain, that young cattle thrive upon it wonderfully,—better, indeed, than upon most kinds of fodder fed to them during the winter months. We have always noticed a diminution in the flow of milk when the last of the fodder had been fed to our herd of cows, and also the *quality* of the milk deteriorates. Corn-fodder should be well cared for, and as much pains taken to preserve it in good condition as is taken with crops of clover or timothy. Corn should not be harvested too early, or while the stalks are green, as, in this case, they are certain to heat in the mow, and take on putrefactive change. Cattle will not eat them if they are mouldy and half rotten. As soon as the corn is removed from the husks, they should be thrown over, and mixed with wheat or oat straw and well salted. If salt marsh hay can be procured, mix considerable quantities of this hay with them, and thus prepared the fodder will be consumed with a relish.

Plant corn, we say. Prepare a few barrels of our *bone and ash fertilizer*, and place a handful in each hill, and it will start it vigorously, and sustain it through to maturity. We raised eighty bushels of good sound corn to the acre the past season, upon rather poor land, with the aid of this fertilizer. At the time of planting, a little earth should be sprinkled over the fertilizer, so that the seed may not rest directly upon it.

POWDERED BONES.

The inquiry so often made, how or where pure pulverized bones can be obtained, is one not easily answered. If any dealer or manufacturer has finely ground raw bone for sale, *which is free from all admixtures, or adulterations*, a ready market is open for it. So many letters of inquiry reach us relating to this point, they have become a source of considerable trouble and embarrassment. Raw bone-dust is prepared from dry bones, such as come from the hands of the soap boiler, or are picked up in the streets or fields. The powder contains, in addition to phosphate of lime, or the earthy portion of the bony structure, the *gelatine*, which is rich in nitrogen. In steaming bones prior to grinding, a large part of the gelatine is abstracted by the high-pressure steam, and therefore the powder is *not so valuable* for direct application to the soil, or for mixing with ashes to form the fertilizer recommended in the *Journal*, as the raw bone. For making superphosphate, or dissolving in acids, the steamed bone is the most valuable, as it contains a larger percentage of phosphate of lime. What is wanted for general farm purposes, *is raw bone ground to an impalpable powder, and free from all sophistication.*

AN EXCELLENT FERTILIZER.

We advise our readers, those who have farms and gardens to cultivate, to prepare as large a quantity of the fertilizer we suggested and recommended in the April No., Vol. II., of the *Journal*, as they possibly can. It embraces in its composition quite every element required in the growth and maturation of roots and the cereal grains; and it has the advantages of being comparatively cheap and easily prepared. No fertilizer we have yet devised—and we have prepared and experimented with a large number—affords more certain and satisfactory results than this one; and those who prepared and used it last season are extravagant in their praises of it. It supplies a most desirable dressing for fruit-trees and vines. We use no other fertilizer for our grapes; and if any of our friends have had better results in their cultivation than we have, it will afford us pleasure to publish their successes. The method of preparing the fertilizer is as follows:—

"Take one barrel of pure, finely-ground bone, and mix with it a barrel of good wood ashes; during the mixing, add gradually about three pailfuls of water. The heap may be made upon the floor of an outbuilding, or upon the barn floor; and, by the use of a hoe, the bone and ashes must be thoroughly blended together. The water added is just sufficient to liberate the caustic alkalies, potash, and soda; and these react upon the gelatine of the bone, dissolving the little atoms, forming a kind of soap, and fitting it for plant aliment. It must be used in small quantities, or in about the same way as the so-called superphosphates. A barrel of this mixture is worth two of any of the commercial fertilizers, and the cost will be but about half as much. It remains to be added: if the bone-meal and ashes are very dry, four pailfuls of water may be required; but care must be exercised not to have it inconveniently moist. It will be ready for use in a week after it is made. *Pure, raw, finely-ground bone* and the best of ashes should be employed."

Setting out Trees in Winter.—A writer in the *Cultivator and Country Gentleman*, says that last winter, in January and February, he set out over 200 trees, bass-wood, elm, hard and soft maple. Of these not one failed to leaf out and grow; but about 10 per cent died during the hot weather of July and August. He chose mild days and covered up the trees while moving them, as they had to be carried about two miles. When the day was too short for him to finish his load, he dug through the snow, set the trees on the bare ground, covered well with snow, and left them till next day. Transplanting trees at a time when the ground is frozen, may be more laborious than during the spring, but in winter farmers have a good deal of time on their hands, and a little of it spent in planting trees in the vicinity of their houses, will be amply repaid by the grateful shade in succeeding summers.

Boston Journal of Chemistry.

BOSTON, FEBRUARY 1, 1869.

☞ Any one sending us the names of three subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For five subscribers we will send the Petite Microscope; for twenty-five we will send, in addition to the microscope, a copy of "Stöckhardt's Chemistry for Students," the best elementary treatise yet published; for one hundred subscribers we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stöckhardt's Chemistry.

☞ Physicians, students, clerks in drug-stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

☞ Correspondents are particularly requested to give their names in full, with their Town and State; and, in case of change of residence requiring a corresponding change in the mailing of their papers, to give not only the new address, but the old one also.

☞ Subscribers who are physicians, dentists, or apothecaries, will confer a favor by informing us of their profession, as we wish to know accurately the amount of our medical subscription list.

NO CHANGE IN THE "JOURNAL."

It was stated in the last number of the *Journal*, that, at the commencement of Vol. IV., in July, it would be enlarged, and the price raised to one dollar. As will be learned from the Prospectus, we have decided to make no changes. Subscriptions are pouring in upon us so rapidly, and the favor with which the *Journal* is received in its present form is so marked and unmistakable, we have decided to follow the wise maxim of "letting well enough alone." *It is true*, as is often remarked by correspondents, that "THE JOURNAL IS THE PAPER FOR THE MILLION, *and a copy should be in every family in the United States*." Friends and readers, help us to accomplish the desirable end of placing it in every family. There is hardly one so poor as not to be able to spare the small sum of *Fifty Cents* a year; and how much reliable, useful information would be gained by every one, from its perusal from month to month! Friends and readers, this is YOUR PAPER. The publishers, even with its large circulation, receive barely sufficient to keep both sides of the ledger balanced, so low is the subscription price. We have at present fully

FORTY THOUSAND READERS!

With your efficient aid, we can have, in five years,

HALF A MILLION

readers. Send in the names! See Prospectus in another column.

BACK VOLUMES OF THE JOURNAL.—We are unable to supply complete files of either Vol. I. or II. of the *Journal*. Of Vol. I. (originally issued bi-monthly), Nos. 1 and 2 are now out of print. Of Vol. II. (monthly), Nos. 1, 3, and 12 are also out of print. Of the remaining numbers we have a few copies left, which we will forward to our friends at the following prices: Vol. I., four numbers, twenty-five cents; Vol. II., nine numbers, fifty cents. We have on hand a few complete files of Vol. III., as far as published. These we will send as ordered, at the rate of six cents per single copy; six copies for twenty-five cents.

ELECTROTYPING THE JOURNAL.—The demand for past issues of the *Journal* is so large from new subscribers, it has become necessary to stereotype or electrotype each number. We shall commence electrotyping with Volume IV.

PROSPECTUS.

BOSTON
Journal of Chemistry.

Vol. IV.—Commencing July 1, 1869.

A PROSPECTUS OF VOL. IV. OF THE "JOURNAL," is issued at an early date—five months before the volume commences—with the view of informing our numerous friends regarding our plans in the future, and affording them ample time to aid us in extending its patronage, and consequent usefulness; besides, it enables us to make a very generous offer to new subscribers, the nature of which is stated below.

A very general desire has been expressed that the JOURNAL should be continued in its present form at least through another year; and, after much deliberation, it has been decided not to make the contemplated change alluded to in the January number.

VOLUME IV. of the JOURNAL, commencing July 1st, 1869, will be of the same form and size as the present volume, each number containing not less than *nine pages* of reading matter. It will be printed with new type, on the finest book-paper; and we shall strive to make it not only the *best and cheapest scientific journal in the world*, but the *handsomest*.

The terms for the JOURNAL *will be the same as heretofore—Fifty Cents* (50) *per year; single numbers, Six Cents.*

The JOURNAL will continue to be independent, unbiased, careful and reliable. No individual, corporation, or organization, is rich or influential enough to suppress its opinions, or in any way control its influence. It will continue to expose frauds, schemes, and speculations, which profess to originate in or grow out of progress in science and art. The great and growing evil of *adulterations* in articles of food, medicine, fertilizers, and substances used in the arts, will receive special attention, and the nature of the sophistications and adulterations fully exposed. We shall present a large number of useful practical formulæ, recipes, and scientific suggestions, which alone will be worth many times the price of the publication.

TO PHYSICIANS,

It will continue to be of *special service*, as it will keep them informed of the nature of all new remedial agents, all new discoveries in chemical and medical science, all new principles or processes connected with toxicology and pharmacy.

TO DRUGGISTS,

It will come as a reliable friend and adviser, affording information and instruction upon all matters relating to the manufacture and dispensing of medicines, and those other substances and agents produced or vended by them.

TO FARMERS,

It will impart information upon the important subjects of the chemistry of plant-growths, and the nature and method of preparing fertilizing agents.

TO CHEMISTS, MANUFACTURERS, ARTISTS, TEACHERS, STUDENTS, CLERGYMEN,

ALL intelligent readers, men and women, everywhere, the *Boston Journal of Chemistry* will supply information and instruction of the highest importance and usefulness.

The JOURNAL has, at the present time, a large army of friends, and these we ask to aid us in extending its circulation. Our patrons know how instructive and useful it *has been* in the past: we assure them it will be even *better* in the future. Cannot each one send us a new subscriber, to commence with Vol. IV.?

We make this generous offer to *new subscribers*: All those who subscribe, and send us *fifty cents* in advance, will receive the remaining numbers of Vol. III. They will receive the whole of Vol. IV., and all the numbers of Vol. III. which are issued after the date of their subscription. *Subscribe early*, and thus obtain as a gratuity, nearly half of Vol. III.

JAS. R. NICHOLS & CO., Publishers,
BOSTON.

ABOUT STOVES.

"What stoves shall we use in our dwellings?" This is a question often and anxiously asked by housekeepers and heads of families, as the cold weather of winter approaches; and, indeed, it is a question of no ordinary importance. The two desirable points in stoves or heating apparatus of any kind, are, *first*, economy in consumption of fuel; *second*, the evolution of heat in a form, or under conditions, conducive to health. In selecting a parlor stove, the first consideration is too often allowed to have a preponderating influence; and if the dealer can satisfy the purchaser that a stove, by any peculiarity of flues and dampers, will save even a small amount of fuel, it is purchased in preference to one more philosophically constructed, or one better adapted to diffuse an equable temperature, and allow of a free escape of the products of combustion into the flue. The stoves, as a class, which obstruct draft by circuitous flues and a multiplicity of valves, or which feed fuel in an unnatural manner, are such as should be avoided in making a selection. How often, in our evening visits to neighbors and friends, do we find the family dozing in a half-asphyxiated state, in a room charged with carbonic oxide, carbonic acid, and sulphurous acid gases, proceeding from a stove with "new patent double back-action transverse return flues, and combination automatic air-valves," which some enterprising inventor has just "brought out"! We doubt if any fuel is really saved in such devices. If there is a saving of a few pounds of coal a week, it is at the expense of health and comfort; and this kind of economy costs fearfully high.

Chemists have had much to say about the immense loss of heat in the escape of the unconsumed gases from stoves; and their statements are in the main correct. There is considerable loss from incomplete combustion in the use of fuel. This fact being generally understood, a whole army of inventors come forward with their "gas-consuming" stoves, and the warehouses of dealers are full of them. We have never yet seen a *safe* and *practical* stove of this description,—one that we would use or recommend; and we have examined many devices. There are practical difficulties in the way of consuming gases in stoves; and we must be content to suffer some loss of heat, so long as attempts to save it result in danger to the life and health of families. A stove with few complications, constructed of sheet-iron, is, after all, the safest and best. It has been proved by satisfactory experiment, in this country and Europe, that *cast-iron* is permeable to the poisonous gases resulting from combustion; and therefore, stoves constructed of this metal, which are to be used for household warmth, should be rejected. No more comfortable or economical wood-burning stove has ever been devised than the old-fashioned "air-tight," which were so common twenty years ago. If provision is made for ventilation, this stove may be used with entire safety, at comparatively small expense. It causes little trouble, and affords much comfort. The new "soapstone stoves," we are reluctantly compelled to condemn, as too *wasteful* of fuel, too costly, and liable to crack badly. We have two of them in use; and practical experience and experiment confirm our views regarding them, formed several years since. The almost colorless, smooth, greasy outside of soapstone stoves affords the most imperfect heat-radiating surfaces it is possible to conceive of. The waste of fuel in these stoves is enormous. From some incomplete experiments made with the view of ascertaining the amount of loss, it is inferred that, under the ordinary conditions in which these stoves are used, at least two

thirds of all the heat developed is forced into the flue, along with the products of combustion. A small stove of this description, connected with an iron galvanized pipe passing twenty feet through two cold rooms, raised the temperature above 200° F. at the inlet to the flue. There are some desirable points in these stoves, such as the slowness with which heat is evolved, the persistency with which it is retained in the stone walls after combustion ceases, etc.; but these advantages do not compensate for the disadvantages alluded to above. Wood is, as fuel, so much more healthful and desirable, it is a pity it cannot be more generally used. The difference in the sanitary condition of a family, other things being equal, where a good blazing wood fire is maintained upon the hearth, is most marked, when contrasted with one using hard coal in connection with the stoves in common use. So long as there is a necessity resting upon tens of thousands of families, to use only this kind of fuel, it is of the highest importance that the stoves in which it is burned should be properly constructed, having a free, clean draft, and no unnecessary, dangerous "dampers" to jeopardize life and health.

Patent Butter Association.—The need of the diffusion of more practical scientific information among all classes is clearly shown, in the readiness with which people become victims to some of the most absurd tricks and schemes which the fertile brains of cunning men can invent. The most recent of these tricks surpasses in audacity all others which we ever heard of. A *Patent Butter Co.* have opened offices in this and other cities to show people how to make *a pound of good butter out of a pint of milk*, and to sell them *rights* to make, and also *a little white powder*, which is the agent used to perform the magic work. At the office of the Co. they do not ask the eager purchasers to believe their statements, but they *churn out the butter before their eyes*. A pint of milk, *with half a pound of good butter*, is put into a little tin churn, with a spoonful of the powder, the whole is *warmed*, and then five minutes' churning brings out *one and a half pounds* of good butter! Here is demonstration! what can be more convincing? No one suggests to the enterprising Co. that nearly *nine tenths* of the milk used, is *water*, and if they perform what they allege, they are changing *water into butter*. This would indeed be a miracle, equal to that of our Saviour, who changed water into wine. We have been asked many times by *intelligent* gentlemen, how this thing can be explained. Very easily. By the process, the whole of the pint of milk (mostly composed of water) is driven into or blended with the half pound of melted butter, put into the churn. There is no important increase of real butter in the churn, although the watery mass which looks like inferior butter, weighs more. Put the mass into a dish and heat it, and the true butter will separate from the milk or water, with which it is blended. This is the method by which butter and *lard* are greatly adulterated. Nearly all the lard sold by grocers, contains from 25 to 40 per cent of *water*. The adulterators have not been able until within a year or two, to combine with genuine lard more than 25 per cent of water; but recently, by the use of the alkaline carbonates, partly saponifying the lard, they force into association *more than* 40 *per cent*. What a shameful fraud this is! and how hard it falls upon poor people, who mostly consume the attenuated fat! We shall wage unceasing war upon these wicked frauds and schemes, and we ask all honest men and women to aid us in exposing, and thus preventing the evils.

Tin-Lined Lead Pipe.—A correspondent informs us that the *N. Y. Tribune*, in a recent article upon this new variety of pipe, took opposite grounds from those maintained in the *Journal*, and ridiculed the idea that it was unsafe to be used for the conveyance of water to dwellings. With a section of tin-lined lead pipe lying upon the desk before us, taken from a well in a neighboring town, so corroded by galvanic action as to cause lead poison in those using the water, we are not likely to modify our views, or be very much influenced by any statements of interested parties, presented through the columns of the secular press. The *Journal*, so far as our observation extends, is the only paper which has explained or exposed the nature of this peculiarly constructed water pipe, and our views are supported and endorsed by the best *practical* scientific men in the country. Better than this, they are proved correct by the results of laboratory experiments, and by actual trial of the pipe in locations where it has been placed by the makers or venders. The matter of safety in water supply pipes is far too serious in its bearings upon the health of families and individuals, to allow private interests to wrongfully influence the public mind, and we shall continue to do what we can to disseminate correct information upon this and all others subjects of interest to our readers.

Carbon.—The element carbon is possessed of extraordinary capabilities, among which its distinctive property of *uniting with itself* to form complicated compounds is the most striking. An aggregation of carbon atoms is found united with hydrogen, oxygen, nitrogen, forming distinct chemical bodies, or groups of atoms, which play, in organic chemistry, a part similar to that of the *metals*, or the simple molecules, such as the radicals NO^2 and SO^3, met with in the inorganic department of the science. These molecules, or groups of atoms are called *compound radicals*, and they act as if they were elements. Carbon is called a *tetrad*, or tetratonic element, and its powers of combination, or atomicity, differ entirely from the *monads*—chlorine, potassium, silver—and the *dyads*—oxygen, sulphur, and magnesium. We must regard carbon not only as one of the most extraordinary of the elementary bodies, but as one of the most important. Organic chemistry without carbon would be like the solar system without the sun.

Complete Steam Atomizer.—A very neat, durable, and convenient instrument is the "complete steam atomizer," made by Messrs. Codman & Shurtleff, of this city. A careful examination and trial of this atomizer convinces us that it will be difficult to construct a better one, and its low price ($6.00) brings it within reach of every physician. The surgical and dental instruments made by Messrs. Codman & Shurtleff stand deservedly high in the estimation of medical men, and their articles find a ready sale in every part of the country.

State Assaying.—The question is often asked, if the numerous certificates relating to hair oils, tooth powders, root and herb medicines, etc., etc., which are found in handbills and newspapers, signed by one or more of our *State Assayers*, are *geniune*,—if they really supply the quacks with such documents. We wish we had, for the honor of true science, and the reputation of the Commonwealth, direct authority to declare them all fraudulent, and the tricks of advertising mountebanks. We have no such authority, and we have never seen any disavowal of them from the parties interested.

The "Wagon" Cement.—A new device for making a sensation, and "raising the wind," has recently been noticed in the streets of our cities and large towns. A wagon loaded with hay or wood, is drawn about, covered over with placards extolling a wonderful cement, the practical value of which is proved by the fact that the leather traces by which the load is drawn, are held together by the cement. This cement is a well known and very simple article, made by taking the common fish glue, dissolving it in an equal weight of warm water, and to each pint of this solution adding two fluid ounces of alcohol, and half an ounce of gum mastic dissolved in a little alcohol. Mix thoroughly and keep in a well stopped bottle. It is a good cement for many purposes, when continued moisture is not present, but it it is much cheaper to make than to buy it of the wagon pedlers.

Breeding Ostriches in Algeria.—M. C. Rivière, Director of the Gardens of Hamma, near Algiers, has succeeded in rearing ostriches in a park supplied with a palisade enclosure containing a quantity of fine sand. Before depositing her eggs, the female ostrich seems uneasy, and seeks a suitable place. She forms a small hillock of sand, slightly concave at the top, and lays one egg in it, to which she afterwards adds others. She lays every two days for two or three months, with an interval of repose. Incubation lasts forty days, during which time the male and female sit alternately. On the 12th of March, five were hatched, and three the day after. At the end of May some of the ostriches had laid their fiftieth egg. The males take great interest in the incubation, and only leave the eggs when pressed by hunger, and then the females take their place, but not for such long periods. An extra circulation goes on in the uncovered portions of the male's body, to generate the heat necessary for the process.

Gum Arabic.—We have gathered some fine specimens of this gum the present winter from trees growing in a conservatory. The species which produces it is known as the *acacia cultiformis*, a very remarkable shrub or tree, of rather slow growth, affording, at the period of inflorescence, beautiful pendent flowers, of a dazzling yellow color. The gum exudes from incisions made in the bark, and is hardened by exposure to heat and air. To produce gum in any considerable quantity, the shrub must be planted in a sandy soil, and subjected to quite a high temperature.

Map Varnishes.—A very good varnish for covering over architectural and mechanical drawings, maps, etc., can be made by dissolving one pound of white shellac, a quarter of a pound of camphor, and two ounces of Canada balsam in one gallon of alcohol.

The following method affords also a good, quick-drying varnish: Thin down Canada balsam with turpentine, and add one fourth of the bulk of quick-drying, pale copal varnish; lay on smoothly with a flat camel-hair brush, and let the map lie flat for a few hours.

Liebig's Extract of Meat.—The establishment on the river Uruguay, South America, for the manufacture of Liebig's extract of meat, it is stated, has the largest kitchen in the world. The building covers an area of 20,000 square feet, or nearly half an acre. In one hall there are four meat cutters, which can dispose of 200 bullocks each per hour. There are 12 digesters, in which the meat is boiled by steam. They can hold altogether 144,000 pounds of beef. About 80 oxen per hour are actually slaughtered for this immense manufactory of meat extract.—*Med. and Surg. Reporter.*

The Spectrum of Lightning.—Lieut. John Herschel has communicated to the Royal Society an account of the spectrum produced by lightning. He says: "The principal features are a more or less bright continuous spectrum, crossed by numerous bright lines—so numerous as to perplex one as to their identity."

Five Thousand Dollars saved by taking the Journal.—One of our subscribers in a neighboring city, who had become interested in a certain scheme or speculation, concluded to invest five thousand dollars in the same, and had made arrangements with the parties to pay over the money. The night before the payment was to be made, the August number of the *Journal* came to hand, and the editorial article upon "schemes" and "speculations" met his eye. This clear exposure of the character and dangers of speculative schemes arrested his attention, and led him to pause before paying over the money. It was not paid, and in less than a month the plausible speculation *failed*, and every dollar invested was lost. Our subscriber thinks the *Journal has been worth to him fully* 50 *cents a year*.

Sea Depths.—Soundings for submarine cables show that the Baltic, between Sweden and Germany, is 125 feet deep; the Adriatic, between Venice and Trieste, 130; the English Channel, 300; the Irish Sea, in the south-western part, 2000; the Mediterranean, east of Gibralter, 3100; off the coast of Spain, 6200; by the Cape of Good Hope, 15,500.

☞ Letters come to hand by every mail, in which the *Journal* is spoken of in flattering terms. Many of the most distinguished men of the country manifest special interest in the publication, and write regarding its "interesting," "useful," "reliable" character. John G. Whittier, the poet, kindly writes as follows: "I take pleasure in commending this admirable journal, which, as might be expected, from the high character of its editor as a practical scientific man, is every way worthy of support. It treats subjects which concern the health and comfort of all; and while it is the cheapest, it is really one of the best publications of the day." Professors, teachers, farmers, physicians, all classes unite in sending words of kindness and encouragement. One says, "I would not be without it if the price was *ten dollars* a year." Another, "It has saved me many dollars by its valuable suggestions." Another, "Regard me as a perpetual subscriber; myself and family cannot do without the *Journal*." We could fill pages with extracts from such letters. We assure our many friends that we shall do what we can to continue the publication an "interesting" and "instructive" journal of practical science.

Molecules and Atoms.—In communications which have appeared in respectable scientific journals, we notice that the terms *molecule* and *atom* are often used synonymously, as if they signified one and the same thing. A *molecule* is a group of atoms forming the smallest portion of a chemical substance, either simple or compound, that can be isolated, or that can exist alone; it is the smallest amount of substance that can enter into any reaction, or be generated by it. An *atom* is the smallest portion of an element that can exist in a compound body as a mass indivisible by chemical forces. For instance, no such thing as an *atom* of *water* exists; a *molecule* is the smallest portion of this compound body possible; and this, H^2O, contains *two* atoms of hydrogen. It is important that accuracy should be insisted upon in the terms employed in scientific statements.

BOOK NOTICES.

Diseases of the Liver; Jaundice and Abdominal Dropsy. By Charles Murchison, M.D., F.R.S., Fellow of the Royal College of Physicians, etc. New York: William Wood & Co., Publishers. 1868.

In the form of lectures to the students of the Middlesex Hospital, the important facts and suggestions of this work have been before presented by Dr. Murchison, and several of the lectures have also appeared in the pages of the London *Lancet*. The object of the treatise is to put prominently forward the leading characters upon which the diagnosis of diseases of the liver depend, such as enlargement, jaundice, dropsy, pain, etc. Hepatic disorders are fearfully increasing in this country, caused, we suppose, by abnormal excitements of the nervous system, and by over-feeding. Physicians will find many useful hints for the proper treatment of these diseases in Dr. Murchison's book.

Use of the Laryngoscope in Diseases of the Throat. With an Essay on Hoarseness, Loss of Voice, etc. By Morrell Mackenzie, M.D., London. With Additions, by J. Solis Cohen, M.D. Philadelphia: Lindsay & Blakiston. 1869. Second Edition.

In another column of the *Journal* we have presented some brief statements regarding the use of the laryngoscope, its construction, history, etc., which were written before this work fell into our hands. Those who desire a thorough treatise upon laryngoscopy, illustrated with cuts and plates, will consult the pages of this beautifully printed book. We have never seen a more perfect specimen of book-making in the department of medicine than this work presents. The type, paper, engravings, and general style are admirable, and reflect great credit upon Messrs. Lindsay & Blakiston, the enterprising publishers.

On Chronic Bronchitis, especially as connected with Gout, Emphysema, and Diseases of the Heart. By E. Headlam Greenhow, M.D., Fellow of the Royal College of Physicians, etc., etc. Philadelphia: Lindsay & Blakiston. 1869.

The readers of the *Lancet* will remember these lectures, as they appeared a year or two ago. They were read with much interest and profit by hundreds of medical gentlemen, who will be glad to know that they have re-appeared in book form. A prominent design of the author is to show the intimate connections between chronic bronchitis and certain constitutional and local conditions of the system. This is accomplished in a very clear and satisfactory manner.

The Physician's Dose and Symptom Book. Containing the Doses and Uses of all the Principal Articles of the Materia Medica and Officinal Preparations. By Joseph H. Wythes, M.D. Eighth Edition. Philadelphia: Lindsay & Blakiston 1868.

A very convenient little manual; one which every physician needs for ready reference in the office and at the bedside of the patient. Seven editions have been sold, which affords evidence of its great utility.

Pronouncing Medical Lexicon. By C. H. Cleavland, M.D. Eleventh Edition. Philadelphia: Lindsay & Blakiston. 1869.

This is the eleventh edition of Prof. Cleavland's well known medical lexicon, a work which was greatly needed when it appeared, and which has been of much service to thousands of readers of medical literature in every part of the country. The size is convenient for carrying in the pocket, if desired.

Curious Statements Regarding Dyspepsia.—Dr. Fenwick (on the morbid states of the stomach and duodenum) gives some curious statistics, proving that moderate smoking does not injure the digestion, but is, on the contrary, often useful in relieving constipation, apparently from its property of stimulating the nerves. Also that dyspepsia appears to be very common among teetotalers, and that a moderate use of malt liquors is eminently useful, especially to females. Excess in coffee appears to be peculiarly injurious. Stout people suffer more than thin people from dyspepsia.

Medicine and Pharmacy.

ABOUT THE LARYNGOSCOPE.

It is difficult to comprehend the immense advances that have been made in medical knowledge for the last two or three decades, particularly in the department of physical exploration.

When, not many years ago, Dr. Horace Green, of New York, announced that a probang could be introduced into the living windpipe, through the throat, his statement was almost entirely discredited. Wise physicians declared it impossible; and it was only after the New York Academy of Medicine had given a thorough and searching investigation, that the assertion was pronounced possible.

Had Dr. Green lived at the present time, and made a similar announcement, he would have met with the same reception as if he had stated the possibility of passing a probang into the œsophagus. The domain of the living body is now penetrated at every natural inlet, and the eyes of the modern physician see sights which their predecessors longed to see, "but died without the sight." The microscope reveals diseases of the solids and fluids, of the cutaneous surfaces, and of the surfaces and substance of glands buried deep out of sight. The stethoscope and sphygmoscope reveal abnormalities of the respiratory and circulatory organs. The ophthalmoscope tells of lesions in the depths of the eye. The endoscope shows stone in the bladder. The urethroscope manifests the changes of structure in the urethra, and the laryngoscope in the larynx.

The term *laryngoscope* is a formidable name for a very simple instrument. It is nothing more than a round mirror which is small enough to be held in the back part of the mouth. It is mounted on a wire, at an angle of about 145°, and is provided with a handle. When this mirror is held as above, at about an angle of 45° with the horizon, the reflecting surface presenting forwards, and a horizontal beam of light is thrown upon it, the effect is to illuminate the larynx and the parts behind the tongue, and to render them visible to the eye of an observer.

This is a great advance in the inspection of the throat, and already ripe fruits have been reaped in this hitherto unknown living field. Only to think that it is possible to see the vocal cords in *situ naturali* and in action, and not only to see, but to study them during their physiological action! We can tell by the sirene the number of vibrations per second of time that are made by these vocal cords during the utterance of a musical note, and, at the same time, we can see the vibrating chink. A diagnosis of the cause of hoarseness can be made. Sometimes it has been found to depend upon excrescences or warts growing in or upon or about the larynx. Some of the most successful feats of modern surgery have been performed in this field, the patients recovering their breath and voices almost instantly upon the removal of these warts or excrescences!

The history of the discovery of physiological laryngoscopy dates back to 1854, when M. Garcia, a celebrated London teacher of music, discovered that he could see his own vocal cords, by means of a mirror held in his mouth, when a powerful beam of light was thrown in on to it. His discovery and observation were communicated to the Royal Academy for that year, and were published in their transactions. They excited but little attention from the medical world; but Dr. Turck, of Vienna, had some mirrors made according to his ideas, and experimented on himself, trying to repeat Garcia's investiga-

tion, but entirely without success. At this stage, Prof. Czermak, of Prague, in Bohemia, borrowed Turck's mirrors, and tried them. He succeeded perfectly. He is called the father of laryngoscopy; and to him is rightly due the credit of having made the art available. He travelled about the continent, making it known, and freely giving all the information he could. Turck, finding Czermak succeeded so well, resumed his trials with success, and disputed the claim of discovery with Czermak. Various persons have also disputed the same claim, unearthing old dead and buried instruments and notions which would have remained so to this day, had it not been for Czermak. At about the same time, in this country, Dr. E. Cutter, of this city, invented a laryngoscope, which was made for him by the celebrated firm of Alvan Clark & Son, of Cambridgeport. He was the first cis-Atlantic, as far as our knowledge goes, to discover the principles of the instrument.

At the present day, the business of inspecting the larynx and posterior parts has arisen to the dignity of a special art; and, in the most populous civilized cities of the world, there is now a large corps of earnest, distinguished, and successful laborers. Diseased conditions have been disclosed which were unknown before, or mistaken for other abnormalities, and which hitherto were allowed to run unchecked. The old method of swabbing the throat in the dark, by guess, so much like the process of cleaning out a chimney, is now in disrepute; while in its place is adopted a scientific and exact application of remedies to the site of the disease, under sight, and nowhere else. The physician treats the affections with more confidence, as he can watch the progress of the disease, see the effect of applications, and determine with definiteness the pathological condition.

From this brief survey, it will be seen that no one who has a serious affection of the throat ought to allow it to go on without giving himself the benefits of a thorough examination with the laryngoscope.

We wonder that more physicians do not employ the laryngoscope. The apparatus and the principles are of the simplest description. It only requires patience and perseverance. It is estimated that fifty per cent of all the cases can be examined by any intelligent and careful manipulator. The remaining fifty per cent require experienced and skilful hands; a small proportion being entirely beyond the abilities of any one.

The difficulties are mainly subjective, and arise from irritability and involuntary movements of the tongue, which has always had the bad reputation of being an "unruly member."

To illustrate the value of the laryngoscope, we will relate a single case: — Some five years since, a young lady of this State became hoarse while teaching school, and finally lost her voice entirely. She consulted a number of eminent physicians, who, without the laryngoscope, made their diagnosis and began their treatment, without any good results. She went from one to another, till the last consulted employed the laryngoscope. This revealed the cause of the loss of voice to consist in a large tumor growing in the larynx, and arising from the vocal cords. It was so extensive that it became necessary to remove it by cutting into the larynx from the outside. This was successfully done; and now, at the expiration of two years and a half of time, the lady is alive and in the constant enjoyment of the use of her voice.

In the *Journal de Chimie* is reported the case of a girl, eighteen years old, poisoned by eating a few of the common domestic flower called the buttercup.

BENZOATED OINTMENT OF THE OXIDE OF ZINC.

Editor Journal of Chemistry: —

The discovery that gum benjamin prevents ointments from becoming rancid is one of the most beautiful, satisfactory, and important of the late contributions to dermal pharmacology. A rancid ointment is irritating to the skin, unpleasant to the eye, and disgusting to the nostrils. It generally receives its appropriate deserts by being cast out as worse than worthless. On the other hand, ointment without rancidity is attractive to the senses. Its purity and freshness soothe the inflamed integument, and allay the irritation. No one ever heard any thing said against the use of unguents when freshly and properly prepared; but when they have lost their virgin freshness, and oxidized into the various stages of chemical changes, from margaric and stearic acids into butyric, etc., their reputation undergoes a similar metamorphosis from good to bad. Thus ointments have fallen into disuse, not from their inherent qualities as first made, but from those features which they acquire by age.

The gum benjamin, as has been stated, arrests these changes, although used in a relatively small proportion to the whole mass. About one grain of the powder to forty-eight of lard is employed. This gum is, according to Wood & Bache's Dispensatory, obtained from the "benjamin-tree, a native of Sumatra, Java, Borneo, Laos, and Siam. By wounding the bark near the origin of the lower branches, a juice exudes, which hardens on exposure, and constitutes the benzoin of commerce. Its chief constituents are resin and benzoic acid; and it therefore belongs to the balsams. It has a fragrant odor, and in the East Indies is burnt by the Hindoos, as a perfume in their temples."

Preparation. — There are two methods of preparing the benzoinated lard, each exceedingly simple. In the first place, the lard should be of the best description. I say *should*, for once, needing some of this ointment for immediate use, and having only lard which had *already become* RANCID, I thought I would try the experiment, to see whether the benjamin would not redeem the lard from its rancidity. It did so. This is a fact worth remembering, and has not hitherto, to my knowledge, been published.

The first process is to take the pulverized gum and lard in the proportion just mentioned; i.e., ten grains to the ounce; place them together in a covered vessel, and then heat over a sand or water bath gently for twenty-four hours, and strain through a fine sieve into another vessel. The finely pulverized oxide of zinc, in the proportion of one ounce to six ounces of lard, is next added, gradually, and as it cools it is to be occasionally stirred with a spatula, so as to insure a uniform diffusion.

The next process is to mix the tincture of benzoin (℥vi. to Oj alch. fort.) directly with the lard, fifteen minims to the ounce, and add the zinc as before. This is considered the most elegant process. However, it does not seem to give that body which the first process secures. This subject has been pharmaceutically studied by Mr. Thomas Doliber, of T. Metcalf & Co., of this city. His labors have been published in the Transactions of the American Pharmaceutical Association for 1866–7. They are entirely satisfactory and exhaustive, and show beyond a cavil the inestimable value of the benzoin in preserving unguents.

Different ointments were prepared with benzoinated lard, and Mr. Doliber, in his carefully conducted test experiments, found that uniformly they kept their freshness in a manner that no other process ever secured. He kept them in a hot place for months, and yet such an unstable ointment as the ung-hydrargyrum refused to become rancid.

The benzoated ointment of oxide of zinc he says, "was not experimented upon, *as, from long experience, I have never known the benzoinated preparation to change;* while it is well known that the officinal ointment *very soon becomes rancid.*" Wilson, the most eminent English dermatologist says: "The benzoated oxide of zinc ointment properly prepared is the most perfect local application for all chronic inflammations of the skin that is known. It is cleanly, agreeable, of a cream-white color, not diffluent and oily like other ointments; and it has a tendency to concrete upon the skin, and constitute an artificial cuticle to an irritated and denuded surface."

An experience of ten years in general practice allows the writer to corroborate this statement. Too much cannot be said in praise of it; keeping for an indefinite time, it is always ready for the use of its normal healing virtues in any case in which it is needed. It is thus a reliable ointment. Its reputation is exceedingly good in the profession, and it is most remarkable that it is not kept for sale by every apothecary throughout the land.

This may be explained in part by the fact that an impression has gone forth that it is an exceedingly difficult preparation to make; and hence when called for, the druggist dishonors the prescription, or sends to T. Metcalf & Co. to have it filled. It finally would be wisest for each pharmaceutist to make it in his own establishment, so that it may become a household word, much better for burns, scalds, erythems, and exanthems, than Russia Salve or Holloway's Ointment, which have such extensive sales. It is useful in the various varieties of eczema, porrigo, and psoriasis; also to wounded, chapped, excoriated, irritated, and inflamed cutaneous surfaces, — a good substitute for "cold cream."

From what has been hinted, it is hoped that the benzoated oxide of zinc ointment may come into more general use. It certainly has been put to the most crucial tests, and has not been found wanting; and in these days of positiveism and progress, such a tried reputation ought to be a passport for it into every druggist's jar and physician's prescription paper. E. CUTTER, M.D.

BOSTON, Mass.

ELECTRICITY IN SEA-SICKNESS.

Within the past few weeks, directions for the cure of sea-sickness have been going the rounds of the papers, which, if completely carried out, would involve the necessity of the patient lying flat on his back, the entire voyage. We find in the *N. Y. Med. Journal*, a description of the process adopted by Dr. Le Coniat, surgeon of the Imperial French Navy, now serving as surgeon of one of the steamers on the French line between Brest and New York.

Dr. Le Coniat's theory is, that sea-sickness is induced by electric disturbance throughout the system, and that vomiting at these times is induced by an involuntary spasmodic contraction of the stomach from the pyloric to the cardiac orifice, thereby emptying that organ. In order to reverse this abnormal condition and restore the electric equilibrium, he places his patient in a horizontal position, uncovers the stomach, and applies to the skin, immediately over it, a solution of sulphate of atropine in the proportion of one grain to an ounce of water; he then places the negative pole of a galvanic battery, terminating in a flat disk, upon the stomach corresponding to the pyloric region. Then, with the positive pole terminating in a moist sponge, he manipulates across the surface of the skin from the cardiac to the pyloric orifice. These manipulations are kept up for three or four minutes, occasionally varying them by vertical passes downward. During the transit of the positive pole across the surface, the muscles can be seen to contract vigorously. The stimulus of galvanism rendered to the stomach by these means is much the same as that given to any other paralyzed or weakened muscle of the body; certainly the effect produced justifies the theory. It appears to be not only local in its influence, but pervading; the whole system seems to be brought under its control; its effects are soothing and refreshing, and generally accompanied with drowsiness, followed by refreshing sleep.

Dr. Le Coniat has been practising and improving his new remedy for about three years past; he has written one or two minor articles on the subject which have been published in some of the French journals. On his return home, he proposes to publish a treatise on the subject, for the benefit of science.

Sulphurous acid is strongly recommended by Dr. Lawson in the treatment of pyrosis. It may be given in doses of from ʒss. to ʒj., in some bitter infusion, three times daily, shortly before meals.

There are on earth 1,000,000,000 of inhabitants. Of these 33,333,333 die every year; 7,780 every hour, and 60 every minute — or one in every second. But there are always more births than deaths, and so population increases.

COMFORT.

The great aim of the mass of mankind is, to get money enough ahead to make them "comfortable;" and yet a moment's reflection will convince us that money will never purchase "comfort," only the means of it. A man may be "comfortable" without a dollar; but to be so, he must have the right disposition; that is, a heart and a head in the right place. There are some persons who are lively, and cheerful, and good-natured, kind and forbearing in a state of poverty which leans upon the toil of to-day for to-night's supper, and the morning's breakfast. Such a disposition would exhibit the same loving qualities in a palace or on a throne

Every day we meet with persons who in their families are cross, ill-natured, dissatisfied, finding fault with everybody and everything, whose first greeting in the breakfast-room is a complaint, whose conversation seldom fails to end in an enumeration of difficulties and hardships, whose last word at night is an angry growl. If you can get such persons to reason on the subject, they will acknowledge that there is some "want" at the bottom of it; the "want" of a better house, a finer dress, a more handsome equipage, a more dutiful child, a more provident husband, a more cleanly, or systematic, or domestic wife. At one time it is a "wretched cook," which stands between them and the sun; or a lazy house-servant, or an impertinent carriage-driver. The "want" of more money than Providence has thought proper to bestow, will be found to embrace all these things. Such persons may feel assured that *people who cannot make themselves really comfortable in any one set of ordinary circumstances, would not be so under any other.* A man who has a canker eating out his heart, will carry it with him wherever he goes; and if it be a spiritual canker, whether of envy, habitual discontent, unbridled ill-nature, it would go with the gold, and rust out all its brightness. Whatever a man is to-day with a last dollar, he will be radically, essentially, to-morrow with a million, unless the heart is changed. Stop, reader; that is not the whole truth, for the whole truth has something of the terrible in it. Whatever of an undesirable disposition a man has to-day without money, he will have to-morrow to an exaggerated extent, unless the heart be changed: the miser will become more miserly; the drunkard more drunken; the debauchee, more debauched; the fretful, still more complaining. Hence, the striking wisdom of the Scripture injunction that all our ambitions should begin with this: "Seek first the kingdom of God and his righteousness;" that is to say, that if you are not comfortable, not happy now, under the circumstances which surround you, and wish to be more comfortable, more happy, your first step should be to seek a change of heart, of disposition, and then the other things will follow—*without the greater wealth!* And having the moral comfort, bodily comfort, bodily health, will follow apace, to the extent of your using rational means. Bodily comfort, or health, and mental comfort have on one another the most powerful reactions; neither can be perfect without the other, at least, approximates to it; in short—*Cultivate health and a good heart;* for with these you may be "comfortable" without a farthing: without them never, though you may possess millions!—*Journal of Health.*

CARBOLIC ACID IN TREATMENT OF BOILS AND ABSCESSES.—C. J. Cleborne, M.D., U.S.N., gives (in the *Druggists' Circular*) his experience with carbolic acid in the treatment of whitlows, boils, and abscesses. Having made a free opening as soon as fluctuation could be detected, and extracted, by gentle pressure, all the pus, he either injected or swabbed out the cavity with the ordinary liquid carbolic acid of the shops, after which he applied a cold water dressing. By this treatment, further suppuration was prevented, and the wound healed so rapidly that the patient returned to duty in two or three days. In some cases, after evacuating the pus and using the acid, the edges of the wound were drawn together with isinglass plaster, and in twenty-four hours it had entirely healed.

Dr. Daney recommends the citrate of soda in diabetes, in doses of from 60 to 120 grains per day. It is converted into the carbonate, and readily enters into the circulation, causing the rapid disappearance of the disease.

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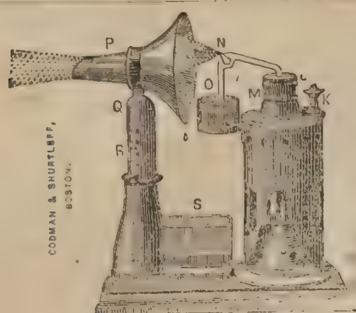

Fig. 1. U. S. Army Standard.
(Pat. March 24, 1868.)

This Steam Apparatus has been placed upon the Supply Table of the U. S. Army as the Standard.
Its joints are both screwed and soldered.
It cannot be injured by exhaustion of water, or by any steam pressure attainable.

Price $12.00.

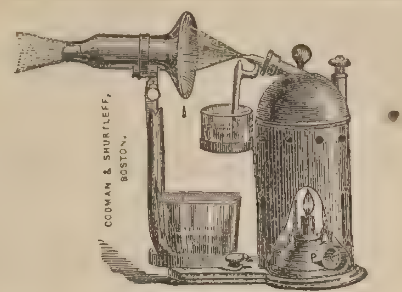

Fig. 15. The Complete Steam Atomizer (*new*).
(Patented March 24, 1868.)

All its joints are hard soldered.
It cannot be injured by exhaustion of water, or any attainable pressure.
It does not throw spirts of hot water; is convenient, durable, portable, compact, and cheap, in the best sense of the word. **Price $6.00.**
Neatly made, strong, Black Walnut Box, with convenient handle, additional **$2.50.**

Fig. 5. Shurtleff's Atomizing Apparatus.
(Patented March 24, 1868.)

The most desirable Hand Apparatus.
Rubber warranted of very best quality. Valves of hard rubber, every one carefully fitted to its seat, and work perfectly in all positions.
The Bulbs are adapted to all the Tubes made by us for Local Anæsthesia in Surgical Operations, Teeth Extraction, and for Inhalation.

Price $4.50.

Each of the above Apparatus is supplied with two carefully made annealed glass Atomizing Tubes, and accompanied with directions for use. The Steam Apparatus are tested with steam, at very high pressure. Each Apparatus is carefully packed for transportation, and warranted perfect.

ALSO,

Hand Ball Apparatus (Fig. 5, without shield), with two Glass Tubes	$4.00
Silver-Plated Tubes, for Local Anæsthesia and for Inhalation, each	2.00
Rhigolene, for Local Anæsthesia, best quality, packed	1.00
Nasal Douche, for Treating Diseases of the Nasal Cavity, six different varieties, each with two Nozzles, packed . .	$1.25, 1.50, 2,00, 2.50, and 3.50

N B.—To save collection expenses, funds should be sent with the order, either in form of draft, post-office order, or registered letter.

[For complete illustrated Price-List of Apparatus, Tubes, etc., see pamphlet.]

Will be sent by mail (post-paid) on application, a Pamphlet containing two articles, by distinguished foreign authority, on

"INHALATION OF ATOMIZED LIQUIDS."

With formulæ of those successfully employed.

Also an article by Dr. J. L. W. Thudichum, M.R.C.P., on

"A NEW MODE OF TREATING DISEASES OF THE NASAL CAVITY,"

WITH HIS FORMULÆ.

Also, an illustrated description of the *best apparatus* for the above purposes, and for producing **Local Anæsthesia** by Atomization with Ether, by the method of Dr. Richardson, of London; or with Rhigolene, as described by Dr. Henry J. Bigelow, in the *Boston Medical and Surgical Journal*, of April 19, 1866.

All our Atomizing Apparatus is made with the utmost care with view to its complete efficiency, convenience, and durability, and every one is warranted. The Steam Apparatus (Fig. 1), has been adopted into the "Supply Table" as the standard for the United States Army. A Gold Medal has lately been awarded us by the Middlesex Mechanics' Association, for Atomizing and Surgical Instruments, as will be seen from the following report, signed by a leading New-England Surgeon and Physician:

"**1503. Codman & Shurtleff, Boston, Mass. One Case Surgical Instruments and Atomizers.**

"The Committee have no hesitation in awarding for this superb exhibition the highest premium. * * * * * The various other instruments for Inhalation of Atomized Liquids, and for Local Anæsthesia, were all apparently faultless, both in design and workmanship. The exhibitors are regarded as more especially deserving of the highest token of merit for having produced nothing except of their own manufacture.—**Gold Medal.**

"(Signed) GILMAN KIMBALL, M.D., *Chairman.*"

The following is an extract from a note from Dr. Bigelow: "I have thus far found nothing better for freezing with Rhigolene than the tubes made by you after the pattern I gave you, and which I still use with your other apparatus."

Dr. J. Mason Warren says: "Your apparatus for Atomization of Liquids seems to have been carefully made, and I think it an efficient one where required for treatment of diseases of the Throat and Lungs. The apparatus for Local Anæsthesia which you made for me answers the purpose perfectly."

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Cammann's Stethoscopes, Articulated	$8 00
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French Rubber Urinals, male, day only . . .	4 00
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Vaccinators, Automatic, in case, postpaid . . .	4 00
Laryngoscopes, complete	$18 00 to 28 00
Dr. Oliver's Laryngoscopic Lantern	4 00
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(*Prunus Virginiana, or Cerasus Serotina.*)

"The bark of the wild cherry is among the most valuable of American remedies. Uniting with a tonic power the property of calming irritation and diminishing nervous excitability, it is admirably adapted to the treatment of diseases in which debility of the stomach, or of the system, is united with general or local irritation."

For the information of physicians, we give a general statement of our method of producing Wine of Wild Cherry Bark. The best bark is selected, reduced, and exhausted of all its properties, without the aid of heat. The result is a liquid in which resides in a latent condition the sedative principle, and this is developed only by bringing the amygdalin of the bark, which hides this principle, into contact with emulsin: this reaction liberates hydrocyanic acid, which thenceforth constitutes one of the most active and valuable principles of our preparation. Sound sherry wine is then added in such proportion as to act as an adjuvant to the combined virtues of the drug.

The remarkable sedative properties of this bark are in this preparation fully developed, and constitute, with the tonic bitter, a very efficacious and palatable remedy. Physicians who prescribe "Wine of Wild Cherry Bark" should be particular to obtain that preparation which combines all the virtues of the drug. Prepared by

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For cleaning and making sweet, musty or bad-smelling Casks or Vats, used for holding Cider, Beer, etc.

It is well known that Cider, Beer, Wine, Vinegar, etc., no matter how good, are spoiled by being put into foul or musty casks.

Permanganate of Potash is one of the most powerful purifying and deodorizing agents known, immediately destroying most organic substances brought into contact with it; and it possesses the advantage over all other disinfectants of being perfectly harmless and inodorous, at present being largely used for the purification of water.

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Dose.—Six or eight grains to adults, dissolved in water, syrup, or wine.

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TO PHYSICIANS.—Prof. Horatio R. Storer will deliver his FOURTH PRIVATE COURSE of TWELVE LECTURES on the Treatment of the Surgical Diseases of Women, during the first fortnight of December, with illustrative operative instruction at the Franciscan Hospital for Women, under his charge.

Fee $50, and Diploma required to be shown. Certificates of attendance upon the previous courses have now been issued to twenty-nine gentlemen in different parts of the country.

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BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. III.—No. 9.] BOSTON, MARCH 1, 1869. [ISSUED MONTHLY, AT FIFTY CENTS PER ANNUM.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Science.

OUR LITTLE SUNS.

Those vast masses of matter called planets, in obedience to great natural laws, revolve around the sun, and their dark surfaces are lighted up by his effulgent beams. During one half the hours we are permitted to spend upon our planet, he leaves us in shadow, and it becomes necessary that we should devise some *little suns* to imperfectly compensate for his absent rays. Our forefathers used rushlights and tallow candles; in more modern times the rich "harvests of the sea" supplied oil, and the simple devices of the primitive people of olden times, were in a measure cast aside and forgotten. Then, we began to bore great auger-holes into the bosom of mother earth; down, down, through sand, clay, and rocks, the sharp revolving instruments were thrust, and upon their return, a strange black liquid bubbled up; this we call oil, and by its combustion millions of very excellent little suns are produced, about which scores of happy families revolve every evening.

But we have to speak in this writing more particularly of that class of artificial suns which the learned and ingenious chemists have suggested or devised, and which have more recently attracted the world's attention. We will allude to them very briefly: First, we have the *electric light*. Of these devices there are many, all dependent upon the agency of electricity for obtaining results. As a class, they are more or less imperfect, the main obstacles in the way of complete success being the cost of production, and some mechanical difficulties comparatively unimportant. A score of indefatigable, laborious students, in various parts of the world, are hard at work upon the important scientific problem of the production of a cheap and practicable light by the use of the electrical forces, and it indeed furnishes a promising field for labor and research. Moses E. Farmer, of this city, one of the most intelligent and indefatigable experimenters in the country, has devoted several years to this special department of study, and the results are exceedingly interesting and important. He is not yet ready to report progress, but this much we venture to say: a very confident expectation may be indulged, that before many months pass away, a cheap, practicable electric light will be ready to dispute with gas and kerosene a place in our workshops and dwellings.

What is known as the *zirconia* light is attracting some attention in Europe. It presents no claims worthy the attention of housekeepers, inasmuch as it is a simple substitution of the rare earth zirconia, for lime, or magnesia, in what is known as the Drummond light. It requires for its ignition, a mingled stream of oxygen and hydrogen, and this renders its use impracticable for ordinary purposes. The new metal *magnesium*, as is well known, affords a most intense light when it is formed into thin ribbons and burned. One serious objection to its general employment—that of cost—has been recently removed, by the discovery of a new and wonderfully cheap method of producing it. Another still remains, and that relates to the production of clouds of impalpable magnesia dust, formed during combustion, which is precipitated upon furniture and renders it unpleasant and injurious. Undoubtedly some lucky experimenter will soon devise a lamp capable of taking care of the magnesia as it is formed, depositing it in some receptacle, and thus enable consumers to secure and sell it to the druggists as medicine. We entertain strong expectations that some practical good will flow from the light produced by burning magnesium.

The recent discovery by which oxygen is very cheaply isolated from atmospheric air, has an important bearing upon the subject of artificial illumination. A full supply of oxygen to flame proceeding from ignited hydrocarbon bodies, increases the luminosity in a wonderful degree. We secure in our gas-lights but about one half the illuminating power which should result, and which would result, if *perfect combustion* took place. Our atmospheric oxygen, by which alone any combustion or luminosity is obtained, is largely diluted with that dead, negative element, nitrogen. This prevents a full supply of oxygen entering into combination with the carbon of the gas, and developing its higher luminous capabilities. Now, if we get rid of the nitrogen, and by artificial contrivances are able to pour a stream of pure oxygen into the jet, we very nearly double its power, and consequently we need not consume but half as much. Here is a cheapening process, provided we can obtain the oxygen at cheaper rates than the carburetted hydrogen or street gas.

We have heretofore described in the *Journal*, Tessié du Môtay's new method of producing oxygen. He procures it from the atmosphere, by first combining it with manganese and soda, and then expelling it from these bodies. The same quantity of manganese and soda will answer for an indefinite amount of oxygen. It is an ingenious but simple process, and the wonder is, that it was not suggested before. The powerful agent is thus furnished in great quantities at a low cost, and it is easy to see that it must have an important bearing, not only upon the matter of artificial illumination, but upon many industrial processes.

The *air light*, so called, is formed by making atmospheric air the vehicle for the conveyance of hydrocarbon vapors, as that of benzole, or light naphtha to burners. All the dozen or more "atmospheric," "gasolene," "automatic," "liquid gas" machines involve this simple idea, and nothing more. We may rightfully be regarded as the parent of the whole of them as a class, as twenty years ago we published the results of our experiments in this direction, as the readers of the *Journal* very well understand. We shall hear but little regarding these devices ten years from the present time. They are open to many objections.

We must exercise considerable patience in this matter

of devising "little suns" for our health and comfort. We are manifestly on the borders of that field of discovery from which the most desirable and important results are to be realized. The chemist is pushing his way in that direction, passing long days and sleepless nights that he may bring immortality upon himself and confer a blessing upon the race.

RANSOME'S ARTIFICIAL STONE.

Success is the touchstone with which we try every thing. But while we applaud the man who attains it at a single leap, how much more worthy of our praise is he who has accomplished his ends only by the long-continued exercise of steady perseverance and determination! It is always pleasant to record instances of such well-deserved success, and in the one that is the subject of this article, we have just such an instance, some account of which will we think interest our readers.

In 1844, an Englishman, Mr. Ransome, conceived the idea that, by making use of certain chemical reactions, he would be able to manufacture artificial stone on a large scale and very cheaply. After seventeen years of labor, he finally attained his end; and for several years past his processes have been in practical operation, at the works of the Patent Concrete Stone Company, at East Greenwich, England. His method consists essentially in binding particles of sand together, by means of a cement of silicate of lime. This is done by mixing with the sand, a strong viscid solution of silicate of soda and then treating the mixture with a solution of chloride of calcium; double decomposition takes place between the two salts; silicate of lime and chloride of sodium are formed, the the mass hardening as the reaction goes on. The chloride of sodium being washed out, there remains a solid, stony mass that retains the shape that was given to the pasty mixture of sand and silicate of soda. This seems very simple, but Mr. Ransome found difficulties enough in carrying it out. He had first to find out a cheap way of making silicate of soda, which was then prepared either by fusing silica with caustic or carbonated soda, or by boiling calcined, powdered flints with solution of caustic soda. The latter gives a weak, very alkaline solution; and both were too costly. He at last hit upon the plan of dissolving his flints in boiling caustic soda, *under pressure*, and found it perfectly successful; indeed it was not even necessary to powder the flints. At the works of the company above mentioned, the solution is prepared in a cylindrical iron boiler under a pressure of 60 or 70 pounds to the square inch. The flints are placed upon a grating, solution of caustic soda of sp. gr. 1.12 poured in, and steam turned on. After the flints have dissolved the liquid (sp. gr. 1.2) is drawn off into a settling tank, whence the clear liquid is run into an evaporator and concentrated to sp. gr. 1.7. We have now a thick, gummy, transparent fluid ready for service. The sand is prepared by drying it in an inclined revolving cylinder, through which a stream of hot air is passed; it is then sifted and a portion of it powdered under cast-iron edge runners. The sand in its natural state would make a stone of too coarse a grain; some powdered sand is therefore mixed with it, and sometimes a little powdered limestone is added. The sand mixture and silicate in the proportion of 2½ to 3 bushels of the former to 1 gallon of the latter, are placed in a mill and thoroughly mixed together. The pasty mass from the mill has just sufficient coherence for moulding purposes.

The moulding is an operation requiring considerable care, as every portion of the mould must be completely filled. The pieces after removal from the mould are sprinkled with a solution of chloride of calcium, and soon become hard enough to bear moving about. It is, however, necessary that every part of the incipient stone should be saturated with the lime solution, and this is accomplished in an extremely ingenious manner. During the process of moulding, an opening is made leading into the centre of the piece and when the solution of chloride of calcium is applied, a pipe is put into this opening and the air exhausted; the pressure of the atmosphere upon the outside forces the liquid completely through the mass. Or if the piece has been moulded solid, it is placed in a box with a perforated false bottom, and exhaustion made from beneath with equally good effect. The objects are now boiled for several hours in the same solution, in order to make it certain that the action is complete. It is very likely too, that the boiling has a tendency to harden the cementing material. The only things now left to be done, are to wash out the chloride of sodium formed in the stone, by the reaction of the chloride of calcium upon the silicate of soda, and to dry the finished articles. The washing is accomplished at the East Greenwich works in shower-baths, supplied with a continual stream of water; any excess of chloride of calcium is, of course, removed at the same time. When the season permits, drying in the sun is preferred; at other times artificial heat is used. It is very evident, that this process is capable of very extended application. Articles of any shape can be made by it, from the plain, square block to the most elaborate and highly ornamented capital. It is peculiarly adapted to the manufacture of mantels, balustrades, or screens. The East Greenwich Company has already gained quite a reputation for such articles. They have made some ornamental screens for the India Office, in London; a number of Ionic capitals for the post-office at New Zealand; and others modelled from some of the masterpieces of Grecian art, intended for buildings at Calcutta. They make grindstones of unequalled uniformity, and, in fact, do any kind of stonework expeditiously and cheaply. It might safely be predicted that this stone would stand the test of time; and such has been the case, wherever it has been tried. From its composition, and especially from its uniformity of composition, we can be certain that it is of an enduring nature. Ransome's process will be of especial value in localities where building material is not found, and even in many places where natural stone abounds, the cost of working it will be so great that the artificial article can successfully compete with it. Works have been already commenced in India and will soon be started in other countries. Would not this process be useful along the line of the Pacific Railroad? In the places along its line where building-stone is to be had, the skilled labor necessary to work it cannot be obtained for a long time to come; while if stone according to Ransome is made, the crude materials transported by the railroad can be worked up anywhere, by ordinary labor, to a building material better than limestone and as good as granite.

Greek Fire.—The nature of the composition used by the ancients called Greek fire, is not well understood. We make an inextinguishable flame by dissolving phosphorus, or sulphur and phosphorus, in bi sulphide of carbon. This we believe to be a more formidable incendiary agent than anything used by the old warriors of Greece. Water does not extinguish it, but wet sand or sawdnst will. Upon the removal of sand, even after many hours, it is liable to spontaneously ignite, and do much mischief. It is a dangerous agent to experiment with.

Arts.

HOW LIQUORS ARE MADE.

We present to the readers of the *Journal* some *very private* recipes for making factitious liquors, used by extensive dealers in Europe and in this country. The spirits made after these formulæ simulate the genuine most wonderfully, and are calculated to deceive even expert tasters. This exposure of the secrets of the trade cannot fail to have an influence in arresting liquor-drinking, more effective than all the oratory of temperance lecturers, combined with tracts and pledges.

RECIPE NO. 1, FOR BRANDY, FROM OIL COGNAC.—AMBER.

Oil cognac	1 ounce.
" bitter almonds	¾ dram.
" wine ethereal	4 ounces.

Being cut in one quart of spirits of wine 95°, place the whole in a bottle properly corked, and shake well together, so that the ingredients may be thoroughly dissolved. Then leave the mixture to stand for a day in a place not too cold. After this, pour the whole into about 175 gallons of pure spirits 10° to 25° above proof. Add 4 to 5 pounds sugar dissolved in water, boiled and skimmed, and as much burnt sugar as is requisite to give the brandy a handsome color. This is now to be well shaken for four days, several times each day, and suffered to remain quietly for from 14 to 20 days—the longer, the better. If it be intended to produce a fine brandy, add to the above 10 bottles of good Malaga wine, in which case, however, only 3 pounds diluted sugar are used.

RECIPE NO. 2, FROM OIL COGNAC.—WHITE.

Oil cognac	1 ounce.
Acetic ether	1 pound.
Tamarinds	4 pounds.
Cherry juice, sour	6 pints.
Sugar, dissolved in water	2 pounds.

Are cut in one gallon of 95° spirits of wine, and the ingredients then dissolved in 130 gallons of spirits 10° to 20°. Color with French coloring, and allow the liquid to stand, after having been well shaken, as long as possible.

RECIPE NO. 3, FROM OIL COGNAC.—GREEN.

Oil cognac	1 ounce.
" ethereal (of wine)	4 ounces.
" bitter almonds	½ dram.
Fleurs de sureau (elder-flowers)	3 pounds.
Tannin	½ ounce.

Are dissolved in one gallon spirits of wine 95°, and the whole poured into about 150 gallons pure spirits, of from 15° to 25° above proof. Burnt sugar is used to obtain a pale or brown color, and the tannin gives a roughness and the appearance of age. Keep from air, and filter properly.

RECIPE NO. 4, FROM OIL COGNAC.—GREEN OR PINK.

Oil cognac	1 ounce.
Acetic ether	4 ounces.
Peach "	3 "

Are dissolved in one quart 95° alcohol. Add then to it, in a clean glass bottle, 10 quarts Rochelle brandy, or pure spirits, of 15° to 25° above proof, and let it infuse for five or six days, exposed to a *moderate* heat. Shake it four or five times a day, taking particular care to keep the bottle perfectly tight. At the end of six days, draw it off clear, and put the contents into 130 gallons pure spirits from 15° to 20°. This preparation will be found to possess a delicious bouquet or flavor.

Manufacturers will find it to their advantage to use sometimes with discretion, tamarinds, bruised French plums, wild-cherry juice, peach ether, old brown sherry, clean oak shavings, tincture catechu, finely powdered charcoal, black tea, ground rice, and other ordinary materials well known to distillers and rectifiers, each valuable for their respective properties.

RECIPE FOR GIN.

Oil angelica	1 ounce.
" juniper, triple	1 "
" rum, white	1 "
Essence lemon	4 drams.
Salt, culinary, dissolved in water	2 pounds.
Syrup, white sugar	1½ galls.
Water	5 "

These ingredients are to be dissolved in about two gallons of high proof alcohol 95°, and after being thoroughly united, poured into about 100 gallons of spirits of

wine, of from 10° to 15° above proof. Distillers frequently employ oil caraway ½ ounce, oil fennel ½ ounce, and oil peach ½ ounce, each of which produces an aromatic effect, and gives a *smoothness, richness, creaminess* to the liquor. Creosote is used with great caution, where a certain degree of *smokiness* is required; and a small quantity of caustic potash is sometimes added, to render the gin biting upon the palate. The casks and utensils employed should be perfectly clean and properly prepared, so as not to give color, as much of the value of the liquor depends on its clearness.

RECIPE FOR RUM.—JAMAICA.

Oil rum, brown	1 pound.
" pimento	1 ounce.
Acetic ether	1 "
Sugar candy, crushed and dissolved in water	3 pounds.
Water, fresh and clear	10 galls.

Are dissolved, the oils being cut in high proof alcohol, in about 100 gallons of pure spirits 10° to 15°, and allowed to stand from 10 to 14 days. The rum produced will be found to possess a rich and delicate flavor.

RECIPE FOR RUM.—SANTA CRUZ.

Oil rum, white	1 pound.
Essence lemon	2 ounces.
Nitrous ether	4 "
Syrup, white sugar	1 gallon.
Water	10 galls.

The method of preparing these ingredients is the same as that observed for the Jamaica brand, care being taken to avoid an excess of any one flavoring.

RECIPE FOR PEACH BRANDY.

Oil peach, or peach ether	1 pound.
" grape	½ ounce.
Orange-flower water	½ "
Syrup	1 gallon.
Water	1 "

Are cut and dissolved in about 60 gallons pure spirits, and then allowed to stand 14 to 20 days.

The recipes here given are some of the most reliable, obtained from different European manufacturers.

It will be observed, that the GIN is peculiarly a delectable compound, with or without the "biting" caustic potash, or *smoky* creosote. The oil of bitter almonds, ethereal wine, peach extract, nitrous ether, etc., etc., are all poisons, and, when taken into the stomach with alcohol, are calculated to make "short work" with those who swallow the liquids. These liquors are often sold at the fashionable and first-class bars, and find their way into the stomachs of the most fastidious tipplers.

To Obscure Window Panes.—If one ounce of powdered gum tragacanth, in the white of six eggs, well beaten, be applied to a window, it will prevent the rays of the sun from penetrating.

To Imitate Rosewood.—Take half a pound of red sanders and the same weight of logwood and boil them in one gallon of water for one hour, then strain the liquor through a cloth and add half an ounce of alum, in powder, and stir until it is dissolved. This stain is now to be applied hot to the wood with a sponge, and it makes the reddish tinge of rosewood. When dry, the dark stain for the blackish streaks is made with a liquid obtained by boiling one pound of logwood for an hour in the same quantity of water as the above, and using it in the same manner. The dark stain can be made jet-black by adding a quarter of an ounce of copperas to the pure logwood stain.

How to Make Ivory Soft and Ductile.—According to the process of Geisler, in Switzerland, articles of ivory are placed in a solution of phosphoric acid of 1.13 specific gravity, and left there until they assume a transparent aspect. After this, they are taken from the acid, washed off in water, and dried with soft linen cloth. The articles are now as soft as thick leather; they become hard in the open air, and when placed in warm water they assume their former softness.

The application of such ivory for nipples of nursing-bottles, or for covers of sore breasts, and for similar articles, is of importance. The change evidently consists in a solution of a portion of the lime producing a composition containing a smaller percentage of lime than ivory. —*Dingler's Polyglot Journal.*

FOOD AND ITS ADULTERATIONS.

High prices for food lead to the introduction of injurious substitutes and adulteration. At the present time an unusual number of articles of food in daily use are badly adulterated. Common scandal for years has assigned to the milk vended from the wagons a reputation by no means creditable to the salesmen. Whiting, flour, water, and many other things have been found to constitute the ingredients of the produce which confiding persons have supposed to be elaborated by the mammary glands of the cow. Cream is a mythical affair altogether.

Butter has also been found to be extensively adulterated in England. About fifteen years ago the owners of the London *Lancet* employed Arthur Hill, Hassel, and others, to investigate the matter of the adulteration of food, and published the results of their experiments in a series of papers. The scales and test-tubes were employed in the endeavors to determine the quality and ingredients of the various staple articles employed in diet by the inhabitants of the British metropolis. Dr. Hassel afterward embodied the results of his labors in a volume, which is declared to be a very cyclopedia of dishonesty. No less than forty-eight samples of butter were examined by these investigators, and their discoveries were recorded at full length. They ascertained that about one fifth of the whole weight consisted of salt and water, the water having been stirred up with the butter rendered half fluid by heating. Potato flour was also detected.

The adulteration of coffee is more notorious. Chiccory and dandelion are commonly mingled with it; and, indeed, peas, barley, sweet corn, wheat, are substituted in its place. Even the chiccory itself is too valuable to escape analogous treatment. Doctor Hassel and his associates examined thirty-four samples of the prepared sort, and found carrot, parsnip, beet, beans, acorns, roasted corn, biscuit powder, and burnt sugar.

These gentlemen examined forty-two specimens of coffee, finding thirty-one to be adulterated purely with chiccory; twelve, chiccory and roasted corn; one with beans, and one with potato flour. A packet of "Jamaica coffee" was found to be composed almost entirely of chiccory; the "finest Java coffee" consisted of half coffee, much roasted corn, and a little chiccory; "superb coffee" was principally chiccory and roasted corn; "fine Plantation Ceylon" was almost entirely chiccory; "fine Java" was heavily charged with chiccory and potato; "delicious drinking coffee" was chiccory and roasted corn. The more imposing the name, the grosser the counterfeit appears to have been. We remember some months since to have been presented with a sample of made coffee, the flavor of which greatly resembled that of charred wool, and its effect upon the stomach was any thing but agreeable. Indeed, in this country, as well as elsewhere, there are but two certain plans to follow to obtain real coffee: to witness the grinding of it or to purchase it whole and grind it at home. Nevertheless, there are honest coffee-merchants occasionally.

The same remark applies with equal justice to the trickery played upon tea. The Chinese adulterate it themselves before selling it to the "outside barbarians," by mixing with it ash or palm leaves. The English are large in the practice of gathering the "grounds" or exhausted leaves, mixing them with a solution of gum and drying them; after which, by adding rose-pink and black lead to "face" them, they are made into black tea, and by using copperas they have green tea. The leaves of the beech, elm, chestnut, plane, oak, willow, poplar, hawthorn, sumach, holly, sloe, are used more or less in the work of adulteration. Black tea, however, does not appear to suffer much in reputation in this manner; but of green teas this cannot be said. Of course, it is not necessary to remark that the difference between genuine green and black teas consists in the peculiar manipulation given them by the Chinese.

Chocolate has also become notorious by reason of its adulterations. Flour appears to be the principal ingredient employed for this purpose; starch, sugar, cocoa-nut oil, lard, tallow, sweet ochre, and chalk, have also been used. The very mode of preparing it affords facilities which the dishonest could not leave alone. The proclivity is unfortunate, for the beverage is cheaper and more wholesome than its rivals.

The corruptions of sugar are less numerous, and are confined principally to confectionery. Gamboge, starch, flour, pipe-clay, plaster of Paris, chalk, and even copper, lead, and mercury, are used in the preparation of cheap candles.

Wheat flour is generally sold in this country in a pure condition, owing to its cheapness. But in England, it has been found upon analysis to yield such queer constituents as white corn meal, potato flour, plaster of Paris, ground bones, chalk, rye, bean, pea, and rice flour. Bread, however, is badly adulterated. There is some reason for our people to adopt the suggestion of the French tiger Marat, and hang up the bakers at their own doors. The bread which they serve becomes thoroughly unpalatable when but a few hours old, owing to the improper ingredients employed in its preparation. Alum, either pure or mixed with salt, is a familiar article in the manufacture, making inferior flour white, and enabling it to absorb a larger quantity of water.

The remedy for these evils is an important topic for consideration. Legislation has often been proposed, but we cannot quite agree with those who regard it as the panacea of human ills. Indeed, it is hardly possible to establish in any large community, like Boston, New York, or Philadelphia, a system by which unwholesome or adulterated articles would be excluded from the market. Beside, we are a people jealous of much governing. We prefer to be cheated in the weight or quality of our bread, the quantity of our berries, the constituents of our milk, or even the ingredients which constitute our coffee or wine, to the alternative of an espionage into our habits and employment. The surveillance which in many European countries exposes every man's most trivial acts to the cognizance of government, would be resented by us as an unpardonable outrage on personal rights. We prefer to take our chances with the petty knaveries of our neighbors, to hourly contact with the informer, the policeman, or the magistrate.

Color Blindness, or Daltonism.—Persons affected with the erroneous perception of colors are partially unfitted for many occupations; but there are some professions in which the defect is a source of positive danger. Some railroad accidents have been reported from this cause; and on the French lines many candidates are rejected on account of their inability to distinguish a green from a red light.

Cleaning Silk.—The following is said to be an excellent recipe for cleaning silks:—Pare three Irish potatoes; cut them into thin slices and wash them well. Pour on them a half pint of boiling water, and let it stand till cold; strain the water and add to it an equal quantity of alcohol. Sponge the silk on the right side, and when half dry, iron it on the wrong side. The most delicate-colored silk may be cleaned by this process, which is equally applicable to cloth, velvet or crape.

Mode of Dividing Glass.—The following plan, to break a bottle or jar across its circumference, so as to form a battery cup, or vessel for other purposes, may be of some service to your readers. I have performed the operation successfully many times. Place the bottle in a vessel of water, to the height where it is designed to break it; also, fill the bottle to the same level. Now pour coal-oil, inside and out, on the water; cut a ring of paper, fitting the bottle. Saturate with alcohol or benzine, so that it touches the oil. Pour, also, some inside the bottle. Set on fire; the cold water prevents the glass from heating below its surface, while the expansion caused by the heat will break the vessel on the water line.—J. T. Peet: *Scientific American.*

Ink from Elder.—We learn from Wittstein's *Vierteljahresschrift* that an excellent permanent black ink may be made from the common elder. The bruised berries are placed in an earthern vessel and kept in a warm place for three days, and then pressed out and filtered. The filtered juice is of such an intense color that it takes 200 parts of water to reduce it to the shade of dark red wine. Add to 12½ parts of this filtered juice, one ounce of sulphate of iron and the same quantity of pyroligneous acid, and an ink is prepared which, when first used, has the color of violet, but when dry is indigo blue black. This ink is superior in some respects to that prepared with galls. It does not become thick so soon; it flows easier from the pen without gumming; and in writing, the letters do not run into one another.

GREEN PAPERS.

Editor Boston Journal of Chemistry:—

A stove furnished with one of Chilson's dampers was left burning in a bookbinder's shop on a Saturday evening. The door of the shop was closed. It was opened but once on the next day, to replenish the coal, which continued to burn till Monday morning. A pile of printed paper, designed for the covering of school-books, was lying in the shop, near the floor. The ground of the paper was green. On Monday morning, the surfaces exposed to the air of the room were found to be straw-colored instead of green.

Did the sulphurous gas from the coal accumulate to such a degree, in the closed room, as to form a sulphite of arsenic with the arsenic oxide of the paper? Is it proper to use arsenic in the covers of school-books put into the hands of children? J. R.

CONCORD, MASS.

NOTE.—The greens found upon papers are usually the arsenide of copper, and are poisonous. By the action of the coal-gases, the color was decomposed, and orpiment, or sulphide of arsenic, was formed upon the paper. All paper of a green color should be rejected by binders of books, as unsafe to use.

HEAT PHENOMENA.

Editor Boston Journal of Chemistry:—

Your correspondent's views regarding the "Phenomenon Relating to Heat," expressed in the January number of your valuable *Journal*, no doubt are correct, and agree with the views of scientific men generally. It is not difficult to prove, in more ways than one, that the effect is not due to a vibratory motion of dust. If it was, what would prevent our seeing the movement, whether the background was varied or otherwise? The conditions for changeable refraction are favorable, as the constantly varying density of the air flying away in hot currents succeeded by colder, changes the refractive power of the medium through which the objects of the background are seen; they are, therefore, necessarily tremulous and distorted. The twinkling of stars is explained in the same way; and the bad weather generally following proves that there were currents of various densities and temperatures.

Yours truly, M. B. MANWARING.

NEW BRUNSWICK, N.J., Jan. 19, 1869.

THAWING FROZEN WATER-PIPES.

Editor Boston Journal of Chemistry:—

Water-spouts and sink-spouts that are frozen up may be speedily thawed out in the following manner:—

Procure a piece of lead pipe of suitable length and size; place one end against the ice to be thawed, then, through a tunnel in the upper end, pour boiling water. Keep the pipe constantly against the ice, and you can penetrate one foot or more per minute.

Thinking the above would be appreciated by the readers of your always welcome and useful *Journal*, I thought proper to communicate it. WM. E. ROGERS.

REXFORD FLATS, N.Y.

COATING TIN WATER-PIPES.

Editor Boston Journal of Chemistry:—

In a conversation with Dr. Charles T. Jackson, the well-known chemist of Boston, some years ago, upon the introduction of water through lead pipes, he stated that he had employed block-tin pipes in his own house; but, as they would corrode through in six months if laid in the soil, he had had them wound around with strips of canvas well saturated with pitch, and then coated all over the outside with hard pitch about an inch thick. He stated it would preserve the pipes for years, and also serve as a protection against frost. This information may be of interest to your readers. H.

NEW CEMENT FOR TEETH.—Freshly calcined oxide of zinc, 9 parts; finely powdered borax, 1 part; finely powdered silex, 2 parts; all mixed well together. A correspondent of the *Druggist* states that this makes a firm plastic mass, and that it is used by French and German dentists.

ZODIACAL LIGHT.

DR. NICHOLS.—Dear Sir: At a meeting of the "Cincinnati Literary Club," held Jan. 2d, 1869, which was addressed by Prof. C. Abbe, Director of the Cincinnati Observatory, the speaker said:—

"Cassini first, in 1633, began to make observations of the zodiacal light; and the common explanation of its appearance has been, that it must be an ellipsoidal atmosphere about the sun. This, however, is of a different constitution from the corona above referred to, and, from the observations of Jones and Schmidt, appears to extend beyond our earth at times. We have thus the sun surrounded by an immense thin, transparent gas—the zodiacal light, within which is a denser atmosphere—the corona, within which is a luminous atmosphere—the photosphere, within which is the liquid molten lava-surface of the sun, and this doubtless incloses a solid nucleus."

Should you think proper, please insert this in the *Journal*, and oblige, NICHLOS JOHN, M.D.

CINCINNATI, Jan. 14, 1869.

REMEDY FOR FROST-BITE.

Editor of Journal of Chemistry:—

If it is the foot, tie it up in a pound of flour, covering every part well with the flour for some hours. The flour will come off quite wet; but the circulations will be restored. The next dressing with flour will come off with very little moisture; the blisters, if any, will dry up, and the foot give no further trouble, except that the toe-nails may come off; but they will grow on again. G. H.

BOSTON, Jan. 18, 1869.

Agriculture.

THE CHEMISTRY OF "SUPERPHOSPHATE."

It is no matter of surprise, that those who have not made the sciences special matters of study, should be puzzled, and even annoyed by the terms and symbols used, especially in the department of chemistry. It is difficult for chemists to write upon the subject, or attempt to explain principles, without making use of language which is imperfectly understood by a majority of readers. We have always endeavored, when writing for general readers, to write *outside* of the technicalities of the science, and forget for a while the easier methods of expressing thoughts, which can alone be understood by the student or professional man. When asked, as we often are, to explain what "superphosphate" is, chemically considered, we do not think it advisable to commence by stating the objections we entertain to the use of the term, and then resort to symbols to explain our meaning. This would be the shorter and easier way, but not the best, for the purpose had in view. "Superphosphate," or superphosphate of lime, is a mixture of gypsum, and *three* different phosphates of lime. There are no less than *thirteen* different phosphates of soda, upon the nature of which an extended treatise might be written. If plaster or gypsum, is a normal constituent of genuine superphosphate, how comes it to be present, if it is not designedly mixed? A brief consideration of what superphosphate is, or how it is made, will explain this. If we take the bones of an ox, or any other animal, and place them in the fire, they will burn, if the fire is very intense, almost as freely as a pine knot. In some bone establishments, large steam-engines are propelled by burning the bones used in the manufacture of phosphorous, or the phosphates. That which burns, is the animal portion, or the gelatine; the *ash* is bone phosphate, or phosphate of lime, which no amount of heat can destroy. Water will not dissolve it, no matter how much is used. This bone ash is composed of a peculiar acid, called phosphoric acid, and common lime, with a little magnesia and soda. Phosphoric acid is formed from that most singular, easily inflammable element, *phosphorous*, and oxygen; take away the oxygen from the phosphoric acid, which the farmer uses to fertilize his fields, and he has in his possession one of the most poisonous and dangerous elements known to chemists. The lime and the phosphorous in the bone, the animal obtained from the *grasses* and *grain* which it consumed as food; the grasses and grain obtained them from the *soil*; hence, it is easy to see, that by sowing bone-dust, or superphosphate upon our soils, we are only restoring what has been taken from it. Water will not dissolve or decompose bone ash (phosphoric acid and lime), *acids will*. Now if we mix oil of vitriol or sulphuric acid with bone earth, or ground bones, it breaks up the compound and forms new ones. Before we mix the vitriol, the phosphoric acid clings to the lime most tenaciously, but when the "*King acid*" steps in, he says to the phosphoric, "Stand aside! I will take charge of the lime atoms;" and this he does. The lime is severed from the embrace of the phosphoric acid; the sulphuric unites with it, and forms sulphate of lime or gypsum; the liquid phosphoric acid is free, and the insoluble plaster remains as a heavy precipitate. It must be understood, that dissolving bones in acid does not give a clear solution, but forms a thick pasty mass, made up largely of gypsum. No amount of acid will, however, change all the lime into gypsum; a portion of phosphate of lime remains dissolved in the free phosphoric acid, and the solution may be produced perfectly clear.

Some farmers who have dissolved bones, using the proper quantity of acid, have been afraid to use the mixture, fearing the oil of vitriol which it contained would "burn up their crops." They find the mass to be *very sour*, and hence conclude the vitriol is unchanged. This is not the case. It is the *free phosphoric acid* which gives the excessive sour taste, and this is what is wanted to make crops grow. The value of "superphosphate" mostly depends upon the amount or percentage of *soluble phosphates* it contains. The highest, purest form of the agent, is made by taking 100 lbs. of powdered calcined bones, and dissolving in 87½ lbs. of oil of vitriol; from this mixture there will result, superphosphate of lime (double) 26 lbs., gypsum 66 lbs, sulphate of magnesia 1½ lbs., sulphate of soda 2¾ lbs; if carefully made, 30 *per cent of this is soluble in water*. This would be superphosphate worth having. Do we get it in the commercial article? Never. Do we get one half, or 15 per cent? No. We have never found a specimen that contained 10 per cent. A true, carefully prepared superphosphate of lime is not on sale, so far as our observation extends. If 100 lbs. of powdered, *unburned bone* is used, 40 lbs. of acid is fully sufficient, as the amount of earthy phosphates present is very much less. We have heretofore described in the *Journal*, the process by which we prepared superphosphate upon our own farm premises. The method is a good and safe one to follow.

POULTRY AND EGGS.

A good deal of experience has taught us that success in the poultry-yard depends as much upon good general management as upon any one thing. When the eggs of any hens indifferently are kept for the purpose of raising young chickens, and when little attention is paid to the particular hens reserved for laying, it will in general be found that the profits are small, and the quality of fowls raised rapidly deteriorates.

In addition to the usual plan of selecting only the best formed and quietest hens for breeding purposes, we have found it of advantage to pay considerable attention to the age of the fowls which we retain. For the produc-

tion of eggs for domestic consumption we never keep hens beyond their second year, but for raising chickens we have found it to be poor policy to employ eggs laid by hens less than two years old. We have always found that the chickens from the older hens are more easily raised, have stronger constitutions, and turn out every way better than those raised from pullets. The eggs consequently cost more, but this extra expense is but a small item on the number of eggs usually employed for hatching.

In order to have eggs during winter, besides the usual appliances of meat, lime, sand, bones, etc., we always make sure of having some very early chickens. The pullets of these will commence to lay in October or November, and will lay throughout the winter. Next season we draft a few of the very best of these and keep them as breeders, the balance being fattened and killed off as soon as they have positively ceased laying. At this time it is wonderful how rapidly hens take on fat. We often see accounts of hens not laying because they are too fat. When considering the ease with which hens fatten as soon as they cease laying for the season, we have often thought that the true way to state the case, is, that they fattened because they did not lay. At this age they are delightfully tender and juicy, and we would about as soon think of fattening a cow that gave twenty quarts of milk a day as to think of fattening a laying hen.—*Country Gentleman.*

In the following brief essay upon manures, presented to the *Essex Agricultural Society* and published in their *Transactions* for 1868, allusion is made to a series of experiments undertaken at LAKESIDE FARM, by the author, having in view the determining of some interesting questions in agriculture. These experiments extend over a period of five years, and have been very carefully and systematically conducted. It was intended in commencing the paper, to present the results and conclusions in detail, but illness prevented. The nature and design of these experimental labors will be understood from what is presented below; and if there should be a general desire expressed to learn further regarding them, we might be led to place them in a form accessible to those interested. There is great need of careful, long-continued observation and experiment, in order to reach conclusions worthy of confidence. But little of such work has been undertaken in this country, and hence we have been compelled to look to England and Germany for our knowledge of scientific husbandry. The soil and meteorological conditions of the countries named do not correspond with those upon this side of the Atlantic; and failures and disappointments often result when the conclusions of foreign writers are put to a practical test.

MANURES—SPECIAL OR CONCENTRATED FERTILIZERS.

BY JAMES R. NICHOLS, M.D.

Nothing more readily attracts the attention of farmers, or conveys more palpable ideas of value, than *bulk*, in manurial substances, and yet nothing is more deceptive or fallacious. A huge bank of animal excrement under the eavesdroppings of the barn, has indeed a positive value, but it does not consist in the great mass of the material of which it is made up. Squeeze out the water, remove the sand and chaff, and we can place all the fertilizing elements of that heap in the smallest sized dump-cart. The high value of stable or barnyard manure, is not found in the eighty or ninety per cent of water, silica, etc., which it contains, but in the nitrogenous elements—the potash, soda, and phosphatic salts, which in amount occupy relatively a most insignificant position. And I may say further, that the exerementitious salts found in the manure heap have the highest positive value as plant-food, of any substances with which we are acquainted. They exist in a form ready to be again taken up by plants and assimilated into the living organism. They differ from the same class of agents found isolated in the hands of the chemist, inasmuch as they have had conferred upon them in their passage through vegetable and animal structures, a kind of vitalized capability, the nature of which is imperfectly understood by chemists.

But the deceptive nature of bulk in fertilizing agents, is not confined to barnyard manure. Leaves, peat, muck, chaff, etc., need to be carefully examined in order to understand their actual value to the farmer. I have been led during the present autumn to make somewhat extended analyses of these substances, with the view of testing the correctness of some published statements regarding them, and also, to learn of how much positive service they may be to the farmer. A bushel of well pressed dry leaves, as they fall from the trees in autumn, weighs about four pounds; by further drying, they part with a little more than thirty per cent of water held in the cells of the leaf structure. A cord of absolutely dry leaves will weigh about 325 lbs., reckoning one hundred bushels to the cord. In weight, then, a cord represents about one twelfth of a cord of wet barnyard manure, and if they contained the same amount of fertilizing material in the same condition, would be equal in value to that amount of manure. But this is far from being the fact. The dried leaves I have found to stand relatively to the leached organic matter of manure, as 10 to 30, in ash value; and when the soluble salts of manure are taken into account, the comparative value is as 10 to 60, weight for weight. A cord of dry forest leaves, made up of the usual deciduous varieties, maple, beach, oak, etc., has an actual *manurial* value of not over *fifty cents*, reckoning good stable manure at eight dollars the cord. Will it pay to collect them? Certainly not for the amount of fertilizing material they contain. As litter or absorbents in the stable, leaves have some value, but much less than straw, inasmuch as they lack the reedy character of straw, and because they are far more difficultly and slowly decomposed.

A pound of good, thoroughly formed peat, taken fresh from the meadow upon my farm, lost of water in drying, a little more than fourteen ounces. A farmer drawing from his meadow a cord of peat weighing 4000 lbs., has upon his wagon 3500 lbs. of water, and but 500 lbs. of the dry material he seeks. This, dried and compressed, could be placed in a couple of our largest sized farm-baskets. The amount of ash constituents in the pound of peat after drying, was a little less than 10 per cent, so that when we reduce the heavy load of peat, which to the eye appears so bulky and valuable, down to its contained inorganic principles, we find the whole amount to be less than 50 lbs. I hope not to be misunderstood in the matter. The ashes are far from being the only manurial part of peat, and as in burning some of the most valuable elements are volatilized and lost, it is not good economy to burn peat for the purpose of securing the ashes. Fresh peat allowed to ferment in contact with lime, is changed into new substances capable of nourishing plants, and where it can easily be obtained, it pays the farmer well to secure a good supply. I cannot help remarking, however, in this connection, that many of the statements made by our chemists and journal writers, regarding the value of muck or peat, are simply absurd, and are proved erroneous by practical experiment. The great value of peat after all, lies in its absorbent qualities. From the experiments and experience of a considerable number of years, I feel more inclined to urge the farmers of our county to save the *liquid excrement* of their animals, by the use of seasoned peat in their cattle stalls and manure pits, as an absorbent, than to recommend them to drag it many miles at much expense to be used by itself or in compost for fertilizing purposes.

How strangely we overlook the value of the liquid excrement of our animals! A cow under ordinary feeding furnishes in a year 20,000 lbs., of solid excrement, and about 8000 lbs. of the liquid. The comparative money value of the two is but slightly in favor of the solid. This statement has been verified as truth, over and over again. The urine of herbivorous animals holds nearly all the secretions of the body which are capable of producing the rich nitrogenous compounds, so essential as forcing or leaf-forming agents in the growth of plants. The solid holds the phosphoric acid, lime, and magnesia, which go to the seeds principally; but the liquid, holding nitrogen, potash, and soda, is needed to form the stalk and leaves. *The two forms of plant nutriment should never be separated or allowed to be wasted by neglect.* The farmer who saves all the liquids voided by his animals, doubles his manurial resources every year. Good seasoned peat is of immense service to farmers, when used as an absorbent, and the stalls for animals should be so constructed as to admit of a wide passage in the rear, with generous storage room, besides, for peat, to be used daily with the excrement.

The remarks above made, may be regarded as preliminary to some brief general statements upon another branch of the subject of fertilizers. With a proper idea of what really constitutes plant aliment, and of the physical and chemical nature of the bulky substances in general use, the inquiry very naturally arises, Why cannot the concentrated principles of such be obtained through other channels, and used more economically and directly upon our lands? An answer to this inquiry opens up the whole subject of the value and use of special or concentrated fertilizers, and this is a subject which has been so often and so fully discussed by theorists and others, that the reader will not thank me for going over the ground again. Upon no subject connected with agriculture, does a wider difference of opinion prevail; and the discussion of the subject in the usual unsatisfactory empirical way does not tend to settle disputed points, or clear away the clouds of doubt which hang around the whole matter. Experiment usually decides controverted points in matters of physical inquiry, and it is capable of reaching this end in the subject under consideration, but it must be made carefully, intelligently, and be long continued. Having entered upon a series of experiments of this nature, with the determination to make no report for at least five years, or until soils could be carried through a period long enough to observe the effects of disturbing influences, and also learn something regarding the growth of different crops, and the lasting effects of peculiar modes of treatment, I find myself at a point of time when it is proper to examine and make known results. The time and space allowed me in this essay do not admit of detailed statements, and such must be reserved for another channel of communication, if health and strength permit.

The experiments have been made upon a farm of about eighty acres, which was purchased in 1863 with the view of entering upon a course of experimental inquiry interesting to agriculturists. The question deemed most important to decide was, whether a run-down farm could or could not be brought into comparative good tilth by the employment of fertilizing agencies outside of stable and barnyard manures. The farm at the time of purchase was well suited to a trial of this kind, as it had been in administrators' hands for several years, and was consequently neglected and unproductive. The soil is varied in its character, with upland and lowland, a fine peat bog occupying a basin between the hills. A portion is silicious, another portion loamy with a clay subsoil, and still another part is rich in organic *debris*, a forest having until within a few years densely covered it. Perhaps no tract of land in our county presents a greater variety of soils, of differences of exposure, or affords the gradations from wet to dry, so desirable for fair experiment. The product at the time of purchase consisted entirely of hay—about twelve tons being produced, of indifferent quality. The crops the present year upon lands embraced in the original purchase, have been 30 tons of good hay, 100 bushels of potatoes, 25 bushels of wheat, 150 bushels of corn, 75 bushels of turnips, and one and a half tons of grapes, besides other fruits in considerable quantities. There has been a steady increase in the amount of crops each year, notwithstanding a series of most unfavorable seasons. The number of acres in tillage is not far from twenty. No stable or barnyard manures, excepting a few loads at the start, have been purchased during the five years, and the amount made upon the premises has been small; the stock consisting until within the past year of only three cows, a pig and one horse. At present the farm sustains eleven cows and heifers, three horses, a pig, and, during a part of the year, one yoke of oxen.

The fertilizing substances used (of which an accurate account has been kept, as also of crops, expenses of labor, etc.), embrace the entire range of those agents which chemistry suggests, and those which have been brought to notice through the recommendation of farmers and experimenters—bones, ashes, lime, salt, the nitrates of potassa and soda, sulphate of ammonia, carbonate

of ammonia, plaster, potashes, fish pommace, shorts, muck, horn shavings, and lastly, the refuse of the Maine lobster-factories. The methods of application and the conditions under which these have been employed, the combinations produced, present details which although extremely interesting, are too extensive to enter upon in this essay. A definite end has been kept in view—that of securing practical facts from which safe general conclusions could be reached. Of course many experiments known to be empirical have been undertaken, and the results noted. For example, a half-acre of grass-land was divided into eighteen equal parts, and eighteen different substances applied; the results were curious, but the experiment actually proved nothing, although a great difference was observable in the crops of grass. More than one half of the experiments which we find reported from year to year, are of this nature. The substances affording the highest satisfaction have been those which furnished in largest quantity and at the lowest rates, the great fundamentals of plant-food—phosphoric acid, lime, potash, nitrogen. These have been obtained from bones, ashes, potashes, fish pommace, and nitrate of soda, principally. Bones have been largely dissolved in acid, and true phosphate and superphosphate of lime made upon the farm premises. Bones ground and unground have been dissolved in the caustic lye of ashes, also in commercial potashes, and fertilizing subtances of the most prompt and satisfactory character produced. I doubt if better crops of wheat and corn have ever been produced in the county, than have resulted from the use of these agents, upon weak lands. I think it must be conceded that the results of these labors go to prove that exhausted soils can be brought and sustained in good tilth by concentrated chemical agents, at an expense considerably less than by the use of excrementitious manures at present market prices in the more densely populated parts of our country. In conclusion, I will briefly present some facts regarding a special experiment upon a measured acre of hill land, dry, and exhausted from repeated croppings. It has been continued through five consecutive years. In the autumn of 1863 it was ploughed, and in the succeeding spring dressed with 500 lbs. of pure fine bone, sown broadcast, and planted with corn, a handful of homemade superphosphate mixed with ground nitrate of soda, placed in each hill. One hundred and fifty-seven bushels of corn in the ear were taken from the field in the autumn of 1864. After the corn was removed, the land was ploughed and again dressed with 500 lbs. of a compost made up of bone-dust, ashes, and refuse saltpetre, and sowed down to winter rye. The crop was 31 bushels of nice, plump grain. The season of 1866 was exceedingly dry, and the ground became so parched that the tender grass roots were greatly injured. The crop of hay was twenty-three hundred pounds. The next season, a top-dressing of 500 lbs. of compost made of bone gelatine and muck was given it in the spring, and a crop of hay cut weighing forty-three hundred pounds. A heavy aftermath was secured this season, which was not weighed. The present season, the crop of hay reached two and a half tons, and the field appears to be in good condition for a fine product next year. Here we have what may be considered a fair experiment, which proves that without the use of animal excrement, a worn-out field may be brought to produce very generous crops—crops which pay a good return for the expense incurred. It proves that chemical unorganized agents are capable not only of supplying nutriment to plants for a single year, but for sustaining crops for a series of years. The fertilizing elements supplied for the five years cost a little less than thirty dollars. The experiment upon this field is not regarded as finished, and the crops will be noted until they are observed to falter.

Importance of Good Seed.—Careful attention must be given to the matter of selecting seed. Many of the failures to secure crops result from the old imperfect seed procured from dealers. Farmers and gardeners should raise their own seed, and thus save most provoking disappointments and failures. Much of that in the market is three, five, and even ten years old. Some packages are so mixed as to contain seeds raised during a half-dozen consecutive years. Look well to the seed you plant.

Boston Journal of Chemistry.

BOSTON, MARCH 1, 1869.

☞ Any one sending us the names of three new subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For five new subscribers we will send the Petite Microscope; for twenty-five we will send, in addition to the microscope, a copy of "Stöckhardt's Chemistry for Students," the best elementary treatise yet published; for one hundred new subscribers we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stöckhardt's Chemistry.

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☞ Subscribers who are physicians, dentists, or apothecaries, will confer a favor by informing us of their profession, as we wish to know accurately the amount of our medical subscription list.

BACK VOLUMES OF THE JOURNAL.

We are unable to supply complete files of either Volume I. or II. of the *Journal*. Of Volume I. (originally issued bi-monthly), Nos. 1 and 2 (July and August, 1866) are now out of print. Of Volume II. (monthly), Nos. 1, 3, and 12 (July and September, 1867, and June, 1868) are also out of print. Of the remaining numbers we have a few copies left, which we will forward to our friends at the following prices: Volume I., four numbers, twenty-five cents; Volume II., nine numbors, fifty cents. We have on hand a few complete files of Volume III., as far as published. These we will send as ordered, at the rate of six cents per single copy; six copies for twenty-five cents.

ABOUT AIR FURNACES.

In the last number of the *Journal*, some observations were made regarding stoves; we purpose in this, to consider briefly the character of the furnaces in common use.

As a source of household warmth, air furnaces are very generally used in all the better class of dwellings, and we presume many families in which the *Journal* is read, are dependent upon this method of securing warmth. A large amount of ingenuity has been expended by inventors in constructing air furnaces, and almost every year a dozen new devices are thrust before the public, and their merits set forth in extravagant language. Upon a careful consideration, or examination, of the various patented devices for warming dwellings by heated air, the conclusion is reached, that but few essential improvements have been made in the apparatus, for a dozen years. Complexity of construction is no more desirable in air furnaces, than parlor stoves; and inventors have yet to learn the important truth, that the man who strips complicated machinery of its useless and interfering appendages, and brings the simple out of the complex, is the most highly honored, and reaps the richest rewards.

Air furnaces are very convenient, but they are also sometimes productive of much discomfort, and may be detrimental to health. Overheating is a source of danger, or an evil connected with furnaces, which is, perhaps, the most prominent, and one most difficult to remedy. Nine tenths of the houses in which they are used, are kept at a temperature much too elevated for either health or comfort. This is epecially true in the autumn and spring months, when the outside atmosphere is above the freezing point. The difficulty is to *regulate* the heat. Housekeepers find they consume nearly, or quite as much fuel in moderate weather, as they do in extreme cold; and they cannot avoid this, as

any important diminution in the amount supplied to the furnace, interferes with its regular working, and the fire dies away, or is extinguished, provokingly often. The difficulty of too much heat can be only in part remedied, and this not so much by interfering with the fire, as by regulating the flow of cool air from outside, through the furnace. A capacious air-conductor is indispensable in connection with furnaces. It should be double the size actually needed in cold weather, and the cut-off, or valve, should be within easy reach, so that it can be opened or closed, as the temperature rises or falls outside. A full volume of sweet, pure air, should flow into the dwelling in moderate weather; a volume so great that it will not become unduly heated by contact with the radiating surfaces of the furnace. Two cubic feet of air at the temperature of 50° F. contains but little more oxygen, or vitalizing power, than a single foot at the temperature of zero. One foot flowing through in January, is, therefore, equal to two feet in March or April.

The evaporation of large quantities of water in furnaces, is not advantageous or desirable. The normal moisture of the air itself is fully sufficient for health or comfort. If furnaces are properly constructed and managed, evaporating pans holding water should never be placed inside of them. The prevailing idea of the healthfulness or necessity of evaporating water in rooms, by means of stoves or furnaces, is founded in error, and is a practice that should be abandoned.

The escape of the gaseous products of combustion through the joints, cracks, and probably through the cast-iron itself, is an evil of prodigious magnitude. Chemical tests applied to the air of rooms heated by furnaces, prove sulphurous acid and carbonic acid to be almost constantly present in a majority of dwellings. In this direction one of the greatest objections to furnaces is found; and it is an evil which urgently demands attention. The utmost care should be bestowed by manufacturers upon their construction; the fewest joints allowed, and these well luted with indestructible cement. A cement made of asbestos, which no amount of heat can decompose or change, must be employed. No *damper* should ever be placed in the flue; it is one of the most dangerous appendages which can be attached to the apparatus. If by accident it becomes partly or wholly closed in the night-time (and we have known strong gusts of wind to turn them), death, or permanent injury may result to a whole household. In one instance, the father and mother of a family, in our own neighborhood, were found dead in their beds, having died from asphyxia, caused by gases proceeding from a furnace with a closed damper, in the cellar.

How iron can be made impermeable to gases, is a problem difficult to solve. If, as is alleged, *wrought iron* is free from the liability, then we must insist upon manufacturers rejecting the use of cast-iron in every part of their work.

Portable furnaces, or those constructed wholly of metal, are in common use, and we have found in quite a number of instances, that they were used without air conductors; the warm air flowing into the rooms being supplied from the cellar. Aside from the manifest unhealthfulness of breathing the often impure air from that locality, how untidy is this practice! The dust and ashes inseparable from furnaces, are taken up with the heated air, and diffused through the rooms, greatly to the injury of furniture and lungs. No furnace should ever be used which does not obtain its air current from outside the dwelling. There is commendable caution in taking down furnaces the latter part of the winter, and removing all accumulations of ashes and cinders, that there may be no obstructions to draft during the mild weather of the spring months. Ascensional currents of warm gases passing through flues, move very slow during the still, damp days in March and April, and if slight impediments to their flow are permitted in their proper channels, they escape into the dwelling. The law of gaseous diffusion is not only a curious, but an inflexible law. Poisonous gases escaping into a cellar or basement, are just as dangerous as if they flowed directly into the parlor. When free, they move in all directions, downwards as well as upwards; and no partitions, or walls, such as are found in dwellings, offer the slightest impediment to their diffusion. Therefore, the grave error must not prevail, that gases escaping into the cellar can do no harm. Equally as great care must be exercised in regard to stoves and furnaces in remote quarters, as in those used in rooms constantly occupied.

There are many other points connected with furnaces and their management, to which we would like to call attention, but these remarks are already sufficiently extended. The points brought to notice, are such as all will do well to heed, as thereby much suffering and many evils may be avoided.

SAFETY LAMPS.

Extracts from newspapers and advertisements relating to so-called "safety lamps," for burning cheap kerosene or benzine, have been frequently sent to us, with the request that we would express an opinion regarding them. We remark, in brief, that no lamp can be constructed in which these highly inflammable liquids may be used with safety. The "escape-valves" and "side-tubes" usually employed are of no service whatever in connection with lamps. They do not in the slightest degree insure safety. *Benzine is dangerous to harbor in families.* More deaths are caused by *breaking lamps* than by explosions. Very few lamps really explode. Men, women, and children are burned to death by spilling the liquid upon the clothing, or upsetting lamps or cans; and most of the explosions reported are accidents of this nature. Exemption from danger is secured only by preventing inflammable liquids from entering the dwelling — not by the use of "safety lamps" or vessels for holding the liquids. Have nothing to do with these devices. Purchase and use only good kerosene oil, of legal standard, and you are safe.

THE ATLANTIC CABLE.

A friend intimately connected with the working of the Atlantic Telegraph Cable, informs us that the insulation is growing more perfect from month to month, and that the first, laid four years since, leaks less than the last one. The loss, at the present time, does not reach *half of one per cent* upon both cables. This is surprising, and very encouraging to the owners of the line. The extreme cold of the deep sea basin, in which the wires repose, is favorable to the retention of the electrical impulses in the channel provided for them. The time consumed in charging and discharging the conductors is a bar to rapid communication; but this is to be overcome by new methods of insulation. A device has recently been brought forward which promises to fully remove this obstacle, and thus enable submarine cables to perform double the work in the same length of time. The success of deep sea cables is now fully assured, and we may look for a large increase in the number during the next quarter of a century.

DESTRUCTION OF TREES BY STREET-GAS.

Many a city and town has had to deplore the loss of fine shade-trees, by carburetted hydrogen gas coming in contact with their roots, and poisoning them by being absorbed. There is a strange instinct in the roots of plants or trees. As if they had eyes to see, they bend and stretch in the direction from which they can derive nutriment; and, wherever they can have free and easy access to the soil, and find food, there the number and thickness of the filaments are augmented. If we plant a tree in hard, unyielding soil, it will struggle most wonderfully to sustain itself, by pushing its roots through the packed earth. If, under these circumstances, a trench is dug ten or even twenty feet from the tree, filling back the loosened earth again into it, the roots appear to be cognizant of the fact, and commence a struggle with the impacted soil, to reach the trench; and this fact explains how it is that the roots of trees are destroyed by gas. The trees upon the sides of streets are placed in hard soil; and when the trench is dug for the gas-pipes, and the earth returned, the roots instinctively push for the trench as a point of relief, or where food can be more easily secured. We have seen gas-pipes, after having lain for several years, perfectly covered with a network of roots proceeding from the neighboring trees. Now, if there is the slightest leak in the line of pipe, the gas moves in the direction of least resistance, and that is along the trench in which is placed the pipe; hence, the tender spongioles are presented with strange and poisonous food, the gas is absorbed, and the tree dies.

We can hardly suggest a remedy for this great evil. It may be well to compel gas companies to cover their pipes, in the vicinity of trees, with a thick coating of cement, or plank the walls of the trench, so as to prevent the tree-roots from passing through. The loss of fine shade-trees in cities and towns is almost irreparable; and every practicable method should be adopted to prevent it.

THE LIQUORS WE DRINK.

The recent disclosures, in New York, regarding the character of the alcoholic liquors sold in the city, although somewhat sensational, are, nevertheless, worthy of serious attention. Every practical chemist, who has taken the trouble to investigate, has a clear understanding of the abominable character of the liquors retailed at shops and bars. We have known, for several years, that the liquors retailed at fashionable hotels and what are known as "first-class" bars, were greatly attenuated and mixed. It may not be, in all cases, that the proprietors or their agents adulterate; for the purchases they make of "first-class" dealers are "demoralized" to a fearful extent by both producers and importers. The *fusil oil*, found almost universally in brandies vended at fashionable hotels and drinking-saloons, results from the admixture of cheap whiskey with the brandy. The flavor, or *bouquet*, of true old brandy is so pervasive, or persistent, we have found, by experiment, that *seventy per cent* of low grade whiskey may be mixed with it, and no one can detect the fraud by taste or smell. Brandy, before being placed in decanters for retailing by dealers, is often subjected to at least two processes, which are not regarded as exactly fraudulent or reprehensible. The first is to add whiskey and sugar, and then water, to bring the proof down to the lowest safe point. The object of liquor drinking by the imbiber being to please the sense of taste and secure alcoholic exhilaration, the vender feels justified in securing these ends at the lowest possible cost to himself. If no positive or active poisons

are used to reach these results, no harm is done, and his pockets are filled more rapidly. Cheap whiskey intoxicates as well as dear brandy; and if sugar and a small amount of brandy-flavor cover the taste and satisfy the palate, why not furnish the mixture? This is the reasoning, or excuse, if conscience is ever aroused. A mixture of two parts of cheap, factitious, home-made gin with one of the true "Hollands," forms a liquor worthy a place at the most aristocratic bar, and plenty of genteel customers are found to pay twenty-five cents a glass for it. If it has an "odd" taste, it must be good, as it is dispensed by a most reputable dealer. Whiskey at first-class bars is generally a very fair article; the proof, however, is usually below standard, not rising higher than 30 or 35 per cent alcohol, when it should be 45 or 50 per cent. The wines — what of them? As a class, they are worse than other liquors, no matter how costly they may be, or who is reputed to have made them. We recently examined a bottle of champagne, taken from the hands of the importer, with a name upon the label which has the highest repute in this city, and it was found to be factitious and poisonous. The whole business of manufacturing and vending wines and liquors, both in Europe and this country, is sadly demoralized; and the more generally this fact is understood, the better it will be for community. Our young men and our old men who are in the habit of patronizing first-class bars, should understand that they fare but little better, as regards the character of the liquors they drink, than if they drank at the bars of low groggeries or dance cellars. In another column we present formulæ by which liquors are manufactured.

A FEW THINGS THAT ARE TO BE.

Before the imprint of the *Journal* bears the date of 1900, science and art will have so advanced as to have effected complete revolutions in many of the industrial processes and methods of securing health, comfort, and convenience to the human race.

Vast gas-manufactories will be found in all the great cities and towns, in which the invisible agent will be manufactured solely for the purpose of cooking the food and warming the dwellings of the inhabitants. These works will be independent of those established for making illuminating gas. It will not be necessary to purify the fuel gas so fully, and it will, in most places, be made from wood. The cost will be so low, and the conveniences so great, other kinds of fuel will, in a large measure, be dispensed with. No ashes, no smoke, no dust — what a glorious realization this will be! At that time, the air, the earth, and the sea will be full of conducting wires, and electric currents will flow constantly in every direction. A new order of things will prevail in our post-offices. The click of the telegraph instrument will be heard, instead of the snap of the lock which closes up the wide mouths of the mail-bags. The small sum of ten cents (perhaps less) will place correspondents in instant communication with each other, no matter how widely they may be separated. Although the industrial arts will have enormously increased, less steam-power will be employed. Electrical, or some other of the hidden forces of nature will be harnessed to the primary moving wheels of the great manufacturing establishments, and smoke and vapor will no longer mark their location to the distant traveller.

The sick will not be required to swallow disgusting doses of medicine. Remedies will be administered through other avenues than the stomach. Chemistry will have eliminated the vital, active principles from all curative agents; and, through the cellular subcutaneous coverings, and by other at present closed doors of access, the influence of therapeutic agents will be brought to bear directly upon diseased parts. Light will be let in upon nearly all the organs of the body, so that the physician can *observe* the extent and nature of disease, and no longer be compelled to diagnose in the dark.

The publishers of this and other journals will perhaps be able to issue simultaneous editions in all the great central cities of the country. A knowledge of practical science will be more generally diffused among the people, elevating and improving the masses, and consequently rendering them happier, healthier, and better fitted for the duties and responsibilities of life.

Kerosene. — It is gratifying to notice the waking up of cities and towns to the importance of enforcing the laws relating to the sale of dangerous burning-fluids. In New York, most efficient measures have been taken by the Board of Health, to prevent the sale of naphtha or liquids inflammable at a point below 110° F. Providence, R.I., two years since, promptly acted in the matter, and not a gallon of adulterated kerosene can be purchased there, and not the slightest accident has ever occurred in that city. Let the good work go on. We can stop all so-called kerosene accidents by the simple performance of duty. In Massachusetts, upon the petition of six citizens of any town, the selectmen are required to appoint a competent inspector of all burning-oils offered for sale.

BOOK NOTICES.

The Cambridge Course of Physics.

The Cambridge Course of Physics consists of a series of text-books for schools, embracing a treatise on Chemistry, Natural Philosophy, Astronomy, etc., by two well-known and highly accomplished teachers in the High School at Cambridge, Mass., — Messrs. W. J. Rolfe and J. A. Gillet. We have carefully examined these books, and find them to be compiled with great accuracy and care; and the arrangement of topics and the general style is admirable. The pleasing perspicuity and commendable exactness with which the elementary principles and facts of the physical sciences are presented in these treatises, are in marked contrast with a number of text-books which have somehow found their way into many of our schools. The series has appeared none too soon; and the attention of educators and those who have the supervision of our educational institutions should be at once directed to a class of text-books in which are found but few errors and blunders, and which present the results of the most recent research and experimental inquiries in a manner easily to be understood by youthful minds. The clearness of the type, and the elegance of the numerous cuts scattered through the books, can hardly be surpassed. Messrs. Woolworth, Ainsworth & Co., Boston, are the publishers.

A Conspectus of the Medical Sciences: Comprising Manuals of Anatomy, Physiology, Chemistry, Materia Medica, Surgery, etc., for the use of Students. By Henry Hartshorn, A.M., M.D. Philadelphia: Henry C. Lea. 1869.

This volume may be regarded as presenting a combination or association of somewhat brief manuals or hand-books of the medical and collateral sciences. It is intended to aid students during the months of their attendance upon the courses of medical lectures, and furnish a book of ready reference to those engaged in the active duties of the profession. It gives, in a brief form and clear manner, the indispensable elements of a course of medical study, as taught in colleges, and very properly, we think, excludes individual opinions and unsettled theories. The work is a useful one, and appears to be compiled with great care, and arranged in the most judicious manner.

Materia Medica for the Use of Students. By John B. Biddle, M.D., Professor of Materia Medica in the Jefferson Medical College, Philadelphia. Third edition, enlarged, with Illustrations. Philadelphia: Lindsay & Blakiston. 1868.

Prof. Biddle has found it necessary to issue a third edition of his "Materia Medica," in which many additions and improvements are made. The new remedial agents are introduced, and their dose, therapeutic action, etc., given. Among the agents regarded as new, are Calabar bean, woorara, mate, the sulphites and hyposulphites, carbolic acid, iodide of ammonium, iodoform, etc., etc. Most of these will be regarded as *old* by the readers of the *Journal*, as we long since called attention to them. The work contains much not found in Wood and Bache's Dispensatory, or other of the special treatises upon materia medica.

The Physician's Daily Pocket Record: Comprising a Visiting-List, many useful Tables, etc. By S. W. Butler, M.D. Philadelphia. 1869.

We should have noticed Dr. Butler's most excellent and convenient *Pocket Record-Book for Physicians* at an earlier date; but it was mislaid, and thus escaped observation. We can hardly conceive of any thing more useful for medical men than this little book. Beside the blank portion for daily records, it contains a list of new remedies, antidotes for poisons, urine tests, table of proportional quantities, etc., etc. Although a portion of the year has passed, it will still be found worth more to the physician than the cost. It can be procured at the office of the *Medical and Surgical Reporter*, Philadelphia.

Medicine and Pharmacy.

TREATMENT OF PULMONARY CONSUMPTION.

The *London Lancet* has recently contained a series of articles of a very interesting and important character, upon the above subject, by Dr. Chas. J. B. Williams and Dr. T. Williams. The last of the series of papers presents the summing up or the results of the observations and experiments of the distinguished authors. There is so much that is practical and instructive in the paper, we are led to present to the readers of the *Journal* some brief extracts worthy of special attention. The author says: —

"On taking a retrospect of an experience of forty years in the treatment of pulmonary consumption, I can trace a remarkable improvement in its success, as judged by the results. During the first ten years of that period, the beneficial effects of the treatment were very limited, being chiefly confined to incipient cases, and to those who were able, at an early stage and for long continuance, to resort to more favorable climates, such as can be obtained by voyages to Australia or India. My general recollection of the histories of the developed disease at that time is that of distressing tragedies, in which no means used seemed to have any power to arrest the malady. The tardative and palliative treatment employed was little satisfactory; and life was rarely prolonged beyond the duration of two years, assigned by Laennec and Louis as the ordinary limit of the life of the consumptive.

"In the next period of ten years (from 1838 to 1843) a marked improvement took place in the results of treatment, apparently in connection with the habitual use of mild alterative tonics, as they might be termed, particularly iodide of potassium with sarsaparilla or other vegetable tonic. These were first given in conjunction with liquor potassæ or an alkaline carbonate; but the lowering effect of the alkali led to the substitution of a mineral acid, generally the nitric; and a combination of this description (iodide of potassium, two grains; dilute nitric acid, fifteen drops; tincture of hops, and compound fluid extract of sarsaparilla, of each one drachm; with an ounce of water or an infusion of orange-peel) became

the favorite prescription, until it was superseded by something which was more efficacious. Several of the earlier of the cases recorded were treated in this way, and with improved results in respect of the general health of the patients, and diminution of the cough and expectoration."

EFFICACY OF COD-LIVER OIL.

Dr. Williams's views regarding the efficacy of cod-liver oil in pulmonary consumption, correspond with those of all careful and observing physicians in this country. So far from the oil being "out of fashion" here, there has never been a time when its usefulness was more generally recognized, or when it was more largely prescribed by physicians. It is the sheet-anchor of hope in thousands of cases:—

"It was in the latter half of this period, that chemists began to produce cod-liver oil of sufficient purity and freshness to be fit for the human stomach; and I have no hesitancy in stating my conviction that this agent has done more for the consumptive than all other means put together. And so far is this remedy from having 'had its day, and gone out of fashion,' that, in my experience, its usefulness and efficacy have gone on increasing in proportion to the greater facilities for obtaining it in a pure state, and to the improvements in the manner of administering it, in combination with various tonics, and in connection with certain rules of diet and regimen. Many of the cases narrated in the preceding papers are striking proofs of the efficacy of this remedy, not only in the general results of cure or prolongation of life, but also in detached passages of the abridged histories, in which improvement or deterioration in the symptoms corresponded respectively with the regular use of the oil, or its discontinuance."

BEST METHOD OF TREATMENT.

"In conclusion, I will endeavor to give a brief general view of the treatment which I have commonly adopted. As we have been led to conclude that consumption is essentially a disease of degeneration and decay, so it may be inferred that the treatment, for the most part, should be of a sustaining and invigorating character. Not only the most nutritious food, aided by a judicious use of stimulants and of medical tonics, but pure air, with such varied and moderate exercise in it as the strength will bear, and the enlivening influence of bright sunshine and agreeable scenery and cheerful society, are among the means best suited to restore the defective functions and structures of frames prone to decay.

"In former years, in this country (as still in many places abroad), the antiphlogistic and starving plan was carried on too long and too far; but it appears to me that there is now a tendency too much to the opposite extreme, so that consumption is treated too exclusively with tonics, stimulants, and full diet. I quite admit that this is the better extreme of the two; and it may fairly be stated that the sooner and the more constantly patients can be treated on this plan, the better. But, in case of active inflammation, continued heat of skin, hard, racking cough (dry, or with viscid and tinged expectoration), much pain or soreness of the chest or side, it answers well to withhold or withdraw the stronger stimulants and tonics, and for a time—it may be a few days only—to substitute cooling and soothing remedies, with moist epithems or counter-irritants on the chest, and, more rarely, local depletion. But this discipline, which is exceptional, should as soon as possible be replaced by what may be called the regular treatment by cod-liver oil and tonics, and a more generous diet. The transition need not be abrupt. So far as regards cod-liver oil, and the mild acid tonics, with which I generally combine it, the change may be made long before the inflammatory complication has subsided. A dose of these may be given after the morning, and perhaps after the midday meal, whilst still the saline is taken in the evening and night, and whilst blisters or other counter-irritants are in full operation.

"So soon as the nocturnal heat of skin subsides, and the cough becomes less urgent, and the urine more free, the salines may be replaced by a mere cough linctus, if that be needed; the counter-irritation moderated, and the tonic, given with the oil, gradually strengthened by the addition of salicine, quinine, or iron. These two last tonics are of great use where they are well borne, as their influence in strengthening the muscular system and improving the condition of the blood is greater than that of any other drug; but their use requires much discretion and watchfulness, for they often increase the lingering or intercurrent inflammations, with their attendant pain, constriction, cough, and viscid expectoration; and not unfrequently they derange the functions of the stomach and bowels. It therefore often happens, where the patient cannot be seen frequently, that it is safer to be content with a milder tonic—such as calumba, cascarilla, or chiretta—which may be continued for weeks and months together, in conjunction with the oil, than to give those that are more powerful, but which, by occasional disturbances, may prevent the continuance of the remedy.

"But the great remedy, more essential and more effectual than any other, is the cod-liver oil; and we may well bestow a little consideration on the mode of using it to the best advantage.

"It is now pretty generally admitted by the profession, that the pure, pale oil, simply extracted from the fresh, healthy livers of the fish, is that most suitable for the majority of patients, as being less unpalatable and at least as efficacious as the impure kinds. Since I first recommended this pure oil (*London Journal of Medicine*, January, 1849), it has been so extensively prepared and used, that it is now one of the most important articles in the materia medica; and the universality of its introduction is a strong proof of its claim to public favor.

"On the mode of operation of the oil, and on the best methods of administering it, I have little to add to what I published twelve years ago ('*Principles of Medicine*,' 3d ed., p. 487). To that I must refer for details that would be too long for quotation here; but I may give the following brief summary of my opinions and experience on the subject.

"Cod-liver oil, when taken into the system in sufficient quantities, and for a sufficient length of time, acts as a nutriment, not only adding to the fat of the body, but also promoting the healthy growth of other tissues, and, in some way, as an alterative, counteracting the morbid tendency to the proliferation of the decaying cells of pus, tubercle, and kindred cacoplastic and aplastic matters.

"That its efficacy depends much on its being absorbed freely into the blood, and through the circulation pervading all parts of the body, and thus reaching to the very seat of morbid deposits and formations.

"That the more fluid part of cod-liver oil surpasses all other oils and fats in the facility with which it forms emulsions, which are tolerated by the stomach and readily absorbed into the blood, without causing the nausea and bilious derangements that commonly result from an excess of fat food. This peculiarity may depend on the biliary and other matters contained in the oil, which in other instances of disease is found to act beneficially on the liver and other secreting organs.

"That the best time for the administration of the oil is immediately after, or, to those who prefer it, at or before a solid meal, with the constituents of which the oil becomes so intimately blended that it forms a part of the chymous mass, and is less likely to rise by eructation than when the oil is taken into an empty stomach. From this chymous mass, the oil, being absorbed through the lacteals with the chyle, is less apt to disorder the liver than if absorbed through the veins of an empty stomach.

"That, as the use of the oil should be continued for a long time,—perhaps for months, or even years,—it is of great importance to conciliate the palate and stomach by giving it in a vehicle that will disguise its flavor and strengthen the stomach to bear it. For this purpose, an aromatic bitter, such as the compound infusion of orange-peel, acidulated with mineral acid, both to help to cover the taste of the oil and also to suit the stomach, which should be duly supplied with acid during digestion, generally answers well. Syrup may be added, according to the taste of the patient; or, still better, some bitter tincture, such as calumba, cascarilla, or quinine, in every case where it is desirable to improve appetite and tone. In cases of peculiar weakness of stomach, with tendency to retching or nausea, strychnia, in a dose of from 1-32d to 1-24th of a grain, proves a most valuable adjunct to the vehicle. By its means, I frequently overcome the fastidiousness of stomach arising from debility, hysteria, or indulgence in alcoholic liquors. Salicine is another efficacious alternative of the kind. Either of these, although a powerful tonic, has none of the heating properties of quinine or iron. When the strong bitter taste is objected to, a pill, containing extract of hop or chamomile, or salicine, or quinine, may be taken after or before the oil and its vehicle.

"The bulk of the whole dose of oil and its vehicle should be small, so that it may be swallowed at a single draught; therefore the vehicle should not exceed a tablespoonful, with, at first, a teaspoonful of oil, to be gradually increased to a tablespoonful. The dose of oil should rarely exceed a tablespoonful twice or thrice daily; when a larger amount is taken at a time, generally either it deranges the stomach or liver, or some of it passes unabsorbed by the bowels.

"The acid may be varied, according to circumstances. The nitric generally suits best in inflammatory cases and those attended with much lithic deposit in the urine; but its tendency to injure the teeth is an objection to its long continuance. The sulphuric is more eligible where there is liability to hæmoptysis, profuse sweats, or diarrhœa. But, in most cases, and for long continuance, I have found reason to prefer the diluted phosphoric acid, which may be termed the most physiological of the acids, tending to derange the chemistry of the body less than the others.

"With some individuals the oil agrees so well, and so much improves their digestive powers, that they require few or no restrictions in diet, but this is not the case with the majority. The richness of the oil does prove more or less a trial, sooner or later, to most persons; and, to diminish this trial as much as possible, it obviously becomes proper to omit or reduce all other rich and greasy articles of food. All pastry, fat meats, rich stuffings, and the like, should be avoided, and great moderation be observed in the use of butter, cream, and very sweet things. Even new milk in any quantity is not generally borne well during a course of oil; and many find malt liquor too heavy, increasing the tendency to bilious attacks. A plain, nutritious diet of bread, fresh meat, poultry, game, with a fair proportion of vegetables, and a little fruit, and only a moderate quantity of liquid at the earlier meals, commonly agrees best, and facilitates the continued exhibition of the oil in doses sufficient to produce its salutary influence in the system.

"Such are the directions which have proved most effectual in the administration of a remedy which may truly be said to have so much altered the prospects of the consumptive as to give hope of cure in not a few, and of much prolonged life in by far the greater number. But, to induce patients to follow these directions, and to overcome their aversion to a remedy that the prejudices of some represent as disgusting, and the experience of many may find trying to continue for so long, the practitioner will often find it necessary to use all his powers of argument and persuasion."

HYPOPHOSPHITES OF LIME AND SODA WITH COD-LIVER OIL.

We are pleased to find these distinguished physicians have had their attention directed to the *hypophosphite salts* in connection with the oil. We have, as our readers are aware, been led to combine the salts with the oil, in a form convenient for use, and also have called the attention of medical men to the combination. We did not know, until Dr. Williams's article appeared, that any one on the other side of the water had suggested the remedy. We think it will be found of much service:—

"The hypophosphites of soda and lime, so strongly recommended by Dr. Churchill, of Paris, have in my hands proved decidedly beneficial in certain cases. They have been tried by Drs. Quain and Cotton, at the Brompton Hospital, with only negative results; but, having met with several patients who distinctly ascribed their improvement to Dr. Churchill's treatment, I have thought it right to try them myself, both as a substitute for the oil, and in addition to it. . . . . . It has happened to me, in several cases, that a patient has long been taking the oil, and, after having derived great benefit from it, halts in his improvement, or even loses ground;

and then the addition of the hypophosphite has been followed by a marked change for the better. Flesh and strength have been gained, and the chest symptoms have been more or less improved. . . . . In my mixture of the hypophosphite with phosphoric acid, I presume the hypophosphorus acid is set free, and is the active agent in the compound. How it acts is quite uncertain. I cannot say that I quite agree with Dr. Churchill's views on the subject, even if I understand them. These hypophosphites seem to increase the failing powers of respiration and circulation. Can this be by increasing the affinity of the blood for oxygen, so that it can attract it and maintain the blood changes, even under the increased difficulties and obstruction produced by disease?"

REMEDIES BY INHALATION.

"In connection with this subject, I must notice remedies administered by inhalation, which are really useful in certain cases — chiefly those in which the larynx and trachea are much affected, and in those attended with convulsive cough or offensive expectoration. I have generally found the use of inhaling instruments fatiguing and unnecessary. A quart-jug of hot water, with a napkin from over the nose down to and around the jug, to confine the steam, is all that is needed. To the hot water is added the drug to be inhaled; and creosote or carbolic acid, iodine, chloroform, oil of turpentine, and juice or extract of hemlock, are the articles which I have found most beneficial. A few drops of one or of several of these combined, being put into the hot water, the inhalation is practised through both mouth and nostrils without restraint or difficulty, and may be continued for five or ten minutes every night, and, if need be, repeated once or twice in the day. Although the chief operation of this medicated vapor is on the guttural and bronchial surface, yet a portion penetrates into the lungs, and is absorbed into the system; for iodine and oil of turpentine can be detected in the urine within a few minutes of the inhalation being made. Still, although proving very serviceable in certain cases, I cannot rank inhalation higher than as a subordinate remedy in the treatment of consumption. I may add, that the practice of painting the chest with the tincture of iodine every night, as a gentle counter-irritant, is not without a certain influence in the way of inhalation; for a portion of the iodine evaporates, and slightly impregnates the air around the patient, and this atmosphere of iodine may not be without its influence for good."

CHANGE OF AIR AND CLIMATE.

"Of far more importance in the treatment of consumption is change of air and climate. It is of the greatest consequence to the phthisical invalid that he should breathe as pure an air as possible, and that the influence of this pure air on the blood and on the body should be increased by such gentle and varied exercise in it as his strength and condition of his organs will permit. This is the great object of our sending him to a warm climate in the winter, and to a high and dry locality in the summer, that he may be as much as possible in the *open air*, with its exhilarating, vivifying accessories of light, purity, and freshness, without the chilling operation of cold and wet in the winter, and the enervating and exhausting influence of oppressive heat in summer. I cannot in this place pursue this important subject into the details of its application to the different forms and stages of disease, and the varieties of air and climate most suitable for them; but I may refer you to my son's little work on climate* for concise information on these points. I would only add further, in conclusion, that several of the most successful cases which have been recorded in these papers are illustrations of the great benefits to be derived from well-directed voyages and change of climate, in addition to the treatment which has been surmised in the present pages.

"In conclusion, I trust that the preceding papers have proved what I stated at the commencement — that, powerless as medicine is in the overwhelming of rapid types of pulmonary consumption, it has yet considerable influence over the milder forms; and *that, under careful treatment, life may be prolonged for many years in comfort and usefulness, and, in not very few cases, the disease is so permanently arrested that it may be called* CURED.

* "The Climate of the South of France, and its Varieties most suitable for Invalids." By Charles Theodore Williams, M.B.: Oxon, 1867.

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. III. — No. 10.] BOSTON, APRIL 1, 1869. [FIFTY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—No receipts for subscription moneys will be given unless paid at the office. The arrival of the *Journal* will be evidence that subscriptions are received.

A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Science.

THE ANILINE COLORS.

Every one has heard of the aniline colors, has seen some of the beautiful shades of color produced on textile fabrics by their agency, and knows their source; *i. e.*, that they are made from coal-tar. Few, however, know how they really are made, and very few know what obstacles have been met and overcome, and within how short a space of time their manufacture has become one of great importance, and their use has extended to almost innumerable applications. The manufacture of the aniline colors is one of the most interesting of the applications of science to the arts, especially since, from its recent growth, it has had no old traditions to check its progress, and also because we are thus enabled to trace its development, from the discovery of the first aniline dye, in 1856, to its present vast proportions. Aniline is found in coal-tar, but only in small quantity, not worth extracting. It is, however, prepared artificially, in large quantities, from the benzols obtained from coal-tar. Benzol is a general name given to a number of hydrocarbons produced by the distillation of coal-tar. The manufacturer divides them into light and heavy benzols, according to the temperature at which they distil. Examined chemically, we find them to consist of a number of hydrocarbons in varying proportions, called benzol, toluol, cumol, cymol, etc. The next step is to convert these benzols into nitro-benzols. This is done by treating them with strong nitric acid, under appropriate conditions. The nitro-benzols thus obtained, exposed to reducing agencies, are transformed into anilines. This transformation is brought about, ordinarily, by mixing them with iron and acetic acid. The action of the acid upon the iron liberates hydrogen, which acts upon the nitro-benzols, reducing them to anilines.

We are now at the starting point of the color manufacture itself, having a method by which we can obtain, in any quantity, the substance from which every one of the dyes is derived. But the observant reader will have noticed that since the benzols first obtained from the coal-tar were mixtures, so must both the nitro-benzols and the anilines be mixtures also. Such is indeed the case. The aniline oil, as it is called, that is used in color making, and the method of whose formation has just been sketched, is a mixture of basic substances resembling ammonia; in fact, they are what are called compound ammonias, or amides, being formed upon the type of ammonia. Aniline oil consists mainly of aniline and toluidine, with less quantities of other similar bases, its boiling point varying according to its constitution; anilines containing larger proportions of aniline or other bases, with low boiling points, being called light anilines, and *vice versa*.

In the early stages of the aniline manufacture, the aniline red was the most important of these dyes, and the one which first attracted public attention. This red was first called fuchsine, a name derived from the fuchsia, whose color it strongly resembles. This appellation is still used by the French and Germans; but in England and this country this beautiful red coloring matter is better known as magenta. It was first brought into the market during the Italian war, just after the battle of Magenta, whence its name. But in a very short time after its discovery the progress of the aniline color manufacture was so great that it very soon lost its importance as a dye-stuff only, being no longer a product, but itself a raw material, the first stage in the preparation of other colors. Magenta, or rosaniline, to use its chemical name, is now the starting point for making nearly all the aniline colors in actual use; and since a green has recently been made from it, the series has become perfect, and we have aniline red, orange, yellow, green, blue, indigo, and violet.

It would be foreign to our purpose to enter into any details of the process for preparing magenta. It is sufficient to say that it is an oxidizing operation. Of the many methods proposed, that one involving the use of arsenic acid as the oxidizing agent is the only one that is now in general use. As at first employed, the workmen were in constant danger from exposure to the fumes of arsenic; but it has since been so improved that it can now be carried on with perfect success and impunity. There is one point, however, in connection with the manufacture of magenta that should be mentioned. Although, from the classical researches of Hofmann, we are acquainted with the composition of rosaniline and its salts, yet the reaction by which it is formed has not been clearly made out. Nevertheless, one thing is known: that neither aniline nor toluidine alone will yield a particle of red color under treatment with arsenic acid or other oxidizing agents; but when they are mixed in the proper proportions, the operation becomes a very easy one. Magenta, or rosaniline, is usually prepared for sale either as a hydrochlorate or acetate, and can be obtained very pure in commerce.

Blue and violet colors of great beauty are made from rosaniline. There are numbers of them, of different shades and characters; but the methods of making them are of more interest to the chemist or manufacturer than to the general reader. Two aniline greens are in use. The story of the discovery of one of them is a very singular one. As told by Dr. Hofmann, who says he heard it from the author himself, it is as follows: A certain dyer, M. Cherpin, was experimenting on an evanescent blue color, which, in spite of all his exertions, he could not fix upon his fabrics. Almost discouraged by the failure of all his expensive experiments, he one day confided his troubles to a friend, a photographer. "Fix the blue?" said his friend. "Is that the only difficuly? Why, it's the easiest thing in the world! Have you tried hyposulphite of soda?"—"Hyposulphite of soda? *Mon Dieu*—no! Do you think it will fix my color?"—"Of course it will. Don't you know that hyposulphite of soda

is the fixing agent *par excellence*, and that, when we want to fix anything in photography, that is the substance we always employ?" Happy is he who possesses faith! Cherpin tried hyposulphite of soda; and his joy and admiration of the chemical knowledge of his friend may be imagined when he saw his blue transformed into a splendid green, this time perfectly stable. It is scarcely necessary for us to add that the mode of action of hyposulphite of soda in this case is entirely different from its photographic action, and that it would be quite impossible to predict the one by knowing the other.

This anecdote contains a moral. It shows, in our opinion, not the result of chance—for that is common to all the world; for where is the discovery to which chance has not more or less contributed?—but it shows the power of the will, the power of perseverance. Chance only favors two kinds of persons—those sufficiently instructed or endowed with talents eminent enough to observe it, to seize it, and to profit by it; and those who, by patience, perseverance, and the power of their will, force it, in time, to become useful to them.

Aniline yellows and browns are made, some of them of great beauty. Aniline black is, at the present time, attracting a good deal of attention from dyers and manufacturers, and is, in many respects, one of the most interesting of the aniline dyes. There is no *real* aniline black. A true black is an absence of all color; and all dyeing blacks are very dark blues, greens, or browns. Aniline black is a green so dark as to appear black. Dyers are not yet able to use this black very well on woollens; but in printing calico it is of considerable value, as it mixes well with other dye-stuffs, and forms a better basis for composite colors than logwood or iron. It possesses extraordinary indelibility. Once fixed upon the fabric, nothing will completely remove it. Acids change its color to a green; but its original tint is restored by an alkali. Some authorities state that bleaching salts will, after long exposure, discharge it; but the best supported statement is that the full black is again restored by exposure to the atmosphere.

Having thus hurriedly run over the aniline dye manufacture, two considerations at once present themselves: *First*, How much has been already done in connection with it, and to what development has it already attained? *Second*, What is there remaining undone, and what are its future prospects? The beauty of the aniline colors first introduced made them immediately very popular, and factories for their production were at once started. Very impure and high priced as they then were, the demand for them was very great, and the profit of their manufacture enormous. For instance, at that time these colors were sold in this country, impure as they were, for one hundred to one hundred and fifty dollars per pound (we do not pretend to precision); now the same dye-stuffs, well crystallized and of excellent character, can be obtained for fifteen or twenty dollars per pound. It is difficult to gather statistics of a business of such recent origin. It is enough to say that, in place of the few dyes, impure and of uncertain tinctorial power, furnished to the trade but ten years ago, they can now choose from a long and constantly increasing list of much better colors, at greatly reduced prices. In fine, within thirteen years this manufacture has commenced and has grown until it has attained a most surprising development. As yet the color manufacture itself has not been carried on in this country to any extent, but the dyes are largely used here. In Europe, however, aniline dyes are manufactured not only to supply home and American consumption, but they are sent to the East, even as far as China and Japan; and since their use requires chemicals (sulphuric acid, etc.), as well as dyeing skill unknown to the Eastern dyers, it has become necessary to send chemical products and workmen also.

Sanguine persons expect that the aniline colors will ere long entirely supplant all other dyes; but whether this ever happens or not, it is beyond question that their use will yet be very largely extended. As we continue to gain a more accurate knowledge of their constitution, we shall be better able to prepare them cheaply, and to derive from them new shades. We have, from the beautiful investigations of Hofmann, a good knowledge of rosaniline and its salts; but concerning many of the others we have only an empirical knowledge. For instance, the composition of neither the aniline green or black is understood; but when we can say just how and when they are formed, it is evident that a great advantage has been gained in the study of the best methods of preparing and using them. It is only by chemical science that the desired information can be obtained; and the manufacture has grown and can grow only as fast as the substances produced by it are studied scientifically. It is very common for so-called practical men to ridicule pure science as useless; but nothing can be more mistaken. Science and practice are really very closely connected. To be properly successful a manufacturing process must be carried on, not empirically, but in strict accordance with scientific principles. Again, reactions obtained in the laboratory are often entirely changed when tested in a practical way: *i.e.*, upon a large scale. The practical man, in order to be *really* practical, should be, at the same time, a scientific man.

So far we have spoken of the aniline colors only as dyes for textile fabrics; but this, though the principal, is still but one of the uses to which they are applied. For almost all kinds of miscellaneous coloring, they are fast replacing all other substances. Paper makers use them very largely for coloring their pulp. Colored writing and printing inks obtain their tints from the same source. Lakes for staining or coloring paper, for water-colors, and for photographic and design coloring, are made from aniline dyes. Perfumers use them for coloring soaps, pomades, unguents, essences, etc.; confectioners for tinting confectionery and syrups. It would be useless to attempt to enumerate all the applications to which they are put; and we will merely add, as examples, the decoration of glass and porcelain, coloring wood, straw, candles, ivory, mother of pearl, blueing linen, etc., etc. Not so important, though interesting, is the useful purpose which they serve in preparing anatomical specimens. Tissues soaked in their solutions absorb the color unequally, and are thus prepared for microscopic examination.

THE GREAT SALT LAKE.

BY GEO. S. CHASE.

In a trip across the continent, a few years since, the writer visited Utah and the Great Salt Lake. Some jottings from his note-book regarding the lake may possibly interest the readers of the *Journal*, although much has been written concerning it quite recently.

The Great Salt Lake is about seventy-five miles in its greatest length from north-west to south-east, and thirty-eight miles in width, extending between the parallels of latitude 41° 42′ and 40° 39′, and longitude 112° 8′ and 113° 16′. Some twelve miles due south of its south-east extremity, is situated Salt Lake City, at the base of the mountains, where a small stream affords a never-failing supply of water for household uses and for irrigating the gardens of the city, and several hundred acres of wheat-fields in the outskirts.

The road from the city to the bridge, across the Jordan, leads past the large brick-fields that supply the city with building material. The bricks are not burned, but are merely the valley mud moistened and worked over until sufficiently tempered, then moulded and dried in the sun. They are called *adobe*, and, when properly cared for, will stand for years, resisting both moisture and frost nearly as well as kiln-burned bricks. The wheat-fields extend all the way to the Jordan, a distance of five miles, and for several miles along its eastern bank. The sacred river here is very unlike its Syrian namesake, being a sluggish stream of liquid mud, some thirty feet wide by five or six deep.

On the western side of the river, beyond the reach of irrigation, is a dreary plain, with a scanty vegetation of sage-bush and cactus. This plain, which is ten miles wide, extends to the foot of the mountains which hem in the valley on the west. The road, after reaching the mountains, bends northward, and skirts their foot, making the entire distance to be travelled some twenty-two miles. The mountains, which are about three thousand feet high, are very bare except near their summits, where there are patches of timber. They are composed mainly of argillaceous schists and talcose slate, overlaid by granite and gneiss, and occasionally rolled stones and pebbles imbedded in sedimentary rock, forming a conglomerate. At one place in the latter formation we passed a cave thirty-five feet in diameter, with a low entrance, but rising in the centre to the height of ten feet. It has long been used as a camping-place by emigrants, and probably by Indians before them; and the walls and ceiling were everywhere of a shiny black, from the smoke of greasewood camp-fires.

Near the lake were three or four dilapidated farmhouses, clustered about a group of brackish springs, which boiled up at the foot of the mountain, and lost themselves, after a little distance, in a reedy swamp that extended eastward, along the border of the lake, to the opposite side of the valley. It is a singular feature of these little brooks, of which there are hundreds upon the plains, that, though they never extend far, but always sink out of sight in the thirsty sand, or end, like these, in a salt pond, before running a hundred yards, yet they are almost invariably alive with small fish, varying in length from half an inch to six or eight inches.

Leaving our horses in charge of the mistress of one of these houses, we pushed on for the lake shore. An old boat was hauled up on the sand; but it was too heavy to be moved, and we were obliged to trudge along over the rocks on foot. The range along whose foot we had been travelling ended in a bluff promontory, with a narrow beach covered with broken stones and white sand. The rocks nearest the water were covered with a thin glazing of salt, which glistened like crystal in the sunshine; and in little depressions and crevices of the rocks fine crystals of salt might be scraped up by the handful. The water-line was marked by a brown ridge, that at first appeared to be a species of seaweed cast up by the waves. The heap was fully four feet wide by a foot high in the centre, and it extended in either direction as far as the eye could reach.

Upon examination, this was found to be composed entirely of the shells or pupa cases of the larvæ of some insect, each being the size of a grain of oats. As there are no fish in the lake, the larvæ seem to have the water all to themselves, and breed in immense numbers; as both Fremont and Stansbury, in the reports of their explorations, mention meeting similar masses in other portions of the lake. The latter at one time describes the

struggles of his party in wading from their boat to the shore through a mass of living larvæ a foot deep, producing, when disturbed, a most offensive and nauseous odor. At another time, he sailed through a shoal of them covering an area hundreds of acres in extent. Fremont tells a story of a party of hunters who arrived in a half-famished state at an Indian cabin while the owners were absent. Finding a bag filled with what they supposed to be dried and pounded fish, they made a hearty meal—only to discover, when too late, that the material of their repast had been, instead of fish, these same larvæ!

The time of our visit being in September, the larvæ had long since turned to mature insects, and their empty shells were no more offensive than if they had been the chaff they so much resembled. Just released from the ever-present alkaline dust of a three-months' trip across the plains, we cared little for bird or bug; but following along the shore for a mile, to a broad bay with a smooth bottom of clear white sand, we pulled off our clothing, and plunged in for our long-talked-of bath in the famous lake. Such an extraordinary bath! The specific gravity of the water was so great that it buoyed up the body as if it were made of cork, not more than two thirds of it being at any time submerged. As for swimming, that was nearly impossible. The feet would not stay under, but, with every stroke, would rise to the surface, and waste their force upon the air.

The bay was very shallow. We waded out a long distance, the depth varying in long, regular swells from two to four and a half or five feet deep. The average depth of the lake cannot be over eight or ten feet. Stansbury rarely sounded over twelve feet; though in a solitary case he found it thirty-three.

There were no salt-crystals in the sand at the bottom of the bay; but the taste of the water was extremely bitter, and a single drop coming in contact with the eyes caused the most intense pain.

The water, though so shallow, felt quite cold,—as cold, in fact, as the water of the ocean at a New-England sea-shore watering-place. It dried off our bodies very rapidly, leaving us crusted over and the hair upon our heads filled with fine crystals of salt, which no amount of rubbing would remove, and which we were obliged to wear back to the city, where a warm bath speedily dissolved them.

In the lake, a hundred yards distant from the shore, was a rocky islet, on the sea side of which were found bits of slate covered half an inch deep with salt, forming a frost-work white as the driven snow, and almost as hard as the stone itself. In a cleft in the rock rested an old nest, probably of a fish-hawk. It was some fifteen inches in diameter, built of sticks and mud, and lined with fine grass. The stones all about it were covered with slender bones. As there are no fish in the lake, they must have been brought from some of the pools of which I have spoken, or possibly from the Upper Jordan, or Lake Utah, fifty miles to the South, which abounds in trout. A few years ago portions of the lake swarmed with birds,—ducks, brandt, blue herons, pelicans, cormorants, and gulls. Possibly, even now, on some of the lonely islands far to the north-west, or on the edge of the great barren plain, they may collect to lay their eggs and rear their young; but none were seen, except a few ducks in the marsh, and a solitary gull, who alighted on the water within gunshot, diving under and thrusting down its beak, as if fishing for something, though there was no sign of either animal or vegetable life in the water.

On the beach of this islet was picked up a little land bird that had drifted ashore. Although apparently dead for a long time, it presented no signs of decay. It was carried to the city and kept for several days, when, to all appearances, it was in as perfect a state of preservation as at the first. Indeed the water of the lake is used, to some extent, for preserving meat. Stansbury states that he preserved all that he needed for the use of his party during their explorations. Twelve hours' immersion sufficed to completely "corn" a large piece of beef, while a few days would change it into what sailors term "salt junk."

We were sorry that time would not permit us to visit the salt works, which were within sight some distance to the west of us. The business of obtaining salt by evaporating the water is carried on upon rather a small scale, as the market is limited, being confined entirely to the city and the wants of emigrants passing through. We were told that the proportion of salt varied from twenty-five per cent in the spring, to twenty-eight later in the season.* This difference in the freshness of the water is, of course, owing to the large quantity of melting snows that pour in in the spring, evaporating rapidly as the sun's rays grow more powerful. It is stated that the difference between extremes of height is sometimes twelve feet perpendicular in one season; but this is probably an exaggeration.

*Fremont evaporated, in a pail over a fire, five gallons of water, which gave fourteen pints or thirty-five per cent of a very fine-grained and very white salt. A portion of this was subjected to an analysis, giving, in 100 parts:—

Chloride of sodium	97.80
" " calcium	.61
" " magnesium	.24
Sulphate " lime	1.12
" " soda	.23
	100.00

A bottle of the water, brought home by Lieut. Stansbury, was analyzed by Dr. Gale, of Washington, D. C., with the following results:—

100 parts of water gave 22.422 solid contents as follows:—

Chloride of sodium	20.196 =	90.07 per cent.
" " calcium	0 trace.	
" " magnesium	0.252 =	1.11 " "
Sulphate of soda	1.834 =	8.15 " "
	22.282 =	99.33 per cent.

Arts.

IMPORTANT TO SMOKERS.

Dr. T. Williams, of Milwaukee, publishes in the *Chicago Medical Journal* an interesting paper regarding the influence of tannic acid upon tobacco smoke. He claims that this agent de-nicotinizes tobacco, and thus deprives it of its poisonous principle. If these statements are well founded, it will lead to combining with tobacco some of the agreeable vegetable astringents, that smokers may not have their nervous organizations broken down so speedily as by the use of clear tobacco. Dr. Williams remarks:—

"It is not generally known that tannic acid de-nicotinizes tobacco. If the bowl of a pipe is filled about one fourth full of tannin, filled up with tobacco, and smoked, the aroma of the tobacco is almost entirely destroyed, and the smoker scarcely feels the effect of the tobacco on his nervous system. In this experiment, the tannin powder does not take up all the vaporized nicotine (which is the intoxicating principle of tobacco and tobacco smoke) as it passes through it. The smoke will at first be entirely free from all taste or smell of tobacco; but in a few moments it will have formed a passage through the tannin, through which it will pass so rapidly that all of its nicotin will not be absorbed.

"The experiment is more striking if a bit of sponge is saturated with a saturated solution of tannin, and placed in the bottom of the pipe. The smoke of the first two pipefuls of tobacco will pass out as vaporless and innocent as the smoke of a child's rattan or grape-vine cigar, and as devoid of tobacco smell. But if several more pipefuls are smoked, the tannin having taken up all the nicotin it is capable of neutralizing, the smoke will begin to pass out with its natural taste and aroma. A sponge, after being used in this way, acquires a peculiar stale tobacco smoke odor. A common pipe may be used in this experiment; but with it the smoker is very liable to draw some of the tannin solution into his mouth, producing an unpleasant 'green persimmon' puckering. The Turkish pipe, which is provided with a reservoir containing water, answers the purpose admirably. The place for water may be filled with a saturated solution of tannin; or, what is better, as it prevents the unpleasant bubbling noise, a sponge saturated with the solution.

"By changing the sponge often enough, a person may smoke as immoderately as he pleases without any injurious effects; and it is particularly recommended to ambitious young gentlemen whom the weed in its natural condition 'makes sick.' I should also suppose that smoking tobacco steeped in a saturated solution of tannin, and dried, would be equally harmless, but have not tried this latter experiment. I am not sanguine, however, that mankind will avail themselves of the advantages of this discovery. It will be like the Frenchman's antidote to the intoxicating effects of alcoholic potations,—it destroys the very effect for which the poison is used.

"The North American Indians were wise, however, and availed themselves of this discovery hundreds of years ago. It is well known what inveterate smokers the Indians are; and still we never see any injurious effects of this habit upon them. This may be due, in part, to their vigorous constitutions and hardy nomadic life; but it is mainly due, I think, to the form in which they use their tobacco. Until they learn the habit from the whites, they rarely or never use the pure leaf. Their 'Killikinnick'—the agreeable aroma of which, once inhaled in a wigwam or lumberman's cabin, can never be forgotten—is composed of equal parts of tobacco and the inside bark of a species of the *cornus coricea*. Sometimes the admixture of tobacco in it is not more than a fourth. This bark is astringent, and abounds in *tannin*, and therefore in a great measure neutralizes the effects of the tobacco. The fancy brands of smoking tobacco labelled 'Killikinnick,' sold by tobacconists in papers, it is needless to say, are pure tobacco, and have no real claim to the name. The Indian name for the particular species of swamp dog-wood which they use for smoking is 'Kinnikinnick;' hence the name. As we learned the art of smoking from the American savage, it would be only showing proper respect to our tastes to take the weed as they do. They peel the inside bark of the shrub, dry it, pound it to a powder in their stone mortars, and then mix intimately with the crumbled tobacco."

Preventive of the Decay of Wood.—Experiments have been carried on in Paris for a long time, in the intent of finding out a means of preserving palings, posts, etc., from decay. As the result of a five years' experience, a paint is recommended, which at the same time possesses the advantage of being impervious to water. It is composed of fifty parts of tar, forty parts of finely-crushed chalk, five hundred parts of fine, white, hard sand, four parts linseed oil, one part of the red oxide of copper, in its native state, and, finally, one part of sulphuric acid. In order to manufacture the paint from this multiplicity of materials, the tar, chalk, sand, and oil are first heated in an iron kettle; the oxide and sulphuric acid are then added with a good deal of precaution. The mass is then very carefully mixed. It is now ready for use, and must be applied while hot. In coating the timber, a stiff brush is used. If it is found upon using that the mixture is not liquid enough, a little more linseed oil should be used. After this paint has cooled and dried, it forms a coating or varnish quite as hard as stone.

Sizing for Gold on Glass.—The following recipe has been recommended: Copal varnish is rubbed up fine with either white bole, burnt umber, or ochre—all of which must be quite dry—and then strained through cloth. The glass having been cleansed with fine chalk, is painted over with this varnish, and placed in a warm room protected from dust. Experience soon teaches when it has become dry enough for applying the leaf, which is pressed on with cotton and then allowed to dry. If necessary, it may then be polished.—*Chemist and Druggist.*

PRESERVING MEAT.

Dr. Simms, of Charleston, S. C., has a method of preserving meat, which he described at a recent meeting of the Institute of Technology, in this city:—

"Putrefaction is nature's process for returning organic to inorganic materials; and this is effected by dealyzation or change in the proportions of the gases of which the former are composed. In meats, this is brought about, as generally believed, by the action of minute animalculæ, whose germs float in the air and permeate the animal tissues. Soon after death come the monads and bacteriums, which begin the process. These must have oxygen to live, and their office is to take away the oxygen, and then die. Next come the vibrios, which are developed and can live without oxygen; and under their influence putrefaction goes on rapidly. If, therefore, by any process, we can prevent the vivification of these animalculæ, we prevent or arrest putrefaction.

"Sulphurous acid gas will do this, but this is evanescent and cannot be fixed. Though theoretically the best, it is not available in practice, as it is efficient no longer than it is in contact with the material to be preserved. Carbon is also a powerful anti-putrescent; but it cannot be used as a meat preservative, as it injures the external appearance, and attracts oxygen. In his process, he combines the sulphur and the carbon in the bisulphide of carbon, in which both the elements are fixed, thus securing the advantages of both, with the disadvantages of neither. No animalculæ can come into existence under its influence. His attention was drawn to this substance as a meat preservative by its efficacy in preserving microscopic specimens of the urinary tubuli in Bright's disease of the kidney, some of which, prepared in 1864, are now in perfect condition in the Army Medical Museum in Washington.

"This material is exceedingly cheap, much more so than salt, the estimated expense being one tenth of a mill per pound of meat preserved. To produce it it is only necessary to burn sulphur in a close retort and pass the fumes over glowing charcoal, when the escaping gas may be employed as such, or may be condensed into a fluid. He places the meat in a vat or chamber, from which the air is exhausted, by machinery if need be, which is then filled with the gas. He had preserved in this way, in September last, at Charleston, S. C., with the thermometer 92 degrees F. in the shade, a whole sheep with the skin on. This meat is now in a perfect state of preservation, as any one can convince himself by calling at 86 North Street, where the whole process can be seen in operation. As the process goes on best at a temperature of 100 to 104 degrees F., it is better adapted for warm climates, where it is most needed, than for cold ones.

As usually seen, this gas is very fetid; but it can be prepared without disagreeable odor. If necessary, the protosulphide can be used, which has rather an agreeable odor. But even with the bisulphide this gas will volatilize at 104 degrees F., in a few minutes, so that the meat is perfectly free from unpleasant odor or taste after cooking it. It everywhere permeates the muscular fibre, dissolving the fat, and carrying the oil through the whole tissue, giving a rich taste relished by many epicures."

Cement for Leather.—Of many substances lately brought very conspicuously to notice for fastening pieces of leather together, and in mending harness, joining machinery belting, and making shoes, one of the best is made by mixing ten parts of sulphide of carbon with one of oil of turpentine, and then adding enough gutta percha to make a tough, thickly-flowing liquid. One essential prerequisite to a thorough union of the parts consists in freedom of the surfaces to be joined from grease. This may be accomplished by laying a cloth upon them, and applying a hot iron for a time. The cement is then applied to both pieces, the surfaces brought in contact, and pressure applied until the joint is dry.

Japan Black.—1. Asphaltum, 3 oz.; boiled oil, 4 quarts; burnt umber, 8 oz. Mix by heat, and when cooling, thin with turpentine. 2. Amber, 12 oz.; asphaltum, 2 oz.; fuse by heat; add boiled oil, half a pint; rosin, 2 oz.; when cooling add 16 oz. oil of turpentine. Both are used to varnish metals.

TEACHERS AND THE "JOURNAL."

Editor Boston Journal of Chemistry:—

I have several times been on the point of writing to you to say that your paper ought to be better known among teachers. There is a great deal of matter in every number which is particularly interesting and valuable to the teacher, and which, in the great majority of cases, would not be accessible to him anywhere else. It is the great fault of teachers, generally, that they are somewhat behind the times in their knowledge of scientific subjects. This is not wholly their fault, but is rather to be considered their misfortune. The scientific periodicals, and the freshest books on scientific topics, are beyond the limited means of many of them; and their only authorities, in most cases, are the ordinary school text-books. These text-books are too frequently no better than the one which you have recently criticized, under the head of "Errors and Absurdities." Your little monthly would at least serve to remind these teachers that the world is not stationary. It would also furnish them a great deal of information which they could use in the way of oral instruction. I have found the *Journal* very profitable and very suggestive, in this very way; and I am confident that thousands of teachers would be eager to use it for similar purposes, if they knew of its existence. T.

Boston, Feb., 1869.

"ABOUT STOVES."

Editor Boston Journal of Chemistry:—

Is cast-iron permeable to carbonic oxide gas? Certainly not, when the metal is cold. How when it is heated?

It is a familiar fact that iron, when heated with carbon in excess, absorbes it with avidity. It is an equally familiar fact that carburetted iron,—cast-iron, for instance,—when heated in the presence of atmospheric air, gives up more or less of its carbon to the oxygen of the air.

Now the cast-iron of every stove is subjected to both these reactions. Its inner surface is exposed, while heated, to carbon in excess, and its outer surface to atmospheric air. What happens? Carbon is absorbed within, and carbonic oxide, or carbonic acid, evolved without.

When the cast-iron stove becomes incandescent,—red hot,—and the mass approaches a plastic state, is it probable that a progressive interchange of elements takes place through the whole substance of the cast-iron between the inner and outer surfaces, carbon being absorbed continuously within, and evolved, in connection with oxygen, without?

This is analogous to the well-known phenomena of electrolysis in fluids, without, however, the determining presence of a galvanic circuit.

I have not seen this view elsewhere, though it may have occurred to others. I offer it as the true explanation of the supposed permeability of cast-iron to carbonic oxide gas.

A correct theory in this case is not only of interest in itself, but may lead eventually to important practical results.

We have good reason to believe that not only the cast-iron stove, patent in more senses than one in the poor man's house, but also the cast-iron cylinder and radiator, inclosed in the furnace of nine tenths of our first-class houses, are poisoning, all winter long, the air which we breathe.

Where is the remedy? First, ventilate every room; then, either substitute steam for the hot air furnace, or use a hot water jacket, or hot water tubes, instead of incandescent iron, to heat the air. Who will invent a cheap and safe hot water furnace for our houses, which even a Celt can manage?

But who will invent any adequate substitute for the invaluable common cast-iron stove for anthracite? The nearest approach to it now is certainly the sheet-iron cylinder stove with fire-brick linings. Unfortunately this cannot replace the universal cooking-stove.

Wm. F. Channing, M.D.

Providence, R. I.

A New Element.—A new chemical element has just been discovered by spectrum analysis.

ACCIDENT FROM NAPHTHA VAPOR.

Editor Boston Journal of Chemistry:—

In conversation with a manufacturer, a short time since, I learned from him that he had lost a woollen mill by fire, caused by leakage of an automatic naphtha gas-light machine, under circumstances that are interesting. The naphtha gas machine was placed forty feet from the boiler furnace; the leakage of naphtha vapor from the machine followed the ground (precisely as water would) to the boiler furnace, which was upon a descending grade from the naphtha gas machine. When the watchman went to the boiler furnace in the morning, to kindle the fire, he placed his lantern upon the floor of the ash-pit, which was below the level of the boiler-house floor, when an explosion took place. The vapor of the naphtha being ignited by the watchman's lighted lantern, the fire ran to the naphtha gas machine in a moment. All was in flame in shorter time than this can be written. The watchman was somewhat injured. The loss from the fire was ($40,000) forty thousand dollars.

Insurance agents are observing men. They have accumulated many illustrations of the above type, and they very prudently avoid writing policies on property that is illuminated by any of the automatic self-generating gas machines.

Recently Wm. H. Perkins, Esq., F.R.S., the real discoverer of aniline dyes, in a lecture before the "Society of Arts," London, illustrated, in a very striking manner, the great density of the vapors of naphtha or benzine. He poured the heavy vapor of naphtha, or benzine, into a trough that was fourteen feet long, and slightly inclined; at the lower end was placed a lighted lamp. The vapor was seen to run down the incline until it reached the lamp, when it ignited and ran up the inclined plane to the top, precisely as a train of gunpowder would.

Mr. Perkins mentioned that in the distillation of naphthas, it was not uncommon for a leak to show itself in the apparatus, when, by its density, it would find its way to the furnace fire, and there ignite, to the great danger of life and property. F.

Lawrence, Mass.

Agriculture.

QUACK CATTLE DOCTORS.

A great deal of indignation is expressed, and very properly, against a class of ignorant men, who, styling themselves "*doctors*," tamper with the lives and health of human beings. It is certainly demanded that we reserve a part of our wrath for another class of quacks, called cattle-doctors, who are destroying hundreds and thousands of our dumb animals every year. The poor animals demand our sympathy more than human beings, whose lives are in the hands of empirics, inasmuch as no other refuge is provided for them when needing medical or surgical aid. It is indeed singular that so few educated veterinary surgeons are found in the various parts of our extended country, and no colleges are provided for the proper instruction of persons in the veterinary art. The sole resource of owners of horses and other valuable animals, when disease attacks them or surgical aid is needed, is to some ignorant pretender, who has contrived to get up a reputation as a horse or cattle doctor, and who is permitted to torture and kill in a most cruel way. We had a very valuable Durham heifer, the past season, who experienced some difficulty in dropping her first calf. A "cow-doctor" was sent for, in our absence, who commenced his course of treatment by *thrusting a large knife into the abdominal cavity*, for the purpose, as he said, of "letting out the air"! Of course the animal died almost instantly. If from motives of humanity we are not led to provide means for educating a class of veterinary surgeons, it would seem as if self-interest would awaken to the importance of the subject. According to the report of the Commission of Agriculture, Hon. Horace Capron, for the fiscal year 1867–8, the annual loss of farm

animals, from fatal maladies, reached the enormous sum of $50,000,000. The losses in swine, from "hog cholera" and other diseases, was not less than $10,000,000. These are large sums to be taken from the pockets of husbandmen and stock-raisers. Horses, mules, sheep, cows, oxen, are constantly liable to attacks of malignant disease, and it is high time a class of men were provided who, by education, are fitted to study them, and provide remedies. There should be, in every town or county, a doctor who has regularly and systematically studied the anatomy and peculiar diseases of farm animals, and who is competent to practise veterinary medicine and surgery. The vocation should be regarded as honorable and respectable, and rank with other departments of learning and art. Many of the diseases of cattle and horses are like those which afflict the human family, and require similar treatment. There are others, however, which are peculiar, and pass as murrains or distempers. These should be carefully studied, and not only curative but preventive means provided. The diseases and accidents to which our valuable animals are constantly liable should be properly treated, and the animals no longer left to suffer at the hands of vulgar empiricism or superstitious folly.

SETTING OUT FRUIT-TREES.

We heard a neighbor, last spring, call to his son, "John, have you finished digging the holes for the pear-trees?" — "Yes, sir," was the reply. A curiosity was felt to examine the "holes"; so, walking into the garden, the rows of little excavations, resembling the openings made to receive the seed in a corn patch, met the eye. The soil was hard and compact, in a condition wholly unsuited to the wants of an orchard of fruit-trees. "You will lose your trees, neighbor," we said, "if you plant them in this way; it is not only a waste of money, but a loss of time and labor." — "Why, are not the holes large enough, or deep enough? How would you dig them?" — "We never make but *one hole*," we replied, "for any number of trees, and that embraces an area equal to the whole of the ground devoted to the orchard." This digging a superficial pit in an unworked soil, in which to bury the hungry roots of young trees, is a proceeding absurd and wasteful. Fruit-trees should never be planted until the soil is in fit condition to receive them. It must be pulverized, and the subsoil turned up and exposed to air and sunshine. Good, well-rotted stable manure must be applied liberally, or ashes and bone dust, which is better. Look well to the planting of fruit-trees.

A LITTLE WHITEWASH.

Yes, a little whitewash will do a great amount of good; but a full supply, enough to cover the inside of barns, stables, cellars, etc., with two good coatings, is much better. The lime which enters into this composition is a purifying agent, and the wash serves as a disinfectant. The benefits conferred in this regard compensate for all the labor and expense involved in whitewashing; but the clean, tidy appearance which it gives to farm premises is most pleasing and salutary. In no way can a farmer make so imposing and even elegant show, for trifling expenditure, as by a free use of whitewash. Even old buildings glow and glisten under the whitewash brush, and assume a new and fresh appearance. Buildings, in the eye of the owner, as well as those of his neighbors, have a higher money value after the process is completed. The spring of the year is a good time to attend to this kind of work; and our readers, by consulting the back volumes of the *Journal*, will find some excellent recipes for preparing white and colored washes.

WHAT IS THE CONDITION OF YOUR CELLAR?

Is it damp, close, filled with disagreeable odors, proceeding from germinating or decaying vegetables? If so, it is high time you gave the matter your earnest attention; for you have in that locality the germs of disease, and yourself and family are liable to be prostrated at any moment.

You think your cellar or basement is in good sanitary condition; do you *know* that it is? Have you fairly and carefully examined the premises? Have you looked over the potatoes, turnips, squashes, and other vegetables, to ascertain their condition? We know that diphtheria, typhoid and scarlet fevers, and many other most serious illnesses have their origin in cellars, both in city and country; and we can do our readers no greater service than to urge them to see that, at all times, they are in a dry, sweet, wholesome condition. Why should farmers and farmers' families, living in the country, away from the pestilential vapors of cities, be so subject to attacks of malignant diseases? There is a reason for it, and we can point it out. They arise from the indifference manifested to the observance of hygienic rules, and the violation of sanitary laws. Cleanliness is essential to health, and it is just as necessary in the country as in the city. A family living over a foul cellar is more liable to be poisoned and afflicted with illnesses than a city family living in its polluted atmosphere, but without cellar or basement filled with fermenting roots and fruits. There is far more sickness in the country among husbandmen than there ought to be. With plenty of pure air, water, and exercise, the evil imp, disease, ought to be kept at bay; and he would be, if a better observance of certain hygienic conditions were maintained. Bad-conditioned cellars, small, close sleeping rooms, stoves, — these are all agents of evil, and are fast making the homes of farmers almost as unhealthy as those of the dwellers in cities Are not these suggestions worthy of consideration?

ASHES AND BONE FLOUR.

It is stated by many that ashes cannot be procured to make the fertilizer recommended in the February number of the *Journal*. Potashes may be employed as a substitute, by dissolving *twelve pounds* in ten gallons of hot water, and thoroughly saturating the bone flour with the solution. A barrel of dry peat or good loam, free from stones, may be mixed with the bone after adding the potash. Care must be used not to have it too moist or too dry. It should not form a sticky mass. In using, a little earth should be scattered over it before dropping the seed. The seed should not fall directly upon it. The effect of this fertilizer will not be noticed early in the season; but as it advances, the crops will become vigorous, and yield a fine return.

Editor Boston Journal of Chemistry:—

Some days ago we accidentally met with the *Boston Journal of Chemistry*, and having received more than fifty cents' worth of information from it, felt in duty bound to send in our subscription, which we did; and we *advise all interested in agriculture to do the same.* We read with pleasure your articles on bone as a fertilizer, and agree with you that it is the only safe way for a farmer to procure a good superphosphate to get the bone and make it himself. W. E. B. & Co.

PROVIDENCE, R. I., Feb. 22, 1869.

COMMERCIAL FERTILIZERS.

We are pleased to find that our exposures of frauds in fertilizers and efforts to prevent them are having an influence upon our law-makers. The following act, reported by Col. Needham, has passed the Senate of this Commonwealth, and will undoubtedly become a law before this paragraph is read. The law is perhaps as good as could be framed; and its enforcement will prevent a vast amount of loss to farmers, gardeners, etc.

AN ACT TO PREVENT THE SALE OF ADULTERATED COMMERCIAL FERTILIZERS.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:—

SECT. 1. Commercial Fertilizers sold or kept for sale in this Commonwealth shall have affixed to every bag, barrel, or parcel thereof a printed label, which shall specify the name of the manufacturer or seller, his place of business, and the constituent parts of said fertilizer, together with a statement of the percentage which each constituent part bears to the whole mass.

SECT. 2. Whoever sells or keeps for sale commercial fertilizers not labelled in accordance with the provisions of the first section of this act, or who shall affix thereto labels not truly specifying the constituent parts of the fertilizers, shall be punished by a fine of ten dollars for the first, and twenty dollars for the second and each subsequent offence.

COAL ASHES.

Editor Boston Journal of Chemistry:—

I consider it a favor to be able to recommend your valuable paper to my farmer friends. May I take the liberty to ask you, will it pay to draw coal ashes one mile for agricultural purposes; and in what way should they be used? Respectfully yours,

M. H. CHRYSLER.

KINDERHOOK, N. Y., Feb., 1869.

REMARKS.—Coal ashes usually contain about 5 per cent of soluble substances useful to plants. They are valuable to spread upon wet meadows; but we think they cannot be transported long distances with profit.

TICKS ON SHEEP DESTROYED BY CARBOLIC ACID.

Editor Boston Journal of Chemistry:—

For the benefit of farmers and others having charge of farm-stock, allow me to make a statement through the *Journal*. Last winter I had a flock of between thirty and forty sheep, which I found, upon examination, to be badly infested by ticks. What to do in the case was a question. For obvious reasons I could not use the tobacco dip. I had seen, in the *Journal of Chemistry*, statements that *carbolic acid* was the most effectual, and at the same time the most convenient remedy that could be found. Without delay, I ordered from you a gallon of the *saturated aqueous solution*. To apply it without waste, I made use of a small tube, passing through a cork, in the neck of a small tin can. My sheep were almost covered with ticks, and I only applied the acid along the back, sides, and neck, parting the wool so that it should penetrate to the skin. I went over the entire flock in three hours' time. A few days later they were examined, and the worst cases treated again; and subsequently a very few were attended to a third time. Two quarts of the solution was all that I used, and the result exceeded my most sanguine expectations; the whole were exterminated. At shearing time, upon most of the flock, not a single tick could be seen. Nor did they go from the sheep to the lambs; my lambs were entirely free from them.

I can say cheerfully that the aqueous solution carbolic acid, sold by you, is the cheapest, the surest, the safest, and by far the most convenient thing I ever used; and I would remark further that I have used it upon cattle with like effect. The knowledge obtained through the *Journal of Chemistry*, in regard to the usefulness of this agent for the purpose named, was worth, to me, last year, many times the cost of the paper. Allow me to suggest that in supplying this acid directions for its dilution be given. There are so few people acquainted with its nature that this seems necessary. S. AUG. NELSON.

GEORGETOWN, Mass.

PROSPECTUS.

BOSTON Journal of Chemistry.

Vol. IV.—Commencing July 1, 1869.

A PROSPECTUS OF VOL. IV. OF THE "JOURNAL" is issued at an early date,—three months before the volume commences,—with the view of informing our numerous friends regarding our plans in the future, and affording them ample time to aid us in extending its patronage, and consequent usefulness; besides, it enables us to make a very generous offer to new subscribers, the nature of which is stated below.

A very general desire has been expressed that the JOURNAL should be continued in its present form, at least through another year; and, after much deliberation, it has been decided not to make the contemplated change alluded to in the January number.

VOLUME IV. of the JOURNAL, commencing July 1st, 1869, will be of the same form and size as the present volume, each number containing not less than *nine pages* of reading matter. It will be printed with new type, on the finest book paper; and we shall strive to make it not only the *best and cheapest scientific journal in the world*, but the *handsomest*.

The terms for the JOURNAL *will be the same as heretofore,—Fifty Cents* (50) *per year; single numbers, Six Cents.*

The JOURNAL will continue to be independent, unbiased, careful, and reliable. No individual, corporation, or organization is rich or influential enough to suppress its opinions, or in any way control its influence. It will continue to expose frauds, schemes, and speculations, which profess to originate in or grow out of progress in science and art. The great and growing evil of *adulterations* in articles of food, medicine, fertilizers, and substances used in the arts will receive special attention, and the nature of the sophistications and adulterations fully exposed. We shall present a large number of useful practical formulæ, recipes, and scientific suggestions, which alone will be worth many times the price of the publication.

TO PHYSICIANS

It will continue to be of *special service*, as it will keep them informed of the nature of all new remedial agents, all new discoveries in chemical and medical science, all new principles or processes connected with toxicology and pharmacy.

TO DRUGGISTS

It will come as a reliable friend and adviser, affording information and instruction upon all matters relating to the manufacture and dispensing of medicines, and those other substances and agents produced or vended by them.

TO FARMERS

It will impart information upon the important subjects of the chemistry of plant-growths, and the nature and method of preparing fertilizing agents.

TO CHEMISTS, MANUFACTURERS, ARTISTS, TEACHERS, STUDENTS, CLERGYMEN,

ALL intelligent readers, men and women, everywhere, the *Boston Journal of Chemistry* will supply information and instruction of the highest importance and usefulness.

The JOURNAL has, at the present time, a large army of friends, and these we ask to aid us in extending its circulation. Our patrons know how instructive and useful it *has been* in the past; we assure them it will be even *better* in the future. Cannot each one send us a new subscriber, to commence with Vol. IV.?

We make this generous offer to *new subscribers*: All those who subscribe and send us *fifty cents* in advance will receive the remaining numbers of Vol. III. They will receive the whole of Vol. IV., and all the numbers of Vol. III. which are issued after the date of their subscription. *Subscribe early*, and thus obtain as a gratuity a part of Vol. III.

JAS. R. NICHOLS & CO., Publishers,
BOSTON.

Boston Journal of Chemistry.

BOSTON, APRIL 1, 1869.

☞ Any one sending us the names of three new subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For five new subscribers we will send the Petite Microscope; for twenty-five we will send, in addition to the microscope, a copy of "Stöckhardt's Chemistry for Students," the best elementary treatise yet published; for one hundred new subscribers we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stöckhardt's Chemistry.

☞ Premiums are allowed only upon *new* subscribers, not on renewals of subscription by old subscribers.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

☞ Correspondents are particularly requested to give their names in full, with their Town and State; and, in case of change of residence requiring a corresponding change in the mailing of their papers, to give not only the new address, but the old one also.

☞ Subscribers who are physicians, dentists, or apothecaries will confer a favor by informing us of their profession, as we wish to know accurately the amount of our medical subscription list.

BACK VOLUMES OF THE JOURNAL.

We are unable to supply complete files of either Volume I. or II. of the *Journal*. Of Volume I. (originally issued bi-monthly), Nos. 1, 2, and 3, (July, August, and September, 1866,) are now out of print. Of Volume II. (monthly), Nos. 1, 3, 6, and 12 (July, September, and December, 1867, and June, 1868,) are also out of print. Of the remaining numbers we have a few copies left, which we will forward to our friends at the following prices: Volume I., three numbers, twenty-five cents; Volume II., eight numbers, fifty cents. We have on hand a few complete files of Volume III., as far as published. These we will send as ordered, at the rate of six cents per single copy; six copies for twenty-five cents.

THE NEW METHOD OF PREPARING OXYGEN.

Much interest is manifested by some of our readers respecting the new method of Tessié du Môtay for preparing oxygen. We have heretofore presented a brief explanation of the method; but a desire is expressed for more explicit or detailed statements, and therefore we allude to the subject again. Like a great many *new* inventions, it is not altogether new. The great chemist, Boussingault, in some experiments with baryta, achieved similar results, and in a way not unlike that of Du Môtay. Indeed we learn that the latter has recently introduced baryta into his process; thus, in a measure, imitating Bousingault's method.

The ordinary black oxide of manganese of commerce is stirred into a solution of caustic soda, and the whole evaporated to dryness. The mixture is then placed in a retort, and a current of hot air passed over it. The oxygen of the air is taken up and combines with the substances, forming manganate of soda. The manganate of soda is then subjected to the action of superheated steam, which decomposes it, robbing it of three equivalents of oxygen, and converting it into sesquioxide of manganese and soda. The steam holding the oxygen is condensed by passing it through a coil of iron pipe immersed in cold water, and the oxygen is conveyed to a proper gas holder. This is a simple statement of how the oxygen is procured. As soon as the current of steam is stopped hot air is again passed over the oxide of manganese and soda, and manganate of soda is again formed. Superheated steam expels the oxygen as before, and thus the process is continuous, the soda manganate being formed and decomposed alternately by the action of hot air and steam. In theory the original mixture should serve an indefinite number of times; but in practice we learn that it does not, as, by partially fusing, it becomes incapable of absorbing oxygen.

The inventor, as before stated, has recently introduced baryta and some other substances into the retort, which aids in the absorption of oxygen, and prevents the semi-fusion of the mass. Considerable expense must be incurred in apparatus, as two retorts are required, and arrangements for superheating steam. The oxide of manganese and the caustic soda are cheap articles, and if they can be used over and over again oxygen can certainly be furnished at a very low cost. It will be seen from this description that the invention does not help those who wish to use only a moderate amount of oxygen It is practicable only for purposes where large quantities are required. Surgeons who require the gas for producing the intense lime light used in connection with the laryngoscope and other optical instruments, can best prepare it from the oxide of manganese and chlorate of potassa after the well-known method. Teachers and experimenters must still depend upon this simple process.

A BISHOP ON SCIENCE.

We have seen in several prominent newspapers, including one of the respectable journals of this city, extracts from a report in the *Buffalo Christian Advocate* of a lecture by Bishop Coxe, of New York. The lecture was on the "Connection of Science and Revealed Religion;" and we are told that it was "full of astonishing facts." It most assuredly was, if the report is an accurate one. For instance, we are informed in it "that the crust of the earth is *just* twenty-one miles thick; that the world's conflagration has already begun, as *the internal fires are tending rapidly to its annihilation*; that earthquakes have multiplied since the Christian era, and *indicate a speedy collapse of our system*; that if the Lisbon earthquake had been a *little* more severe the shock would have *driven out* that portion of the surface; and, *most wonderful of all*, that on the first day of the present century, a little planet was discovered by Kepler in our system; and since then a large family of these little planets have appeared, which are *parts of an exploded world*, and that some of these fragments have fallen on the earth in *showers of meteors*." After stating this last wonderful fact, the lecturer appears to have made the sapient inquiry, "If Kepler's planet exploded, *why may not ours?*"

It is pleasant to know that scientific men, who have hitherto estimated the thickness of the earth's crust all the way along from ten miles up to eight hundred, are now agreed that it is *just* twenty-one miles. It is well to have these disputed questions finally settled. It is not so pleasant, however, to be informed that the internal fires of our planet, instead of cooling down by slow degrees, as many of the most eminent students of physics have assumed, are raging more and more fiercely, and that "a speedy collapse" of the globe is to be expected. It is also unwelcome news that the strain upon the earth's crust by the Lisbon earthquake has been so exactly measured, and that a little more force would have "driven out" a piece of it; for we cannot tell how fearful may be the results of the next great earthquake, which, from the increase of earthquakes, may be expected to be "a little more severe." The consequences *may* be such an explosion of our terrestrial ball as the bishop darkly hints at in an interrogatory way.

But concerning the last of these facts, and the "most wonderful of all," we must venture to express a doubt. There is pretty good reason to believe that Kepler died in the year 1630; and we must still adhere to the commonly accepted statement that it was another man who discovered the little planet Ceres on the first of January,

1801. It is true that Olbers advanced the theory that this little planet, and the others like it which were soon afterwards discovered, are parts of a shattered planet; but we supposed that this theory was now almost universally rejected by astronomers. These planets now number about a hundred, and are scattered through a belt of the heavens more than a hundred millions of miles in breadth, or more than the distance from the earth to the sun; and it is difficult to conceive of an explosion that could throw great fragments of a huge planet through distances so vast. There are other objections to the theory which are even more serious. On the other hand, if we accept the nebular hypothesis (of which we gave a sketch in the last *Journal*), the formation of this zone of minor planets is as readily explained as the origin of our own globe, and the mightier orbs that move in wider circles round their solar centre.

Of course we do not believe that the lecturer said that Kepler discovered Ceres. He probably mentioned Kepler in that connection, and the reporter, as reporters sometimes do, got things somewhat mixed in his memoranda. But the good bishop very likely did make most of the other statements ascribed to him; for it is a common vice of unscientific writers on scientific subjects to be very rash and dogmatic on doubtful or disputed points. They frequently have no hesitation in deciding questions which wise men, who have made them the study of their lives, do not venture to consider settled.

Even if the lecturer made none of the statements in the positive form in which they are reported, there can be no doubt that the *Christian Advocate*, and the papers that have copied its report of the lecture, are responsible for the promulgation of these errors and absurdities; and it is certainly to be regretted that there is so general an ignorance of the very alphabet of physical science that these absurd things can be printed, and reprinted, and widely read without challenge or contradiction.

A NEW ANÆSTHETIC,

Or, rather, an improvement upon an old one, is proposed by Dr. E. Andrews, of Chicago. A recent number of the *Chicago Medical Examiner* contains a paper by Dr. Andrews, giving the results of some experiments with the nitrous oxide in association with certain quantities of free oxygen. The object of these experiments was to ascertain if, by mixing oxygen with nitrous oxide gas, it might not have conferred upon it a *sustaining power*, so as to be applicable to the longest surgical operations. It is well understood that, while nitrous oxide acts promptly, and leaves none but the most agreeable sensations behind, its healthy anæsthetic action cannot be very long continued. For use in extracting teeth, and for minor surgical operations, it is better and more desirable than either ether or chloroform; but for the more serious surgical cases, requiring the patient to be kept insensible for a long time, it has been found to produce unpleasant and dangerous symptoms.

The theory regarding the cause of these effects is, that the oxygen is so firmly locked up in the combination that it cannot aid in the revivification of the blood, and hence is as inert as the oxygen of carbonic acid. The nitrous oxide needs to hold in mechanical combination sufficient oxygen to sustain life while it is acting to produce anæsthesia. Dr. Andrews claims that his experiments prove that *oxygen-mixed nitrous oxide* is an agent perfectly safe to use in the longest as well as the shortest surgical operations, and that it forms the pleasantest and best anæsthetic known. He recommends one volume of pure oxygen to be mixed with three of nitrous oxide, and remarks that care must be used, in administering it, that no atmospheric air becomes mingled with it. We feel that Dr. Andrews's theory and statements deserve careful consideration, and we hope they will stand the test of the most rigid scrutiny and experiment. It is impossible to place full confidence in his results, as there is manifestly an incompleteness in his labors, and they do not rest upon that substantial basis of experimental demonstration which is demanded for matters of so important a character. His theory seems plausible, and may be correct. We sincerely hope it may prove so.

EVAPORATING WATER IN CONNECTION WITH STOVES AND FURNACES.

A correspondent inquires, — "What becomes of all the water evaporated in the hot-air chamber of furnaces? Several pailfuls are evaporated in many furnaces each week, and yet the walls and windows of the heated rooms appear dry."

If the sense of sight of the occupants of our dwellings was acute enough, many strange and interesting processes might be observed which are now entirely hidden from view. What are called "convective currents" would be seen, in heated rooms, moving upwards and downwards, the warm air ascending, the cooler descending. Constant agitation, constant motion, is maintained in all apartments, even those apparently the most quiet. Air is passing in and out of rooms through every crack and crevice, and the amount thus transferred in the course of twenty-four hours is immense. If it were not so, no one could live in-doors a single day. The air passing up from furnaces, loaded with aqueous vapor, is disposed of in various ways. The abnormal moisture is in part condensed by contact with cool surfaces in the room; a part passes out of doors; and still another portion is distributed over the dwelling, and is condensed upon ceilings, floors, windows, etc. In frosty weather, a large part is condensed upon the windows, which are rendered cool from the chilling winds without.

Families suffer in health, and dwellings are injured, by this foolish practice of evaporating water in connection with stoves and furnaces. No family should allow "several pailfuls" of water to be changed into vapor every week, to hang in the atmosphere of rooms, and impinge upon furniture and walls! A pailful of water makes seventeen hundred and twenty-eight pailfuls of steam. What an atmosphere this must produce for human beings to live in! Is it natural? Is it pleasant? Is it healthful? No. We have always found the most cases of croup, influenza, rheumatism, coughs, etc., in families who entertain the erroneous and vulgar idea that much moisture is essential to health. A better system of ventilation, a more careful adjustment of temperatures, is what is wanted in our dwellings, — not an abnormal steam-impregnated atmosphere.

CARBOLIC ACID.

It is becoming more apparent every day that our expectations regarding the value of this new agent are to be more than realized. Even with our present imperfect knowledge of its therapeutic character and capabilities, it must be regarded as a great boon to suffering humanity. When it is better understood, when it shall have been fairly studied and tested by patient experiment, the number of important uses to which it will be found applicable must be very large. In medicine, it has a twofold power; it is both a prophylactic and curative agent. Nothing that modern chemistry has suggested equals or even approaches it as an antiseptic or destroyer of contagion. We cannot avoid the belief that it is to exert a vast influence in preventing and arresting diseases of almost every nature. In measles, hooping-cough, fevers, diphtheria, scarlatina, etc., it has been found not only to mitigate the severity of the attacks, and shorten the periods, but to prevent these diseases from spreading in families and communities. These desirable results are secured, not by internal use alone, but from allowing the vapor to pervade the dwellings or rooms in which patients are confined. The form of *pure carbolate of lime* is best adapted for this purpose. A few ounces placed in saucers or other receptacles, in rooms, diffuses, when the preparation is pure, an agreeable odor, which is constant and pervasive. Many physicians are ordering its employment in all sick-rooms, without regard to the nature of the disease. The close, impure air in which the sick are often confined is prejudicial to both invalid and attendants.

Carbolate of lime is exceedingly useful in purifying the air and destroying all septic germs. The common commercial carbolate of lime is not adapted to such purposes, as it is very impure, holding many extraneous substances yielding unpleasant odors. At the suggestion of several physicians, we have been led to prepare *chemically pure carbolate of lime*, suited to household employment, and to place it in small parcels convenient for use. No family should be without this important disinfecting, purifying agent. Sufficient to meet the wants of a family for several weeks can be purchased for the small sum of twenty-five cents.

There is inexcusable ignorance among druggists regarding the nature of the agent and the form in which it should be dispensed. Quite recently, one of the most reputable of the dispensing druggists of this city filled a prescription calling for a mixture of *solution of carbolic acid* and glycerine, with the liquid in nearly a pure form. The mixture was prescribed for purulent ophthalmia and most serious results followed its application.

Two years ago, from a careful study of the new substance, we were convinced that the *saturated aqueous solution* was the form in which it would best meet all, or nearly all, therapeutic uses. Accordingly we prepared a chemically pure solution of this character, and introduced it to the notice of physicians. This is perfectly safe, and adapted to all external and internal employment, and is what is required when solution of carbolic acid is prescribed.

The *Journal* has been largely instrumental in awakening an interest in carbolic acid, and diffusing a knowledge of its history and chemical character. In this we feel a great service has been rendered to physicians and our readers generally.

SEVERAL THOUSAND DOLLARS MORE SAVED. — In the January number allusion was made to the fact that a party had saved *five thousand dollars* from reading in the *Journal* some statements regarding "*schemes*." We present below an extract from a letter recently received from a well-known gentleman in New York. He says: — "I value the *Journal* highly; I would not give it up on any account. I was pleased to see that you intended to raise the price to one dollar, and regretted to notice afterwards that it was not to be changed. An article published last summer upon *gas* prevented me from investing in the Pneumatic Gas Machine Co. here, and I now see *that it saved me from a loss of several thousand dollars*. Don't fail to send me every number of the *Journal*."

SALTS OF MORPHIA.

We have the pleasure of informing our medical and druggist friends that we can now supply our own brand of *pure salts of morphia*, in any quantity that may be desired. Our arrangements are such as will enable us to furnish the *sulphate, acetate, muriate, valerianate, etc.*, in lots of *one hundred* or *one thousand ounces*, and also, *all the acid and alkaloidal principles of opium* used in medicine.

The *sulphate of morphia*—the salt most used by American practitioners—we present in the form of beautiful, white, downy crystals, of the *highest purity and excellence;* and these are placed in vials holding ⅛ ounce each, avoirdupois. We venture to state that modern chemistry is incapable of producing the active principles of opium in greater perfection than is found in the salts we offer.

No agent is more generally used or relied upon by physicians than morphia; and hence the importance of securing it in the highest state of integrity, free from all attenuation or sophistication.

Our morphia salts may be obtained of all the principal druggists throughout the United States.

J. R. N. & CO.

TRICHINA.

The occasional occurrence of deaths from the presence of these parasites in the human system creates alarm on the part of nearly all pork-eaters. Pork infected with the worm is generally darker than usual, and it presents a speckled appearance to the naked eye. When pork is eaten containing the parasite, the cyst in which it is involved is quickly dissolved by the gastric juice, and the creature is set free. Finding itself in the midst of nourishing food, it rapidly grows; so that in two or three days it is four times its original size, and begins to penetrate deep into the muscles of the victim. To do this it *bores through the walls* of the intestines, producing terrible mischief. The most excruciating pain is produced from the inflamed muscles, and the patient dies in great agony. The pig is most commonly infested by the trichina; but they have been found in the muscles of dogs, rats, foxes, frogs, moles, and most carnivorous birds. Thorough cooking of pork destroys the life of the parasite; and therefore no cold raw ham, sausages, or uncooked pork in any form should be used. The little petite microscope so often spoken of in the *Journal* shows the trichina in a very thin slice of infected pork most clearly. They must be searched for in the lean or muscular part of the animal.

☞ The new clinical microscope devised by Dr. Cutter, of this city, and described in another column, is creditable to his skill and ingenuity. The new immersion objective, by Tolles, is first figured and described in the *Journal*, and will attract attention from those engaged in microscopical research.

Claret.—No variety of wine is more dangerous to use than what is called *claret*. It is usually a vile mixture. Thousands of gallons are made by allowing water to soak through shavings, and adding thereto a certain proportion of logwood and tartaric acid, and a little alcohol. Good judges can hardly discriminate between this factitious mixture and the genuine article.

☞ We have several book notices ready, which are crowded out of this number for want of room. They will appear in our next.

Medicine and Pharmacy.

"FASHION" IN MEDICINES.

It is quite common, both in this country and in Europe, for medical writers to speak of certain remedial agents as being in or out of "fashion." To those who do not watch the progress or course of things in the medical world this sounds strangely. Every one understands the meaning of the word "fashion" as applied to dress and some other matters, but how there can be "fashion" in remedial agents is an idea not easily comprehended. We do not exactly like the word used in such connection, and yet it has great significance. Bromide of potassium, the sulphites, carbolic acid, etc., may be said to be very fashionable this year; how they may be next it is impossible to say. One thing is certain, if they are out of fashion, or have fallen into disuse, it will not be owing to any want of inherent therapeutic excellence in the articles, but due rather to caprice, negligence, or want of intelligent discrimination in their employment. The history of the introduction and subsequent fate of most of the new remedial agents brought to the notice of the profession during the last quarter of a century is indeed curious and instructive. Some, perhaps, might not find in it the evidence of that wisdom and sagacity which should characterize the profession. Undoubtedly many hasty judgments have been formed, and erroneous verdicts rendered; but these failings are common to all professions. Some agents are in fashion at one point and out of fashion at another. There are local prejudices quite amusing. For instance, in Edinburgh, and, indeed, throughout England, the use of ether as an anæsthetic is almost entirely unknown. It is regarded as a bulky, disagreeable, unsafe agent, vastly inferior to chloroform in every particular. In this city, ether is the one grand *lethean* universally employed by surgeons in hospital and private practice. Chloroform the Boston authorities regard as dangerous and hurtful to patients, causing many deaths. This the Edinburgh surgeons deny, and accuse us of exaggeration and prejudice. The truth lies between the two. Both ether and chloroform, properly understood, are good and safe anæsthetics, and each have a useful purpose to subserve in the hands of the surgeon. There is no good reason why either agent should be denounced or regarded with suspicion by surgeons, on this or the other side of the Atlantic. No less a physician than Dr. Richardson of London has recently informed us that nitrous oxide is an asphyxiating agent, a poison sure to kill when administered to men and animals. This absurd statement caused it in a measure to go out of fashion in England, when it was becoming quite popular. We know in this country that half a million people have breathed the gas, and not a dozen cases of injury have resulted. But few thereapeutic agents suggested secure a fair and extended trial at the hands of physicians. Great interest is manifested when an alleged new discovery is made, and, for a time, the demand for any new substance is very pressing. It is used for every conceivable ill; one prescribes it for pains in the joints; another, perhaps, for extirpating ovarian tumors. For a time it is employed as if it were known to be a sovereign panacea for all human ills. Those most useful agents, the bromides, are now greatly in fashion everywhere. As they will, of course, be found entirely inefficient for the relief of every form of illness, we may expect them soon to be neglected or cast aside. Their real merits as hypnotics or nervous sedatives should not be overlooked or forgotten, because they have failed in numerous cases where they were inappropriately used. The attention of physicians has been often called to new agents entirely worthless and inefficient; indeed we may say that perhaps the majority have been of this character. If it were only such that have gone out of fashion or fallen into disuse, it would be well for physician and patient; but this is hardly the case. There are quite a number of old as well as new remedial agents of great value which are now entirely neglected or seldom employed. A few years ago how largely was the *veratrum viride* prescribed! how seldom now! Has it not been conclusivly proved that as a controller of arterial excitement this agent is without a rival? Is it not a remedy of too high value to be neglected or to go out of fashion? Columbo is an old remedy, and one of the safest and best tonics which our materia medica offers. It has bolstered up more weak stomachs, and helped to establish the reputation of more physicians, than any other remedial agent; and yet it may be regarded as hardly in fashion at the present time. It is not often prescribed, or, at least, not half often enough.

Whenever a new remedy is suggested by advancing chemistry, if its claims seem to be founded upon correct theory,—if, indeed, it appears to be worthy of any notice or trial,—the trial should be a fair one. A little superficial, hesitating, doubtful dabbling in anything settles no questions, establishes no truths, dissipates no errors. If we are ever to make progress in medical science, there must be more persistent, intelligent, independent, original investigation, and less leaning upon men regarded as medical oracles, whose views and opinions are often erroneous and liable to mislead. There is no good reason why a remedy which, after long and careful trial, is found to be useful should ever go out of fashion; and certainly it is absurd to retain in use those which are worthless and inert because they are fashionable.

VACCINATION.

A very general complaint is made by physicians of failures to produce constitutional effects with vaccine virus. The freshest and most perfect specimens fail in hundreds of cases, and there seems to be no good reason for this. It is also remarkable that vaccination appears to be less protective than formerly. Small-pox, in several localities, especially on the Pacific coast, is making alarming ravages in spite of vaccination. The son of a friend, who was clerk of one of the Pacific mail steamers, recently died of confluent small-pox, at Hong Kong China. He had been repeatedly and successfully subjected to kine-pox vaccination, but all to no purpose. Physicians who send to cities for vaccine matter should remember that its vitality is destroyed when subjected to a temperature above eighty degrees Fahrenheit. It may be frozen without harm. There is often great injustice in the complaints of physicians that *inert* virus is sent them, which is the cause of failures. We have undertaken to supply virus from kine and from healthy children; and its collection and preservation has been in the hands of one of our most careful and experienced physicians, who is indefatigable in his efforts to present it in its highest efficacy. If it has proved ineffectual, it must be due to transportation (in letters) in hot mail cars, or to other causes wholly inexplainable. Physicians' offices in which virus is kept are often heated above eighty degrees Fahrenheit, and when carried in the pocket it is soon rendered worthless. Our duties are so various and exacting we can no longer supply virus to our medical friends, and consequently they will send their orders to other parties.

A NEW CLINICAL MICROSCOPE.

BY DR. EPHRAIM CUTTER, BOSTON.

Editor Boston Journal of Chemistry: —

It cannot be denied that the live physician of the present day feels the want of a portable microscope of standard excellence, that can be used at the bedside of the patient, for the purpose of determining morbid morphological elements in the secretions, as a means of diagnosis. He wants as good combinations of lenses as he can afford to buy; but it is impossible for him to carry about in his pocket even the beautiful and superior student's microscope, made so well by the Boston Optical Works, to say nothing of higher grades of instruments. This want so pressed upon the writer that he set himself to devise a microscope which should have the nicest optical excellence, and embrace all the *essentials* of a microscope, and yet be portable. The result is depicted in Fig. 1, which has been pronounced by experienced

Fig. 1.

microscopists *all* that is necessary or desirable for a microscope which is to be used by the bedside of a patient anywhere.

It differs from the clinical microscope of Beale, in having a good adjustment by means of a screw thread cut on the tube of the instrument, and also in the form of the stage and holder. Its use is very simple. If a sediment of urine is to be examined, a drop is placed on the centre of a common glass slide. It is covered with a common covering glass. A piece of bibulous cloth or paper is then applied to the edge of the cover, and the superfluous fluid is absorbed, so that when the slide is turned upside down the cover will be held in place by the capillary attraction between the cover and the slide. The slide (cover next the microscope) is then slipped under the elastic band at one side, and the object brought over the opening in the centre of the stage. The instrument is then put to the eye, like a spy-glass, and the stage turned towards the light, it may be of a window or of a lamp. When it is remembered that a beam of light only 1-30 inch in diameter is sufficient for illumination for a 1-5 inch objective, it is easy to see that the question of light need trouble no one when in any civilized habitation. The following description by Dr. Rufus King Browne, a most eminent microscopist, was given at a late meeting of the Middlesex (Mass.) East District Medical Society: —

"This is strictly a portable microscope; that is, it can be carried wherever he goes, in his practice, by the professional man, in his breast-pocket, without inconvenience or discomfort. The same name is applied to very poor instruments; this is a very *good* one. Portable microscopes are usually of very *low* power, and are applied to very limited range of use. In this there is high power, as well as lower ones; the former as little troublesome to use, exacting as little acquired expertness of the observer, as the latter.

"I think nobody as yet has realized or embodied the conception of a portable microscope at all equal to this. It embodies not only several advantages over others, but is very *complete.* It is exceeded by the best trunnion microscopes only in the *number* of the appliances of the latter, but sums up all their other excellencies. It is a simple tube, which incloses both objective and eye-piece. It resembles in appearance an ordinary single-barrelled spyglass; but the objective is not, as of that and other microscopes, liable to be brought in contact with foreign substances. The glasses of the objective are therefore safe from this source of injury to them. The objective is entirely in the interior of the tube.

"The adjustment of it to focus for the object examined requires only a turn or two, with the left hand, of the lower portion of the tube, held toward the light by the right. This portion of the tube, extended into the shape of a flange, is the stage, upon which the slide and object is placed. It is closely held thereupon in view by an elastic ring. The bottom of the tube is closed, except a small circular opening which admits the light, through the object and objective, to the eye-piece and eye of the observer.

"Nothing accessory is required for the complete working of the instrument, with as high a power as a 1-12 Tolles. No reflector is needed, and the amount of light which reaches the eye of the observer is sufficient for critical examination of fine objects with this power. The objective need never be removed from the interior of the tube, nor even touched, except to give place to a second objective. In its place, it is protected from wear and dust, and entirely secluded from a particle of the latter, if the small aperture be plugged with a twisted, small piece of paper. This source of annoyance and trouble, incident to the use of all forms of microscope of the most expensive and elaborate construction, is far more effectually guarded against than by any case.

"In this particular it is preferable to any other form of instrument. It can be as efficiently useful under the most adverse as well as most favorable circumstances. It can even be so used in a railway car in rapid motion. As it rests in or is held by the hand, the coincidence of movement by the car of hand and eye (or head) enables observations to be made with it even here. We cannot imagine any improvement in it. The objectives are of Tolles's best construction of *long focus.* They present a *clear field,* and an image of the object entirely free from coarseness of outline. Unlike any other form of microscope, this can be as advantageously and perhaps more advantageously employed in a reclining posture of the examiner; as, for example, when the head is entirely at rest. Under any circumstances it can be used with the same facility as an opera-glass, and can be used while the observer is in a reclining posture. Even nicer observation can be effected with it in this way than by the ordinary stand microscope; for in this posture of the body, the head being entirely quiescent, there is a perfectly uniform distribution of the fluids of the eye over its entire surface, and an object in the field must be unvaryingly distinct. Held in the hand of the observer, like a common opera-glass, it is equally well used, without any adaptation of the inclination of the body of the observer to the instrument, requiring only the adjustment of it to his eye, whether looking upward or forward.

"But perhaps one of the most original advantages it offers to the observer is, that the object being once on the slide and under observation, it can be manipulated, even to the extent of dissection of it, without transfer. To do this, the observer has only to work with his instruments on the obverse side of the slide. He can thus separate soft solid masses into minuter parts, and subject them during the act to the most careful inspection throughout.

"In these several respects I regard the instrument as combining characteristic advantages over that with the ordinary stand. For clinical observation it will be equally useful."

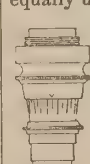

Fig. 2.

Fig. 2 represents an objective of very high power which is used with this instrument, made by the celebrated microscope-maker, Mr. Robert B. Tolles, of this city. It has a novel peculiarity, which will be understood by those who are experts. He calls this feature "immersion without cover." It is used for wet objects. The object is placed on the distal end of the objective itself, and held by placing a cover over it. The light passes through, *first*, the cover, *second*, the object, and then into the objective. In ordinary immersion, the light passes through, *first*, the slide, *second*, the object, *third*, the cover, *fourth*, the immersion liquid, and then into the objective. In the Tolles modification, two media are left out, and the object is viewed directly, with no medium between it and the objective. Used for blood, milk, saliva, and other liquids, denomination of the objection represents 1-12 inch. The adjustment is that of the objective itself.

A SINGULAR ACCIDENT.

Editor Boston Journal of Chemistry: —

Sir: — The following case came within my observation. In December last, Wm. H. Jones, clerk in apothecary store No. 33 Boylston street, Boston, took to his home a tooth-wash composed as follows: —

R Nichols' saturated solution of carbolic acid........ ℥ss.
Essence gaultheria .... ʒi
Aqua fontis.. ℥v
M.

A little sister three (3) years old, got to the bottle, and drank half an ounce of the mixture. She was ill, at the time, of a diarrhœa, (3) three months standing, which had resisted the treatment of three (3) physicians, and growing worse. As soon as it was discovered what the child had done, considerable alarm was excited in the family. This alarm soon subsided when it was discovered no harm followed. But unexpectedly the diarrhœa ceased, and did not return for five weeks, when it was readily checked by a few drachm doses of the same mixture, and is now apparently cured. Yours, etc.,

Ira Perry, M.D.

Boston, Feb. 10, 1869.

Remarks. — This is one of those singular but happy accidents which sometimes occur, and from which much may be learned. It certainly proves, what has been before stated, that carbolic acid exerts a most salutary influence in certain morbid conditions of the bowels attended by obstinate diarrhœa. It is probable, in those troublesome cases of infantile diarrhœa in which the discharges are offensive or putrid, carbolic acid in aqueous solution is the best and most effective remedy. It is to be observed that had the druggist employed the ordinary dangerous concentrated solutions, or the liquid carbolic acid sold by so many druggists, instead of our *saturated aqueous solution,* the child would have been *instantly killed.* Druggists must be careful in what form they dispense this powerful agent.

NOTE FROM DR. CHANNING.

Dr. Nichols: — The following formula combines the action of glycerine, bisulphite of soda, and carbolic acid on the throat better than any which I have seen. I have used it for three years, and recommend it as a gargle or wash in the whole class of inflammations of the throat and mouth to which those reagents apply; especially scarlatina, diphtheria, and croup: —

R Aquæ .... ℥ii.
Glycerine.. ℥i.
Nichols's solution carbolic acid,
Liquor sodæ bisulphite,......................... āā ℥ii.
M.

The formula gives a standard preparation suited to the majority of cases.

Wm. F. Channing, M.D.

Providence, R. I.

THE USES OF WALKING.

Walking, for young and active people, is by far the best exercise; riding is good for the elderly, middle-aged, and invalids. The abuse of these exercises consists in taking them when the system is exhausted more or less by previous fasting or by mental labors. Some persons injudiciously attempt a long walk before breakfast, under the belief that it is conducive to health. Others will get up early to work three hours at some abstruse mental toil. The effect in both instances is the same; it subtracts from the power of exertion in the after part of the day. A short saunter or some light reading before this meal is the best indulgence of the kind; otherwise the waste occasioned by labor must be supplied by nourishment, and the breakfast will necessarily become a heavy meal, and the whole morning's comfort sacrificed by a weight at the chest, from imperfect digestion of food. These observations apply especially to elderly persons, who are prone to flatter themselves into the persuasion that they can use their mental or bodily powers in age as in youth.

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. III.—No. 11.] BOSTON, MAY 1, 1869. [FIFTY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE **Boston Journal of Chemistry**

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

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Contents.

Familiar Science.

CHEMICAL NAMES.

Every one must see the importance of a systematic nomenclature in a science which, like chemistry, deals with the composition and the classification of all material substances; and few events in the history of chemistry have had a greater influence upon its progress than the adoption of such a nomenclature by the French Academy, in 1787, and its general acceptance by scientific men throughout the world. If we consider merely the tax upon the memory which would be imposed by the multitude of arbitrary names needed to distinguish the ever-increasing list of compounds, we readily see how much is gained by a method of naming which is uniform and systematic. A name like *aqua fortis* (Latin for *strong water*) applies as well to any other powerful acid as to the nitric; and a tyro in chemistry might be puzzled sometimes to connect it with the right one; but the term *nitric acid*, to one who has learned the few fundamental principles of the modern nomenclature, tells at once the story of its composition. So the old name, *sal mirabile* (or *wonderful salt*), which was given to what is otherwise known as *Glauber's salt*, is unmeaning and unsuggestive; while *sulphate of soda*, or the more recent *sodic sulphate*, cannot be misunderstood or misinterpreted.

It is not our purpose to give the history or to state the laws of the chemical nomenclature which has been in general use for many years. These can be found in any of the elementary books on chemistry, and are doubtless familiar to the great majority of our readers. We wish merely to say a few words about the more important *modifications* of this nomenclature, which are now adopted by the leading writers on chemistry, both in England and in this country. In the *Handbook of Chemistry*, by Messrs. Rolfe and Gillet, we are pleased to find the new nomenclature adopted. It is also found in Roscoe's *Elementary Treatise*, which we recently noticed.

It is a singular fact that the main features of this new nomenclature are *not* new, but were proposed by Berzelius half a century ago. Such terms as *ferrous oxide* and *ferric oxide*, *ferrous sulphate* and *ferric sulphate*, which many imagine to be the invention of the more progressive of living chemists, were first used and advocated by him. It is strange that they were not at once accepted generally; for they are briefer, more expressive, and more in harmony with the fundamental principles of the prevailing system than the names based upon that system. *Nitrous* and *nitric*, *sulphurous* and *sulphuric*, and the like, have become familiar as expressing different degrees of oxidation in the case of the *acids*; and Berzelius wished to apply the same principle of naming to the *bases* and *salts*. *Ferrous oxide* is more concise than *protoxide of iron*, and *ferric oxide* than *sesquioxide of iron*; and *ferrous sulphate* is, for the same reason, better than *protosulphate of iron*, and *ferric sulphate* than *sesquisulphate of iron.* Moreover, as the names *ferrous* and *ferric* are derived from the Latin, they will have essentially the same forms in all the modern languages; and an approach is thus made to a universal chemical nomenclature. The advantage of such uniformity of usage in different countries is not slight in these days, when every student of chemistry must be familiar with French and German works which are not translated into English, and when so many English and Americans are pursuing their studies at Berlin, Gottingen, Heidelberg, and Paris.

Under this new Berzelian method, the names of *all* binary compounds are formed, in the same way, from the names of their constituents; the name of the electro-positive constituent, with the ending *ic*, being placed before that of the electro-negative constituent, which is made to end in *ide*. Thus, potassium and sulphur form *potassic sulphide* (formerly *sulphide of potassium*, and, at an earlier day, *sulphuret of potassium*); sodium and oxygen form *sodic oxide* (formerly *soda* or *oxide of sodium*); silver and chlorine form *argentic chloride* (*chloride of silver*); lead and iodine, *plumbic iodide* (*iodide of lead*); and so on. When the same elements form two compounds, the one containing the *smaller* proportion of the negative element is distinguished by changing the ending of the name of its positive constituent to *ous*; the ending *ic* being used for the compound containing the *larger* proportion of the negative element. This is illustrated by the names *ferrous oxide* and *ferric oxide*, of which we have spoken above. In the same way, we have *mercurous* and *mercuric* oxides, *cuprous* and *cupric* oxides (oxides of *copper*), *stannous* and *stannic* chlorides (chlorides of *tin*), etc. Calomel is *mercurous chloride*, and corrosive sublimate is *mercuric chloride*; and so on. The Latin adjectives can cause no trouble to the student of chemistry, who has already learned that the symbol of iron is Fe, from *ferrum*; that of tin, Sn, from *stannum*; etc.

When a binary compound contains oxygen, and becomes an acid when united with water, or a salt when united with a base, it is termed an *anhydride*. Thus, one atom of oxygen and two of sulphur form *sulphurous anhydride* (formerly *sulphurous acid*); one of oxygen and three of sulphur, *sulphuric anhydride* (*sulphuric acid*). The old names are given to the *true* acids, or the compounds of these anhydrides with water. There is here also a gain in clearness and conciseness, compared with the old way of naming. We no longer need use the absurd name, *anhydrous sulphuric acid*, to describe a substance which has no acid properties whatever; and when we speak of sulphuric *acid*, there can be no doubt which of the two compounds is meant.

The *hydrogen* acids, or *hydracids*, are named in the same way as other binary compounds. Thus, muriatic acid is *hydric chloride*; hydrosulphuric acid (or *sulphuretted hydrogen*, or *sulphide of hydrogen*, or whatever it may have been called) becomes *hydric sulphide*; and so on Of course, in the case of these and many other very familiar substances the common or *trivial* name is often

used. We should not generally speak of water as *hydric oxide*, any more than we used to call it *protoxide of hydrogen*.

We hardly need go on to explain the naming of the *salts*, which is on the same general principle, and which we have already illustrated in the case of *ferrous sulphate* and *ferric sulphate*. The reader will have no difficulty in applying the rule for naming *binary* compounds to the interpretation of the names of *ternary* compounds; such as *argentic nitrate, sodic phosphate, calcic carbonate* (carbonate of lime), *plumbic chromate*, etc.

It would exceed our present limits, and it was not our purpose, to give the minor points in the new system, or to show its application to the naming of organic compounds.

We will only add that this nomenclature has been adopted by the Chemical Society of London, and is coming to be generally used by the best modern authorities. Some recent writers have accepted, thus far, only a portion of the system; but consistency and the force of the current will doubtless soon compel them to adopt it in full. A man who persists in speaking of "lead nitrate" and "sodium sulphate," while he does not hesitate to say "ferrous sulphate" and "ferric sulphate," is pretty certain eventually to exchange his mixed nomenclature for a uniform one.

"HUMBUG" TOADS.

A correspondent of the *London Mining Journal* thus disposes of the hermetically sealed toad business. He says,—"Your Derbyshire correspondent, in last week's *Journal*, refers to the alleged discovery of a live toad in a solid block of Cannel at the Ravenhead Colliery, St. Helen's. This to me is like all other fabulous reports. I would first ask if the man is one of those who get an extra shilling by such tricks; for it looks much like a trick, when he says his attention was called to the fine appearance of the piece of coal. He then broke it, and found it hollow, and then takes it with him to the surface, and finds a toad in it. It is not unusual to find stones hollow. Then what could have induced him to carry it to the surface. I have myself twice had this attempted to be practised on me. Hollow stones are very convenient to play this trick with. I have seen frogs put in a hole not half the size of a frog's body. I was in Wales a few months since, where some men were sinking a shaft, half in solid rock and half in old quartz. There were four Scotch gentlemen with me. The men blasted a hole, and in a few moments one of the men came up with a living frog, and said the hole had thrown it out. The Scotch gentlemen were so delighted with the discovery that orders were given for something to be got to convey it to Scotland, and the man was about to get a reward, when I interfered, and asked them if half the shaft was not in old rubbage. I had seen it, and they were compelled to acknowledge it, as Mr. Mackenzie, the engineer, was one of the party, and would have gone down and proved it. The smoke of the powder soon caused the frogs near to get out of the water, and this one jumped up on the rock. Miners now a days are quite up to all these manœuvres to get a ready shilling. I thought to have heard no more of frogs or toads in stones after what Mr. Hunt openly stated as to himself and all the committee at the Exhibition being misled, when they allowed the frog to be put in the lump of coal there as being found in a lump of coal in a mine. Mr. Hunt stated at a public meeting that they were duped, and he much regretted ever consenting to it being put there. It is only narrow-minded men who allow rogues to dupe them in such a way."

A PHYSICIAN'S EVIDENCE ON DANCING.

That beautiful, graceful accomplishment of dancing, so perverted by late hours and the indecency of fashionable attire, has outraged many sensible people, and led them to deprive the young ones of the most simple and healthful enjoyments, because it has been abused. For myself, I can testify not only to its healthful, but recuperative power. The fortieth, nay, the fiftieth year of my age found me enjoying this life-cheering exercise. It should be one of the earliest amusements of children, and care should be taken by parents that it is understood as an amusement. While I am on this topic, I will mention a case that occurred in my practice. A thoughtful, anxious mother, who had lost three children, brought to me her only remaining child, a daughter. Her temperament nervous, billious,—the nervous fearfully predominant,—with great irritability of the system; peevish, passionate, dyspeptic, sleepless; of course exacting, arbitrary, and uncomfortable, the poor child looked sad, old, morbid, and miserable. She had been to school, because her parents thought it an amusement for her to be with other children. After critically examining her physiognomy, I said to her mother, "What is the temperament of your husband?" "The same as my own," she replied. "Then the child is doubly stamped," I continued. Very vigorous measures must be used, if you expect to restore her to health. Divorce her immediately from anything mental, so far as memorizing is concerned; then send her to dancing-school, that she may combine exercise with order and melody, and thus some of her rough edges may be rounded." The child, her large eyes open with wonder and delight, interrupted with, "Dancing-school? Oh, how I've longed to go! but mother says its wrong, and leads to wickedness." What a dilemma for a physician! what a dilemma for a child! "Did you ever intend your daughter to play the piano, guitar, or other musical instrument?" said I, to the mother. "Oh, yes," was the answer. "Why," I continued, "why show such partiality to the upper extremities? The hands are rendered happy as a medium of melody; the feet are rendered equally happy in the same way."

A nice afternoon school revived the little girl, who grew in health and harmony every month, as she followed the hygienic rules prescribed for her. Dancing is a healthful, beautiful, graceful recreation, and is not responsible for the abuses luxury has thrown around it. The vulgarism and excitements of the ball-room have no more to do with the simple enjoyment of the dance than the rich wines and sumptuous banquets of the gourmand, in whom they induce disease, have to do with the temperate repasts that satisfy the natural wants of the body.

DR. H. K. HUNT.

CHELSEA, Feb. 11, 1869.

HEAT AND FORCE.

Whenever friction is overcome, heat is produced; and the amount of heat so produced is the exact measure of the force expended in overcoming the friction. Professor Tyndall says, while speaking upon the subject of "Heat Considered as a Mode of Motion,"—"We usually put oil upon the surface of a hone; we grease the saw, and are careful to lubricate the axles of our railway carriages. What are we really doing in these cases? Let us get general notions first; we shall come to particulars afterwards. It is the object of the railway engineer to urge his train boldly from one place to another. He wishes to apply the force of his steam or his furnace, which gives tension to the steam to this particular purpose. It is not his interest to allow any portion of that force to be converted into another form of force, which would not further the attainment of his object. He does not want his axles heated, and thence he avoids as much as possible expending his power in heating them. In fact he has obtained his force from heat, and it is not his object to reconvert the force thus obtained into its primitive form. For by every degree of temperature generated by the friction of his axle, a definite amount would be withdrawn from the urging force of his engine. There is no force lost absolutely. Could we gather up all the heat generated by the friction, and could we apply it mechanically, we should by it be able to impart to the train the precise amount of speed which it lost by the friction. Thus every one of those railway porters whom you see moving about with his can of yellow grease, and opening the little boxes which surround the carriage axles, is, without knowing it, illustrating a principle which forms the very solder of Nature. In so doing he is unconsciously affirming both the convertibility and the indestructibility of force. He is practically asserting that mechanical energy may be converted into heat, and that when so converted it cannot still exist as mechanical energy, but that for every degree of heat developed a strict and proportional equivalent of locomotive force of the engine disappears. A station is approached, say at the rate of thirty or forty miles an hour; the brake is applied, and smoke and sparks issue from the wheel on which it presses. The train is brought to rest. How? Simply by converting the entire moving force which it possessed at the moment the brake was applied into heat."

LIFE LENGTHENED.

1. Cultivate an equable temper; many a man has fallen dead in a fit of passion.

2. Eat regularly, not over thrice a day, and nothing between meals.

3. Go to bed at regular hours. Get up as soon as you wake of yourself, and do not sleep in the daytime, at least not longer than ten minutes before noon.

4. Work always by the day, and not by the job.

5. Stop working before you are very much tired,—before you are "fagged out."

6. Cultivate a generous and an accommodating temper.

7. Never cross a bridge before you come to it; this will save half the troubles of life.

8. Never eat when you are not hungry, nor drink when you are not thirsty.

9. Let your appetite always come uninvited.

10. Cool off in a place greatly warmer than the one in which you have been exercising; this simple rule would prevent incalculable sickness, and save millions of lives every year.

11. Never resist a call of nature for a single moment.

12. Never allow yourself to be chilled "through and through;" it is this which destroys so many every year, in a few days' sickness, from pneumonia, called, by some, lung fever or inflammation of the lungs.

13. Whoever drinks no liquids at meals will add years of pleasurable existence to his life. Of cold or warm drinks, the former are most pernicious; drinking at meals induces persons to eat more than they otherwise would, as any one can verify by experiment; and it is excess in eating which devastates the land with sickness, suffering, and death.

14. After fifty years of age, if not a day laborer, and sedentary persons after forty, should eat but twice a day, in the morning and about four in the afternoon; persons can soon accustom themselves to a seven-hour interval between eating, thus giving the stomach rest; for every organ without adequate rest will "give out" prematurely.—*Hall's Journal of Health.*

USEFUL REMEDIES.

Editor Boston Journal of Chemistry:—

Will you permit a non-medical correspondent to suggest two or three simple remedies for "ills that flesh is heir to," or to which it is frequently exposed?

CHILBLAINS.—Some persons are constitutionally exposed to these troublesome and sometimes painful things. Ordinarily they are developed as a consequence of cold feet; though there are individuals so sensitive that the appearance of snow in the atmosphere is sufficient to bring on the difficulty.

In cases where the irritation and swelling have not resulted in ulceration or abrasion of the skin, soak the foot in tepid water about ten minutes, just before going to bed. Wipe the foot dry, and immediately anoint the part affected with pure *oil of cloves*. Cover it with a piece of oil silk, or the film taken from "leaf lard" or suet; draw on a cotton stocking for the night; and, ordinarily, the soreness and irritation will have disappeared by the next morning. If one application is not fully successful, try it again the night following, and repeat as often as the chilblains appear. This remedy has been employed by the writer during twenty years, and has never failed to afford the desired relief.

BURNS.—The success of this application in the case of chilblains (which so strongly resemble slight burns), led to a trial of its virtues in the latter instance; and the success was such that it has been frequently repeated in the writer's family for the last fifteen years; and many a time have children and *cooks* had reason to be thankful for the relief afforded.

We ordinarily keep some oil of cloves (renewing it each year) in a vial, with a small quill or camel's hair

pencil stuck in the cork, and immersed in the oil. In the case of a burn or scald *which is not so severe as to break the skin*, apply the oil of cloves immediately. If this is done before the blister appears, it will be effectually prevented, and the pain will be allayed. If the blister is produced, the pain will, nevertheless, be speedily relieved; and, as the irritation will also be removed, the blister will not cause much inconvenience.

The writer wishes to have it distinctly understood that this remedy is proposed for slight burns and scalds only where the skin is unbroken. Were the injury *severe*, *i.e.*, extensive, or if excoriation had taken place, he would call in a physician, and commit the case to his hands.

Cold Sores.—This name is commonly given to the small blisters or ulcers which frequently form on the edges of the lips and nose when one has taken cold. They may be entirely *prevented* by frequently applying *strong spirits of camphor* to the part affected, as soon as the irritation appears; and if the blister is developed, the same remedy will remove all soreness and irritation in the course of twelve or twenty-four hours. S.

Arts.

CHEMISTRY OF HAIR DYES.

The attention which we called, some time since, to the new and perfect black hair dye which Dr. M'Call Anderson lately incidentally hit upon, produced a long series of commentaries from accomplished dermatologists and others well qualified to speak on the not uninteresting subject. Mr. Erasmus Wilson, a leader amongst the professors of dermatology, now enters upon and discusses the whole question in a series of very interesting observations in the *Journal of Cutaneous Medicine*. He observes, that the hair owes its property of dyeing to its porosity, which is evidently greater than its physiological structure would lead us to infer. Another of its properties, namely, the presence of sulphur in its constitution, renders it prone to darken under the use of certain mineral substances; for example, lead and mercury, whose compounds with sulphur are black. Thus, if a weak solution of lead or mercury be brushed into the hair, a certain quantity of the solution will penetrate the hair, and a dark color will be produced in consequence of the formation of a sulphuret of lead or sulphuret of mercury. The depth of the shade of color will depend upon the quantity of sulphur present in the hair; and as red hair and light colored hair contain more sulphur than dark hair, the result will in that case be comparatively greater. But where the amount of sulphur is too minute to produce the dye, science suggests the means of introducing more sulphur, as is illustrated by a reversal of the process, in the following quotation from a paper by Dr. M'Call Anderson, on *Eczema Marginatum*:—

"During the treatment I accidentally discovered what promises to be the most perfect black dye for the hair which has been seen. After having used the bichloride lotion for some weeks, I changed it for the lotion of hyposulphite of soda, and the morning after the first application the hair of the part which before was bright red had become nearly black. One or two more applications rendered it jet black, while neither the skin nor the clothing were stained. I saw this patient a couple of weeks later, and there was not the least deterioration of color, although, of course, as the hair grows the new portions will possess the normal tint."

The reason of the escape of the epidermis while the hair was so thoroughly dyed is that it contains no sulphur. Mr. Balmanno Squire, in a commentary on the above process, observes, that if, instead of the hyposulphite of soda, one of the more common mordants be employed,—say, for example, the sulphide of ammonium,—instead of a black, a bright red color will result. The *modus operandi* of Dr. Anderson's dye is this. The hypo-sulphurous acid, on being liberated from the soda, decomposes into sulphurous acid and sulphur. The sulphurous acid reduces the bichloride of mercury to the chloride, and the sulphur converts the chloride into (black) sulphide. The effect of the sulphide of ammonium on bichloride of mercury is to produce the (red) bisulphide which is the common vermilion of commerce. Another commentator on hair dyes observes, that with the barbers the sheet anchor appears to be lead and lime. And again, it is recommended to first wash the hair with a solution (ten grains to the ounce) of nitrate of silver; then use a weak solution of pyrogallic acid, and wash.

An interesting article on the subject, from the pen of an able chemical writer, Dr. Scoffern, may be found in the May number of *Belgravia*, under the head of "Cosmetics for the Hair." Dr. Scoffern reminds us that the Persians employ indigo to procure a blue-black dye, and the Turks and Egyptians a pasty writing ink, composed of pyrogallic acid in combination with a native ore of iron, while in the West the chief constituents of hair dyes are metallic bodies and walnut juice. The metals chiefly in use as capillary chromatics are silver, lead, and arsenic, while others applicable to a similar purpose are gold, bismuth, iron, copper, cadmium, titanium, uranium, and molybdenum. Lead in its crudest form is represented by the leaden comb; but as the process by this means is slow, a compound of oxide of lead, or litharge, with lime, and made into a paste with water, is more commonly employed. This is smeared on the hair at night, the evolved gases being imprisoned by an oil-silk cap, and in the morning the dried paste is brushed out and the hair refreshed with pomatum. Or if a so-called brown, a smothered or fusty black be required, the paste should be mixed with milk instead of water. The night is preferable for these remedies, because the hair is supposed to exhale more sulphur at this period than during the day. These preparations remind us of a lotion in common use at the present time, consisting of a drachm of acetate of lead, with twice the quantity of sulphur, to half a pint of water. The nitrate of silver is another common form of dye, but is open to the objection of staining the skin and, in fact, everything it touches, and also of becoming iridescent on exposure to light, producing, as Dr. Scoffern observes, a chromatic play of tints, which is very undesirable. Bismuth presents the same characteristics as lead, but is not much used; and when iron is employed to produce a black tint, it requires for its mordants either the pyrogallic acid or the hydrosulphate of ammonia. Brown is produced by the chloride of gold alone, as also by a solution of sulphate of copper with a mordant of the prussiate of potash (ferrocyanide of potassium); and titanium, uranium, and molybdenum, judged by their chemical behavior, would give rise to similar results. The golden yellow color, so much in fashion of late, is produced by a solution of arsenic with a mordant of the hydrosulphate of ammonia. And cadmium would probably give rise to a similar result. In the case of dyeing the lighter tints, however, it becomes necessary to submit the hair to a process of bleaching, which is commonly effected by a solution of one or other of the alkalies; by chlorine, by the chloride of soda or lime, or by sulphurous acid, bisulphate of magnesia or lime, or peroxide of hydrogen. In general, the dyes requiring mordants do not stain the epidermis. —*British Medical Journal.*

ABOUT COFFEE.

If the raw berries are boiled in water, from 23 to 24 per cent of the soluble matter is extracted. On being roasted till they assume a pale-chestnut color, they lose 15 to 16 per cent, and the extract obtained from these by means of boiling water is 20 to 21 per cent of the weight of the unroasted berries. The loss in weight of the extract is much larger when the roasting process is carried on till the color of the berries is dark brown or black. At the same time that the berries lose in weight by roasting they gain in volume by swelling; 100 volumes of green berries give, after roasting, a volume of 150 to 160; or two pint measures of unroasted berries give three pints when roasted.

The usual methods of preparing coffee are, 1st, by filtration; 2d, by infusion; 3d, by boiling.

Filtration gives often, but not always, a good cup of coffee. When the pouring of the boiling water over the ground coffee is done slowly, the drops in passing come in contact with too much air, whose oxygen works a change in the aromatic particles, and often destroys them entirely. The extraction, moreover, is incomplete. Instead of 20 to 21 per cent, the water dissolves only 11 to 15 per cent, and 7 to 10 per cent is lost.

Infusion is accomplished by making the water boil, and then putting in the ground coffee; the vessel being immediately taken off the fire and allowed to stand quietly for ten minutes. The coffee is ready for use when the powder swimming on the surface falls to the bottom on slightly stirring it. This method gives a very aromatic coffee, but one containing little extract.

Boiling, as is the custom in the East, yields excellent coffee. The powder is put on the fire in cold water, which is allowed merely to boil up for a few seconds. The fine particles of coffee are drank with the beverage. If boiled long, the aromatic parts are volatilized, and the coffee is then rich in extract, but poor in aroma

As the best method, I adopt the following, which is a union of the second and third:—

The usual quantities both of coffee and water are to be retained; a tin measure, containing half an ounce of green berries, when filled with roasted ones, is generally sufficient for two small cups of coffee of moderate strength, or one so called large breakfast cup (one pound of green berries, equal to sixteen ounces, yielding after roasting 24 tin measures [of one-half ounce] for 48 small cups of coffee).

With three fourths of the coffee to be employed, after being ground, the water is made to boil ten or fifteen minutes. The one quarter of the coffee which has been kept back is then flung in, and the vessel immediately withdrawn from the fire, covered over, and allowed to stand for five or six minutes. In order that the powder on the surface may fall to the bottom, it is stirred round; the deposit takes place, and the coffee poured off is ready for use. In order to separate the dregs more completely, the coffee may be passed through a clean cloth; but generally this is not necessary, and often prejudicial to the pure flavor of the beverage.

The first boiling gives the strength, the second addition the flavor. The water does not dissolve of the aromatic substances more than the fourth part contained in the roasted coffee.

The beverage when ready ought to be of a brown-black color; untransparent it always is, somewhat like chocolate thinned with water; and this want of clearness in coffee so prepared does not come from the fine grounds, but from a peculiar fat resembling butter, about twelve per cent of which the berries contain, and which, if over roasted, is partly destroyed.

In the other methods of making coffee, more than the half of the valuable parts of the berries remains in the "grounds," and is lost.

To judge as favorably of my coffee as I do myself, its taste is not to be compared with that of the ordinary beverage, but rather the good effects might be taken into consideration which my coffee has on the organism. Many persons, too, who connect the idea of strength or concentration with a dark or black color, fancy my coffee to be thin and weak, but these were at once inclined more favorably directly I gave it a dark color by means of burnt sugar, or by adding some substitute.

The real flavor of coffee is so little known to most persons that many who drank my coffee for the first time doubted of its goodness, because it tasted of the berries. A coffee, however, which has not the flavor of the berry is no coffee, but an artificial beverage, for which many other things may be substituted at pleasure. Hence it comes that if to the decoction made from roasted chicory, carrots, beetroot, the slightest quantity of coffee be added, few persons detect the difference. This accounts for the great diffusion of each such substitute. A dark mixture, with an empyreumatical taste, most people fancy to be coffee. For tea there are no substitutes, because every body knows what real tea is like.—*Liebig.*

GAS FOR FUEL.

Editor Boston Journal of Chemistry:—

I observe in the papers an extract from your *Journal* predicting the progress that will be made in the year 1900. Among other things, you predict that we will dispense with coal and wood as a source of heat, but use, instead, a cheap gas. This desideratum will be realized more speedily than you conjecture. I have now in the Patent Office my specifications for the production of "steam gas" from water, not by the costly retort method, but by means of a furnace, whereby I can get the mixture of carbonic oxide and hydrogen at a mere nominal cost. I do not think this steam gas will cost over ten or fifteen

cents the thousand cubic feet. This new illuminating gas gives a powerful heat, but of course but little light. To render it light-giving, I pass it through a light hydrocarbon, by which it acquires an illuminating power of about fifty per cent over coal gas. Thus, I say, your prediction will be fulfilled ere the year 1900 comes!

The gases, being inflammable ones, do not appear to merely mix with the vapor of the hydrocarbon, but they unite themselves with it by such a powerful affinity that a very reduced temperature is required to condense out this hydrocarbon. But the great value of the steam gas will no doubt be its great adaptability to heating purposes, being, as it is, so cheaply made. As you appear to think, the world has to come to this method of heating, and the sooner the better. Then, indeed, will we have as you say, "no ashes, no smoke, no dust;" but all will be comfort, safety, and convenience.

Respectfully,

J. Milton Saunders.

New York, March 24, 1869.

Remarks.—We print Prof. Saunders' note with pleasure, as he has a deservedly high reputation as a chemist. We must be permitted to doubt, however, regarding the full practical success of his invention. Probably no party in this country has experimented more carefully or persistently in this direction than we have, and we certainly ought to possess a pretty clear understanding of the obstacles to be overcome in reaching such results. We are far from regarding them as impossible; but they are too important to be attained at a single bound. If Prof. Saunders can give us hydrogen, or a mixture of hydrogen and carbonic oxide, at ten or fifteen cents the thousand cubic feet, in unlimited quantities, he must be regarded as not only a very great discoverer, but benefactor of the race. We shall look with interest to his more mature conclusions or views regarding the matter.

Dr. Cutter's Clinical Microscope.—We are requested by Dr. Cutter to say, that the Clinical Microscopes described in the April *Journal* are not yet in the market. Owing to high cost of skilled labor in this country, they can be made much cheaper at Paris than here. But in order to obtain them at the lowest possible price, it is necessary to have made not less than fifty at one time. As soon as the requisite number is engaged, at a price not to exceed twenty-five dollars each, they will be ordered. Physicians wishing them will please send in their names to Mr. George S. Chase, at the office of the *Journal of Chemistry*. The money need not be paid until the arrival of the instruments.

Dr. C. has recently mounted his microscope upon a stand, thus making it in every way equal to a microscope of a much higher price, while not interfering with its peculiar value as a clinical or pocket instrument.

Popular Errors.—To think that the more a man eats the fatter and stronger he will become. To believe that the more hours children study the faster they learn. To conclude that, if exercise is good, the more violent it is the more good is done. To imagine that every hour taken from sleep is an hour gained. To act on the presumption that the smallest room in the house is large enough to sleep in. To argue that whatever remedy causes one to feel immediately better is good for the system, without regard to more ulterior effects. To eat without an appetite; or to continue to eat after it has been satisfied, merely to gratify the taste. To eat a hearty supper for the pleasure experienced during the brief time it is passing down the throat, at the expense of a whole night of disturbed sleep, and a weary waking in the morning.

Composition of Lucifer Matches.—Phosphorus, 4 parts; nitre, 10; fine glue, 6; red ochre, or red lead, 5; smalt, 2; convert the glue with a little water, by a gentle heat, into a smooth jelly, put it into a slightly warm porcelain mortar to liquefy; rub the phosphorus down through this gelatin at a temperature of about 140° or 150° Fah.; add the nitre, then the red led, and lastly the smalt, till the whole forms a uniform paste.

Agriculture.

SOUTHERN AGRICULTURE.

The energy and industry displayed by the people of the Southern States, in labor upon the land and in the workshop, is worthy of the highest praise. The sufferings and losses experienced by the terrible war were such as but few people have ever been called upon to endure. It is evident, however, they are not disheartened; but still resolute and hopeful, and determined to be again prosperous. A more generous or a kinder people cannot be found in any country upon the earth; and Northern men who have gone among them are loud in their praise of the courteous and friendly manner with which they are received. The lands of the Southern States are, for the most part, very fertile, and the genial climate is in marked contrast with the frigid, icy winters of the North. There is ample room for Northern farmers in the Gulf States, and in the raising of cotton, the cereal grains, and fruits there is great profit.

Lands can be bought at low prices at present in Alabama, Tennessee, Georgia, and the adjoining States, and no man who respects himself, and is worthy of the good will and respect of others, need have the least fear of meeting with other than the most pleasant treatment from Southern men and women. Fractious, meddlesome, gossipping individuals, who cannot live on good terms with their neighbors here, had better not migrate; but we fully believe, from what we know of the South, and from letters received from various sections, that fair minded, industrious farmers can greatly improve their condition by purchasing lands and locating in some of the Middle or Southern States. The northern part of Alabama, in the Valley of the Tennessee, would suit us better than any locality, as the climate is genial and healthy, and the land extremely fertile. The time is coming when that beautiful valley is to be the garden of the world, and filled with a dense population.

ERRONEOUS VIEWS.

In some remarks made by Col. Daniel Needham, in the Massachusetts Senate, upon the bill relating to the sale of commercial fertilizers, he gave a formula for preparing a fertilizer which was presented as something new and valuable. He is reported as making the following statements:—

"He said that a most valuable fertilizer could be made by taking four barrels of ground bone, one carboy of sulphuric acid, and two barrels of ashes. He said that the expense of this fertilizer would be only about eighteen dollars a ton, and that he did not doubt the fertilizer thus made would be as valuable as any purchased in the market for forty dollars per ton. He stated the expense substantially as follows:—

4 barrels bone, at $2.50 per barrel,	$10 00
175 pounds sulphuric acid,	5 25
2 barrels ashes,	2 50
	$17 75

"The process of mixing, he said, was very simple. He would take the ground bone, and, after wetting it thoroughly, allow it to heat, which it would do in a short time; then pour on the sulphuric acid, and afterwards mix with the mass two barrels of ashes."

Quite a number of correspondents have inclosed to us slips cut from newspapers containing the formula, with requests for an expression of opinion in the *Journal* respecting its value. As regards this matter it may be said in brief, that we have a very high opinion of the substances employed, but a very poor opinion of the chemistry involved in making up the mixture. It is proposed to do first simply what we have so often recommended farmers to do,—make their own superphosphate, by acting upon ground bones with sulphuric acid. But that also is proposed, which we have never recommended,—viz., add ashes to the mixture, and thus greatly retard or injure the fertilizing influence of both the superphosphate and the ashes.

Ashes contain much caustic potash and soda, and these would be instantly seized upon by the free phosphoric acid in the dissolved bone, and locked up in new combinations,—phosphate of potash and soda. Thus several agents, of high fertilizing value as they exist in the bone mixture and naturally in the ashes, would be placed in a form not so readily and perfectly assimilable by plants.

The mixture is quite unscientific and unnecessary, and farmers had better keep ashes out of their superphosphate; for, as chemists say, it is incompatible. Adding ashes to fine bone, moistened with water, as we have recommended, gives quite different results. The caustic alkalies act upon the gelatine or the animal portion of the bone, and become in part saponified; and by abstracting or appropriating this portion of the bony structure the atoms of phosphate of lime are liberated and made ready for plant food. The soapy, alkaline portion goes to form a healthy, robust stalk; the phosphoric acid and lime gives full, plump seeds.

It may be further remarked, regarding the fertilizer spoken of above, that the prices affixed to the substances are as far from being correct as the formula. The cost of the mixture would be nearly double the price stated.

ABOUT CROWS.

The following extract is taken from an article in the April number of the *Atlantic Monthly*, written by Thos. M. Brewer:—

"Whatever wrong the crow commits against the cultivators of the soil, may, by a little painstaking, be materially lessened or wholly prevented. The benefits he confers are both numerous and important. 'During the time he remains with us, he destroys,' says no less authority than Wilson, 'myriads of worms, moles, mice, caterpillars, grubs, and beetles.' Audubon also affirms that the crow devours myriads of grubs, every day of the year,—grubs which would lay waste the farmer's fields,—and destroys quadrupeds innumerable, every one of which is an enemy to his poultry and his flocks. Dr. Harris, also, one of the most faithful and accurate observers, in speaking of the fearful ravages sometimes wrought in our grass lands and gardens by the grub of the May beetles, adds his testimony to the great services rendered by the crow in keeping these pests in check. Yet in Massachusetts, regardless of such testimony in their favor, we have nearly exterminated these birds; and the destructive grubs, having no longer this active enemy to restrict their growth, are year by year increasing with a fearful persistence. We have seen large farms, within an hour's ride of Boston, in which, over entire acres, the grass was so completely undermined, and the roots eaten away, that the loosened turf could be rolled up as easily as if it had been cut by the turfing spade. In the same neighborhood, whole fields of corn, potatoes, and almost every kind of garden vegetables had been eaten at the root, and destroyed. Our more intelligent farmers, who have carefully studied out the cause of this unusual insect growth, have satisfied themselves that it is the legitimate result, the natural and inevitable consequence, of our own acts. Our shortsighted and murderous warfare upon the crow has interrupted the harmonies of nature, disturbed her well-adjusted balance, and let loose upon agriculture its enemies, with no adequate means of arresting their general increase."

The reverse is true of nearly or quite all the statements contained in this extract. Notwithstanding Audubon or Mr. Harris, we do not believe the crow confers benefits

upon farmers or any one else. It is positive, he is a saucy, prowling, mischievous bird. Crows never were so numerous in New England as at the present time. They are increasing with great rapidity. We have seen, the present winter, flocks of them containing thousands. On one of our wheat-fields, the past summer, a black cloud of crows embracing several hundred settled down, and tore up the tender roots of the sprouting grain to a great extent. The crow does not often alight in fields to destroy "grubs, beetles, and caterpillars." Unless there is a corn or wheat field to ravage, they remain most of the time in the woods, out of harm's way.

If Mr. Thos. M. Brewer had not given us the results of his observations upon fields "within an hour's ride of Boston," we should have concluded, from his absurd statements, that he never was in the country so far from the State House.

As regards "our shortsighted and murderous warfare upon crows," we venture to inquire what is meant by this. The crow is so "longsighted" that farmers' boys and others intent upon "murderous warfare," cannot well get near them to commit half enough "murders." This cunning, sagacious bird knows so well how to take care of himself, it is quite unnecessary for our city philanthropists to get up laws for their protection; and we beg of Mr. Brewer that he will turn his attention to some other department of philanthropy or philosophical inquiry.

GRAPE CULTURE.

The cultivation of the grape is so easy and simple, that it seems strange that any family having a house and lot, however small, should neglect the culture of a fruit so beautiful and so much of a luxury as is the grape. In every yard, both in city and country, where the sun reaches the earth, and where there is room on house, fence, stake, or trellis, for the vine to be trained, there a vine should be planted.

The first thing to be done is to prepare the ground for the reception of the roots. If only one is to be planted, dig out a hole four feet square and two feet deep, and fill it with good rich soil mixed with one third as much old, well-rotted manure; and then plant your vine, spreading the roots evenly in every direction, and cover about four inches deep.

The most important part of grape culture is the training and pruning. No cultivated variety will continue to produce a good crop of fine, well-ripened fruit, unless it be wisely pruned. There are a number of modes of training vines which are good; but the most simple and easily managed plan is that by which the vine is trained with horizontal arms. To grow a vine in this form, commence by growing one cane on an upright stake, pinching off the little side branches, or laterals, leaving one leaf. This pinching is to be repeated when the laterals grow again, and an additional leaf is left at each successive pinching. This treatment concentrates the sap in the main stalk, which should be grown as large and strong as possible, the first season; and the end should be pinched off before cold weather sets in.

In February, this shoot should be cut down to the point where the arms are to start from, say fifteen to eighteen inches from the ground. Then rub off all the buds below the two upper ones, and from these two buds grow two new stalks, as nearly opposite as possible, and in the direction in which you wish to have them when placed in a horizontal position; but grow them nearly upright during the season, and treat them with as much care as was the one during the former season. The third year, in February, these two canes are to be cut off to about four feet above where they were the year before. Then bend them down to a level position, one to the right and the other to the left, and fasten them to the trellis with a strip of leather. The trellis should be prepared before the third year.

Next, cut out, or rub off after they start, all the buds on the under side of these arms, which will be every other bud. The upper bud will grow, and produce canes that will produce bunches of grapes this season; but only a few should be allowed to grow, as it will exhaust the root.

With short-jointed varieties, like the Delaware, it will sometimes be necessary to take off a part of the buds on the upper side of the arm; or the fruit-bearing canes will be too close together. But with long-jointed varieties, like the Concord or Diana, this will not be necessary, as every alternate bud will bring the bunches from eight to twelve inches apart.

When these canes have grown up to twenty inches or two feet, the tops should be pinched off, so as to check their growth; and when they have grown two or three inches more, pinch again. This pinching has a tendency to expand the leaves, to ripen the wood, and to increase the size of the fruit.

The fourth year, these fruiting canes are to be cut down to one good strong bud near the arm; and from this bud another fruiting cane is to be grown, the same as the year previous. The vine may now be considered fully established; and the same process is to be repeated from year to year, unless it is desirable that the vine should cover a large space. In that case, bend down the cane nearest the end of the arm, and extend it in the same way you did the arm in the beginning.

DISSOLVING BONES.

We suppose as acceptable and useful service can be done our agricultural readers in pointing out the errors into which they are liable to fall, and warning them against the expensive and profitless experiments they may be led to undertake, as in stating new facts, or calling attention to new and important discoveries. They are constantly liable to be misled by the statements made at farmers' club-meetings and through the journals professedly devoted to their interests. We have recently read, in one of the most widely circulated of our agricultural papers, an editorial article upon dissolving bones in sulphuric acid, in which farmers are advised to collect large quantities of bones, reduce them to fragments by pounding, and then dissolve them by pouring on the acid. Also the same wise advice was given by several speakers, at a recent meeting of the New York Farmers' Club. Now, this is all wrong. Farmers should not be advised to treat bones in this way, as it will certainly end in disappointment and pecuniary loss. Raw bones pounded into fragments cannot be fully and expeditiously dissolved in acid; and whoever recommends the process has never tried the experiment, or if he has he purposely misleads. Fragments of bones no larger than a hazel-nut may remain in strong or dilute acid for months, and may not be perceptibly acted upon. A bit of bone, when brought in contact with sulphuric acid or oil of vitriol, is immediately attacked by it upon the *surface*, and the action goes on but a little while before a film or coating of *insoluble* gypsum or sulphate of lime forms upon the surface, and this *prevents farther action*. In order to dissolve bony structures and fit them for plant food, *they must first be ground to fine powder, and the finer the better*, as the acid can then cut through the little atoms, and disintegrate them entirely. Coarse pounded bones should never be placed in contact with acid with the idea of dissolving them; they will not dissolve. Strong potash lye will dissolve whole bones, and therefore they may be packed in ashes under certain conditions with good results. If a farmer has a quantity of bones on his premises which cannot conveniently be ground, it is better to burn them to whiteness, and in this condition they can be ground in a common stone mill; and the powder when acted upon by acid forms most excellent true super-phosphate of lime, useful for almost all kinds of crops.

Boston Journal of Chemistry.

BOSTON, MAY 1, 1869.

☞ Any one sending us the names of three new subscribers, with advance pay, will be entitled to receive the *Journal* free for one year. For five new subscribers we will send tne Petite Microscope; for twenty-five we will send, in addition to the microscope, a copy of "Stöckhardt's Chemistry for Students," the best elementary treatise yet published; for one hundred new subscribers we will send a complete set of chemicals, together with test-tubes, alcohol lamp, stirring rods, etc., suitable for performing experiments in Stöckhardt's Chemistry.

☞ Premiums are allowed only upon *new* subscribers, not on renewals of subscription by old subscribers.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price, will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

☞ Correspondents are particularly requested to give their names in full, with their Town and State; and, in case of change of residence requiring a corresponding change in the mailing of their papers, to give not only the new address, but the old one also.

☞ Subscribers who are physicians, dentists, or apothecaries will confer a favor by informing us of their profession, as we wish to know accurately the amount of our medical subscription list.

☞ We are unable to supply complete files of either Volume I. or II. of the *Journal*. Of Volume I. (originally issued bi-monthly), Nos. 1, 2, and 3 (July, August, and September, 1866) are now out of print. Of Volume II. (monthly), Nos. 1, 3, 6, and 12 (July, September, and December, 1867, and June, 1868) are also out of print. Of the remaining numbers we have a few copies left, which we will forward to our friends at the following prices: Volume I., three numbers, twenty-five cents; Volume II., eight numbers, fifty cents. We have on hand a few complete files of Volume III. as published. These we will send as ordered, at the rate of six cents per single copy; six copies for twenty-five cents.

A SOLUTION OF A DIFFICULT PROBLEM.

Spirituous liquors used as beverages have caused and are causing an incalculable amount of evil in the world. It would seemingly have been better for the race if atoms of carbon, hydrogen, and oxygen had been rendered incapable of grouping themselves together in a form to produce alcohol. Alcohol is useful in art processes, and it perhaps serves a good end in medicine; yet we are almost ready to say that it could be annihilated without serious inconvenience. The progress of science would not have been essentially retarded, or any great discovery prevented, if alcohol had never been known. Chloroform and other anæsthetics can be manufactured without it; the druggists' medicinal tinctures and extracts can be made available in other forms; the surgeon and naturalist can preserve their morbid anatomical and other specimens in a mixture of water, glycerine, and carbolic acid, equally as well and at much less cost than by the use of alcohol. Its solvent powers are certainly useful to the chemist, but modern science has pointed out very satisfactory substitutes. It serves as a pleasant stimulant in certain forms of disease, but even here it is so often misapplied it would perhaps be as well for invalids if it were never mentioned by physicians. But alcohol is in the world, and mankind have learned to use it for proper as well as for improper purposes, and the question is, how can it be retained for the former and placed beyond reach for the latter.

How to properly and beneficially regulate its sale is a problem among law-makers not easily solved. All laws hitherto made have proved ineffectual or inadequate to meet desirable ends. In our view they are based upon wrong assumptions, and are too complicated. The general license system has proved a failure; vending liquors through State and town agents is not only a miserable failure, but a public disgrace. It opens up a system of fraud and empiricism hurtful to public morals.

In constructing laws, they should be brief, explicit, and, above all, based upon an intelligent and minute knowledge of the subject legislated upon. All "liquor laws," so called, have assumed that *different forms or modifications* of alcohol were needed for medicinal and art uses. Brandy, rum, gin, whiskey, wines, &c. (or factitious mixtures bearing these names), have been placed in State and town liquor-shops, in one State at least (Mass.), and vended under the protection of law, as if each subserved a separate and distinct purpose, and were in fact important each in itself. What is the chemical nature of these various intoxicating liquids? They are all composed of alcohol diluted more or less with water, and holding minute portions of agreeable but unimportant ethers, or flavoring substances. None of these ethers, oils, or flavors, in any important sense, are medicinal; none of them are of the least service to the chemist, artist, or mechanic. The one ingredient *alcohol* is all that is demanded, or that can prove really useful in medicine or the arts. These peculiar substances only render alcohol attractive and pleasant to the taste. Alcohol in itself, if pure, has no marked flavor, is not palatable; and would find but limited sale, and do comparatively but little mischief if it was allowed a free, unrestricted sale. Mix water with it, add oil of juniper and other foreign agents, and call it *gin*; or distil it from the cereal grains, mixed with water and grain oils, and call it *whiskey*; and thousands will drink it as if it were the nectar of the gods. If it is true that *simple alcohol* is the only liquid that can in any way be regarded as useful, why not make brief, plain laws forbidding under severe penalties all persons to manufacture, sell, or transport any kind of spirituous liquids other than *chemically pure* alcohol, or alcohol containing five per cent of pure water. Allow all respectable apothecaries, under certain restrictions, to sell this alcohol, with other chemical and medicinal substances.

A law of this kind would be clear, explicit, easy to enforce; would meet all the requirements of chemists, druggists, physicians, heads of families, etc., and place intoxicating liquids beyond the reach of those who improperly use them. No State or town liquor agents would be required, no complicated official machinery put in operation. Brandy, whiskey, wines, ale, etc., could not be legally vended, and the sensible and correct principle recognized in law that no kind of spirit but pure alcohol is actually needed for any purpose in medicine or the arts.

Oxygen.—Every method devised by which oxygen or oxygenized air may be cheaply supplied possesses great scientific interest. Prof. Graham, of London, has succeeded in increasing the amount of oxygen in the air, by, as it were, filtering it through fine leaves of India rubber. By this treatment he has succeeded in adding thirty-six, forty, and forty-six per cent of oxygen to the air. When air contains as high as forty-six per cent of oxygen, it will re-ignite a glowing taper. This is a most important discovery, and, if practicable upon a large scale, must be of great service in the arts. Supply us with air containing forty-six per cent oxygen, at trifling cost, and we have in our hands one of the most important agents of good it is possible to conceive of. With it we can add to our gas-lights a high degree of illuminating power, and, by promoting more perfect combustion, save immensely in fuel in heating our buildings.

Bleaching Sponges.—The white, beautiful appearing sponges which are sold in the streets of our cities are bleached in the following manner: The softest, finest specimens are selected, and the sand removed from the cavities by shaking; they are then washed in hot water, and, after squeezing out the water, are placed in a bath of dilute hydrochloric (muriatic) acid, and allowed to remain for half an hour. They are then taken out, and, after washing again in hot water, are placed in a fresh bath of the dilute acid, to which has been added six per cent of dissolved hyposulphite of soda, and allowed to remain twenty-four hours. The sponge is finished by washing in water, and drying.

THE JOURNAL CORRESPONDENCE.

The family of *Journal* readers has become so large, and the correspondence so extensive, it must be apparent to our friends that we cannot reply to but few letters other than those of a strictly business character. The average number received each day exceeds *one hundred*, and very many contain requests for information or advice upon agricultural, chemical, or medical subjects which is for the exclusive benefit of the writers. However much we may desire to oblige our patrons by answering their questions, we cannot, as time and strength will not permit. It affords us much gratification to read the kind words regarding the *Journal* contained in so many business letters, and we hope our friends will not omit them if we do not respond, as they greatly encourage us in our labors.

☞ The voluntary, unsolicited additions to our subscription list have reached nearly *one thousand a month* since January. We are receiving from the Southern States—Georgia, Alabama, Florida, North and South Carolina, etc.—large accessions daily.

Money to renew several subscriptions has been received too late to be credited upon the May number. In the next paper the credit will be given.

"Liquid Gas."—A dozen or more *Journal* readers, residing in different towns and States, write to us, inquiring if we know anything regarding the new and wonderful "liquid gas," which is being extensively sold all through the country by travelling agents. It does seem as if every person of common sense and common intelligence could see through a wicked cheat like this. How can there be a "liquid illuminating gas"? The very name shows that it is nothing but a fraud and deception; and yet we are told that hundreds, nay, thousands, are introducing *dangerous, explosive naphtha* into their dwellings, under the name of "liquid gas." How ingenious are the villains who speculate in cheap inflammable liquids! and how credulous are the victims of their schemes. This "liquid gas" is one of the most dangerous of the light coal *naphthas*, and every family in which it is used is incurring a *fearful risk*. The "gas" can be bought of the manufacturers at 15 cents the gallon, and we are told it is sold for 40 or 50 cents a gallon by the "inventors."

Why are not the men engaged in peddling this liquid, or selling "rights" to use it, arrested? There is law enough; why is it not enforced? We say to heads of families, send the scoundrels to prison; they are conspiring against your lives and those of your little ones. Read the 4th section of the statute just passed by the Legislature of this Commonwealth.

"Sec. 4. Any person who shall sell or keep for sale naphtha, under any assumed name ("*liquid gas*" is an assumed name), shall for each offence, upon conviction thereof, be liable to the same penalties provided and set forth in the first two sections of this act."

The penalty is fine and imprisonment. Readers of the *Journal*, whenever you find a man or woman selling or offering for sale any liquid to be used for illuminating purposes, which is alleged to be better, cheaper, or safer than kerosene oil of legal standard, no matter what may be its *name, color*, or *physical characteristics*, it is *safe* to take legal measures against the individual at once. It is your duty to act promptly, and bring the offenders to punishment. We repeat, what we have several times before stated,—*there is not, nor can there be*, any oil or liquid substance devised, suited to household illumination, which is cheaper, safer, or better than well manufactured kerosene of legal standard!

POISONOUS HAIR DYES.

Editor Boston Journal of Chemistry: —

What do you think of Hall's Hair Restorative? I have had several patients who were troubled with severe neuralgic pains and great nervous irritability, with more or less of colic pains, which I could attribute to nothing else than the profuse application of this restorative to the head. T. TEMPLE, M.D.

NORTH AMHERST, Mass.

REMARKS.—This preparation belongs to the class of hair dyes of which our drug stores are full, made of acetate of lead and lac sulphur, with a little glycerine and much water. They are poisonous, and there is good reason to believe that hundreds are suffering from lead poison introduced into the system by the use of these hair dyes. We have a friend who is suffering from severe attacks of lead colic, brought on by the use of these dyes. There are more than forty preparations of this character, made by different parties, bearing different names, all of which find a ready sale. It is the duty of physicians to inquire carefully into the character of the cosmetics and toilet articles used by their patients.

BOOK NOTICES.

T. S. ARTHUR & SONS, Philadelphia, send to us packages of the magazines published by them:—"*Arthur's Home Magazine*," "*Children's Hour*," and "*Once a Month*." These publications are very neatly printed, and much of the reading matter is entertaining and useful. Mr. Arthur's stories are of a moral character, and are well intended, undoubtedly Without designing our remarks to bear upon these magazines, we feel compelled to enter our protest against a class of publications springing up in almost every city and large town, which are exerting a very pernicious influence upon the youth of both sexes. We allude to the *story* books, and *story* magazines, which are being crowded into families, libraries, Sunday and week-day schools, and into rail cars and steamboats. These *stories* are not of the kind strictly belonging to the domain of "yellow covered literature." They are not to be classed as "blood and thunder stories," but are designed to be "moral," "unobjectionable," and yet they are strongly tinctured with the sensational, improbable, unnatural element. The constant reading of such books is wasting the time of our children, perverting their tastes, keeping them under the strain of unnatural excitement, and poorly fitting them to be healthy, practical, useful men and women. The prevalent fashion of inculcating all moral truths, religious precepts, and scientific facts through the medium of "stories" is pernicious and absurd. There are thousands of story books to be found in Sunday-school and public libraries which ought to be committed to the flames. Legitimate literature, in the shape of books of travel, histories, biographies, scientific treatises, such as used to be read, and upon which most of the intellect and moral force of the world rests, are looked upon as dull and unprofitable, by the rising generation. We speak plainly and emphatically upon this subject, because we feel it is one demanding the most earnest and prompt attention.

A SYSTEM OF CHEMISTRY APPLIED TO DYEING. By James Napier, F.C.S.; a new and thoroughly revised edition, including the Chemistry of the Coal Tar Colors, by A. A. Fesquet. Philadelphia: H. C. Baird. 1869.

Napier's system of chemistry applied to dyeing has, for several years, been regarded as a standard, practical work of great value. One edition in England and another in the United States were published, and disposed of soon after they appeared. The present edition is thoroughly revised, and a full description given of the chemistry of the new aniline dyes so largely employed in the industrial arts. This work will prove useful and interesting, not only to practiced dyers, but to scientific and cultivated readers of all classes. For sale by *Williams & Co.*, 100 Washington street.

ILLUSTRATED LIBRARY OF WONDERS. Published by Charles Scribner & Co., New York. A. Williams & Co., 100 Washington Street, Boston. Price, each vol., $1.50.

This Library embraces a series of books, each treating upon some interesting department of science in a popular way. The first is upon *Thunder and Lightning*; the second, upon *Wonders of Optics*; third, *Wonders of Heat*. The treatises are translated from the French of *W. de Fonvielle*, by *T. L. Phipson* F.C.S. The books afford pleasant and instructive family reading, and are admirably adapted to interest youth, and lead them to acquire a taste for scientific investigation.

PENNSYLVANIA HOSPITAL REPORTS. VOL. II. 1869. Philadelphia: Lindsay and Blakiston.

A valuable volume, recording some of the most important cases treated at the hospital during 1868, and presenting many facts and observations of interest to medical men.

HALF YEARLY COMPENDIUM OF MEDICAL SCIENCES, PART 3, JANUARY, 1869. Philadelphia, S. W. Butler, M.D.

This half yearly review or compendium of medical science reflects great credit upon the industry and intelligence of the editors, Drs. S. W. Butler and D. G. Brinton, of Philadelphia. It presents a synopsis of the American and foreign literature of medicine, surgery, and the collateral sciences, for six months, and is therefore indispensable to physicians who desire to keep themselves informed regarding the progress of medicine. It is eminently an American compilation, and contains much drawn from domestic medical literature. The price per annum is $3.00; single numbers $2.00. Our medical readers desiring the volume will please address Dr. S. W. Butler, 115 South Seventh Street, Philadelphia.

A FOURTEEN WEEKS' COURSE IN CHEMISTRY. By J. DORMAN STEELE, Elmira, N. Y. A. S. Barnes & Co., New York. 1868.

Many of the statements contained in this book are so extraordinary, and the general style is so peculiar, a knowledge of its contents should not be confined to teachers and school children exclusively. The perusal of the work fairly upsets a great many of our long cherished notions regarding chemical facts and theories. Indeed it introduces us to a *new kind* of chemistry. The author disclaims originality in his preface, but we think he is entirely too modest. He certainly has a right to be regarded as one of the most *original* of authors.

Of *carbon* he says, page 68, "None of the acids, *except nitric*, corrode it."

The fact that a person is not so tall at night as in the morning is given as an illustration of the destructive agency of oxygen! Page 27.

He says of warm-blooded, hibernating animals, that they "become *cold-blooded* during the winter." Page 26.

Bleaching powder is "produced in great quantities, *in the process* of making sal soda." Page 243.

He informs us that the human body sometimes takes fire spontaneously. "It happens most generally in the case of intemperate persons. In these instances the fire was not easily subdued, nor communicated to other substances,—the body having even burned to ashes, while the garments were unconsumed." Page 80. There has never been an instance of a person taking fire spontaneously and *burning to ashes*. It is a vulgar superstition, unworthy of notice in a school book.

Fluorine "will not unite with oxygen, and *for this reason* exists in the enamel of the teeth." We suppose that the "reason" for the presence of other elements in the enamel is that they *will* unite with oxygen.

Phosphorus, "at temperatures above 32° emits a feeble light; and *at* 60° *bursts into a flame*." Page 102. Describing the burning of a friction match, he says that four compounds are produced,—phosphoric acid, sulphurous acid, carbonic acid, and water. Then follows this profound remark: "During the burning of the sulphur, the value of the match is *entirely prospective*, as the sulphurous acid is not a supporter of combustion." As none of the compounds formed are supporters of combustion, and as "the value of the match" does not seem to depend upon their being or *not* being such supporters, we fail to see the meaning of the statement. We cannot even guess what the author *meant* to say; and there is nothing in the context that throws any light upon the enigma.

He defines *salts* as "ternary compounds." We supposed there were some salts that were *binary* compounds! "NEUTRALS," he says, "have neither the properties of an acid nor a base. Examples: Na Cl, chloride of sodium; KI, iodide of potassium." Page 14.

Without proceeding farther, let us take a complete paragraph, or sentence, from the book, and examine it. Under the head, "*Singular Truth*," is the following:—

"It is a fact, as poetical as it is characteristic, that when the carbonic acid comes forth from the lungs, it is poisonous, fully charged with the seeds of disease, so that if we should re-breathe it, death would inevitably ensue; yet as it passes out it produces all the tones of the human voice; all songs, and prayers, and social conversation. Thus the gross and deadly is, by a divine simplicity, made refined and spiritual, and caused to minister to our highest happiness and welfare." Page 70.

What a jumble of errors and nonsense is here placed before school children! In the first place, carbonic acid is *not* "poisonous." It destroys life when breathed, by excluding oxygen, not by any specific poisonous action. Second, when "it comes forth from the lungs," in itself it does not differ from any other carbonic acid; it contains no more "seeds of disease" than if it came from ignited charcoal. As it "passes out," the volume is so small that it produces no "tones" in the human voice. Tones are produced by expelling inspired air, as in talking and singing, etc. No human being ever sung a song or uttered a "prayer" by the use of carbonic acid!

The whole paragraph, like a hundred others in the book, is sensational, erroneous, foolish.

The style of the book is very objectionable. For *stopper*, the vulgar word "stopple" is used; for *precipitate*, the term "settle"; and so on.

We are informed that another edition is about to be issued, in which all errors will be corrected. If the labor is faithfully executed, it must stand related to former editions as the boy's new jackknife did to the old one, which had not only new blades, but a new handle. The author of this book may be a competent teacher in some departments of study; but he certainly is not a chemist, and should not have undertaken to prepare a treatise upon chemistry.

Parents have a right to know regarding the character of scientific text-books placed in their children's hands for study in schools; and therefore we have felt it a duty to bring this book under review. It is extensively used in schools in various parts of the country, which is certainly a matter of surprise. We should hesitate to state that it is used in some of the public schools of *this city*, if the information rested upon any less substantial basis than personal knowledge.

We have received from Ex-Governor Front, of New Jersey, the "*Report of the Commissioners to Examine the various Systems of Prison Discipline, and propose a new*

plan," appointed by the Senate and General Assembly of New Jersey, in 1868. The commissioners, in the course of their investigations, were led to visit this city, and express their thanks for attentions received from Dr. S. G. Howe, Edward Morton, Judge Russell, and others. The report discusses the whole question of prison discipline, and closes with recommending a plan which in all essentials corresponds with that adopted in Massachusetts.

TRANSACTIONS OF THE MEDICAL SOCIETY OF THE STATE OF NEW YORK, 1868.

This volume contains a large amount of medical information of the highest importance and usefulness. We have carefully examined the various papers presented, and do not find one that is dull or common place in the collection. The publication of volumes like this is well calculated to sustain the high scientific reputation of American physicians, and indicates the rapid progress making in medicine, surgery, and the collateral branches of science. We hope to find room in the *Journal* for some of the papers contained in these transactions.

OUR DOMESTIC EXCHANGES.

A list of our domestic exchanges — medical, agricultural, and scientific — is presented below, and the price and place of publication also stated. These journals and papers are, for the most part, ably conducted, and well worthy the patronage of professional and cultivated gentlemen everywhere. There is a growing demand for scientific publications; and many of our readers will be pleased to know the names, terms, and place of publication of the leading journals of this class in our country.

MEDICAL.

Am. Journal of Pharmacy, bi-monthly, 3.00, —— ——, Phil., Pa.
Am. Journal of Obstetrics, monthly, 3.00, W. A. Townsend & Adams, N. Y. City.
Druggists' Circular, monthly, 1.50, L. V. Newton, M.D., N. Y. City.
Dental Register, monthly, 3.00, J. Taft, Cincinnati, Ohio.
Guardian of Health, monthly, 1.00, W. M. Cornell, M.D., Boston.
Hall's Journal of Health, monthly, 1.50, W. W. Hall, N. Y.
Iowa Medical Journal, bi-monthly, 2.00, J. C. Hughes, M D., Keokuk, Iowa.
Journal of Medicine and Surgery, monthly, 3.00, W. K. Bowling, M.D., Nashville, Tenn.
Medical Bulletin, semi-monthly, 2 00, Edward Warren, M.D. Baltimore, M.D.
Medical Investigator, monthly, 2.50, C. S. Halsey, Chicago, Ill.
Medical and Surgical Reporter, weekly, 5.00, S. W. Butler, M.D., Phil., Pa.
Medical and Surgical Journal, weekly, 4.00, David Clapp & Son, Boston.
Buffalo Med. and Surg. Journal, monthly, 3.00, Julius F. Miner, Buffalo, N. Y.
Chicago Medical Journal, monthly, 3.00, J. A. Allen, Chicago, Ill.
Leavenworth Medical Herald, monthly, 3.00, C. A. Logan, M.D., Leavenworth, Kan.
New York Medical Journal, monthly, 5.00, D. Appleton & Co., N. Y.
New England Medical Gazette, monthly, 2.00, S. Whitney, M.D., Boston.
Richmond & Louisville Med. Journal, monthly, 5.00, E. S. Galliard, M.D., Louisville, Ky.
St. Louis Med. and Suag. Journal, monthly, 3.00, —— ——, St. Louis, Mo.
Missouri Dental Journal, monthly, 3.00, Levison & Blythe, St. Louis, Mo.
St. Louis Medical Reporter, semi-monthly, 3.00, P. M. Pinckard, St. Louis, Mo.
Medical News and Library, monthly, 1.00, Henry C. Lea, Phil., Pa.
Pharmacist, Chicago College of Pharmacy, Chicago, Ill.
Physio-Medical Recorder, monthly, 2.00, Wm. H. Cook, Cin., Ohio.
Review of Medicine and Pharmacy, bi-monthly, 3.00, —— ——, Detroit, Mich.
Western Journal of Medicine, bi-monthly, 3.00, Theophilus Parvin, M.D., Indianapolis, Ind.
Medical Gazette, weekly, 3.50, —— ——, New York.

AGRICULTURAL.

Am. Agriculturist, monthly, 1.50, Orange Judd & Co., New York.
Cultivator and Country Gentleman, weekly, 2.50, Luther Tucker & Son, Albany, N. Y.
Maine Farmer, weekly, 2.50, —— ——, Augusta, Me.
New England Farmer, weekly, 2.50, R. S. Eaton & Co., Boston.
New England Homestead, monthly, 75 cents, Henry M. Burt & Co., Springfield, Mass.
Iowa Homestead, weekly, 3.00, —— ——, Keokuk, Iowa.
Hearth and Home, weekly, 4.00, —— ——, New York.
Rural Southener, weekly, 1.00, Samuel A. Echols, Atlanta, Ga.
Massachusetts Ploughman, weekly, 3 00, —— ——, Boston.

SCIENTIFIC.

Am. Naturalist, monthly, 4 00, Peabody Academy of Science, Salem, Mass.
Am. Artisan, weekly, 3.00, —— ——, New York.
Am. Journal of Mining, weekly, 4.00, Western & Co., New York.
Manufacturer and Builder, weekly, 4.00, —— ——, New York.
Mechanic and Inventor, monthly, 50 cents, M. & I. Association, Detroit, Mich.
Philadelphia Photographer, monthly, 5.00, Benerman & Wilson, Phil., Pa.
Scientific American, weekly, 3.00, Munn & Co., N. Y.
Miner's Journal, weekly, 3.00, —— ——, San Francisco.
Mining and Scientific Press, weekly, 5.00, Dewey and Co., San Francisco.

Medicine and Pharmacy.

CINCHO QUININE.

Cincho quinine results from a series of experiments upon the cinchona barks, undertaken in our laboratory with the view of presenting the medicinal alkaloidal principles in an equally efficient but pleasanter and cheaper form than sulphate of quinine. This desirable end has been accomplished. It is manufactured from a mixture of the finest varieties of the Loxa and Calisaya, or the pale and yellow Peruvian barks, and no substance or ingredient but what exists naturally in these barks enters into its composition. The crystallizable, alkaloidal principles of these barks, upon which their therapeutic influence depends, dissociated from mineral acids, constitute cincho quinine.

It presents the tonic and febrifuge properties of bark in their most pleasant, direct, and natural form, and is adopted to replace sulphate of quinine, and is preferable to that salt from the following considerations: —

1st. It exerts the full therapeutic influence of sulphate of quinine, in the same doses, without oppressing the stomach or creating nausea. It does not produce cerebral distress, as sulphate of quinine is apt to do; and in the large number of cases in which it has been tried it has been found to produce much less constitutional disturbance.

2d. It has the great advantage of being nearly tasteless. The bitter is very slight, and not unpleasant to the most sensitive, delicate woman or child.

3d. It is less costly than sulphate of quinine. Like the sulphate of quinine, the price will fluctuate with the rise and fall of barks, but we shall supply it at all times at less than the lowest market price of that salt.

Cincho quinine we present in the form of snow-white, crystalline flakes, easily reduced to powder by rubbing, and perfectly soluble in weak acidulated water. It is placed in vials holding each one ounce, of the same size and form of those holding sulphate of quinine. No directions for its employment are needed, as it may be used in the same quantities and forms and for the same affections as sulphate of quinine, so fully understood by every physician.

Any physician in the United States, by inclosing four three-cent stamps to our address, will receive by return post a specimen of cincho quinine sufficient for satisfactory trial. J. R. N. & Co.

HOPE FOR THE CONSUMPTIVE.

Neither physicians, invalids, nor friends of consumptive invalids should ever relinquish hope in any case. Nothing is more alarming than pulmonary hemorrhage, nothing considered more fatal; and yet how many cases are on record of perfect recovery from this affection in its worst forms. We have a very near relative now in his seventy-eighth year, who during the past thirty years has had more than a dozen attacks of bleeding at the lungs, and yet, with care, he has managed to live comfortably, and perform a great amount of useful labor. The case of President Day, of Yale College, is remarkable. We find in the *Transactions of the Connecticut State Medical Society* some interesting statements regarding him, written by Professor S. G. Hubbard, of New Haven.

"Jeremiah Day was born in Washington, Connecticut, August 2, 1773, and during the war of Independence was old enough to appreciate the nature of the issue involved in that struggle, and well remembered having seen some of the actors. His infancy and boyhood were marked by indications of feeble vitality, and the prospect of his arriving at the maturity of manhood, never very flattering, sensibly diminished as he approached that period. He entered the freshman class in Yale College, in 1789, but was soon obliged to leave college on account of a pulmonary difficulty, which was, doubtless, the incipient stage of the organic disease of the lungs which subsequently developed itself. These symptoms were so far alleviated that for two years he taught a school in Kent and Winchester, when he found his health so much improved that he returned to college, and was graduated in the class of 1795.

The succeeding six years, a period of great feebleness, were spent partly in teaching at Greenfield for a year, as tutor in William's College for two years, and as tutor in Yale College for three years, during which last period he studied theology, and preached occasionally in vacant churches in the vicinity until 1801, when he was elected professor of mathematics and natural philosophy in the college.

He was prevented, however, from entering upon his professional studies by the occurrence of an alarming pulmonary hemorrhage, which happened after a Sabbath service at West Haven, where he had preached for Rev. Dr. Williston. Other hemorrhages followed, by which he was greatly prostrated, losing large quantities of blood. According to the prevailing practice of that time, he was freely bled from the arm, "the doctors taking," as he remarked to me, "nearly all of the little remaining blood in his body."

In this condition of extreme exhaustion, at the age of twenty-eight, he abandoned temporarily the purpose of entering upon the duties of his professorship, and in September of that year he made a voyage to Bermuda, to try the effect upon his health of a warm climate. While there he was treated with tincture digitalis to the extent of producing its cumulating effects, which were so profoundly sedative that for a time his life was despaired of. Indeed so reduced and attenuated was he on leaving home that none of his friends expected to see him again alive; and the published letters of Prof. Kingsley and others of that period lament him as already lost to science and the world. He returned, however, in the following April, but without having experienced any material benefit; so that he now gave up entirely all idea of fulfilling his collegiate appointment, and, bidding farewell to his associates, he retired to his home among the hills of Washington to die.

The hemorrhages continued, and were followed by venesections, until a Dr. Sheldon, of Litchfield, who enjoyed a wide reputation for curing consumption, chanced to see him, and casually remarked that he needed iron, and he believed he could help him.

Although the patient was evidently in a hopeless decline, he was placed under the care of Dr. Sheldon, who would seem to have been an acute observer, and in his knowledge of pathology and therapeutics far in advance of his time. Under the use of preparations of iron, with bark, and nutritious food, Mr. Day soon began to exhibit signs of returning health and strength; and in 1803, although he seemed to his friends literally like one raised from the dead, he was so far restored to health as to be inaugurated as professor. From this time all symptoms of pulmonary disease disappeared and did not return.

On opening the throax only a moderate quantity, perhaps a pint, of serum was found in both cavities. The lungs were everywhere quite free from tubercular deposits, and in all respects healthy. In the apex of each lung, however, was found a dense, corrugated, circular cicatrix, an inch and a half or more in diameter; also a third circular cicatrix on the left side of the left lung, a few inches below the apex, each involving such a depth of tissue as to indicate that the vomicæ of which they were the remains had been large and of long duration. Both lungs were slightly adherent to the apex.

Here, then, was all that remained to mark the beginning, progress, and cure of a tubercular consumption, occupying twelve years in its period of activity, and with its incipient stage dating back more than three quarters of a century; — a legible record, surpassing, in interest and importance to the human race, those of the slabs of Nineveh or the Runic inscriptions.

The bitterness of epsom salts is removed by boiling a little coffee in the solution.

SMALLPOX AND VACCINATION.

The *New York Medical Gazette* makes the following remarks regarding smallpox and the influence of vaccination: —

"Smallpox of a malignant type is prevalent in Montreal. It has also been prevailing in California since June last, with a steady onward mortality, increasing at the rate of ten per cent daily. Public vaccinators have been at work, but the people are vastly more at fault than the public authorities. Still, it is perhaps not sufficiently insisted upon by physicians that repeated thorough vaccinations will eradicate varioloid as well as smallpox; for varioloid is smallpox merely somewhat modified by imperfect vaccination, and, of course, varioloid patients will convey smallpox to unvaccinated or entirely unprotected persons."

We are compelled to differ from our excellent cotemporary regarding this matter. In our view, repeated vaccinations will not eradicate varioloid, and varioloid does not result from imperfect vaccination. Varioloid may properly be regarded as modified smallpox; and those who have suffered most from kinepox vaccination, who have apparently been most thoroughly brought under its influence, are the ones who will most likely have varioloid if exposed to the contagion of smallpox. It depends upon the peculiarities or idiosyncrasies of individuals. Some persons it is almost or quite impossible to bring under the influence of kinepox virus. Others are but slightly affected by it; such we regard as not likely to contract the modified form of smallpox if exposed.

There are peculiarities of organization, peculiar susceptibilities, in certain individuals, which render them liable to contract malignant diseases. We see this in children. How greatly children, even of the same family, differ in this regard. It is one of the most puzzling problems which comes under the notice of medical men, and a subject upon which we earnestly desire light.

IS CONSUMPTION CONTAGIOUS?

Dr. H. I. Bowditch, of this city, writes as follows, in the *Atlantic Monthly*: —

"It was our fortune to attend a man slowly dying of consumption, who, while hopelessly and helplessly ill, was devotedly cared for by his wife, who, at the time, felt herself, and seemed to be, in perfect health. Years after her husband's death, and when she was bravely battling against the disease, which commenced its insidious attacks immediately subsequent to his death, she related to me the following fact, but only on my definite inquiries as to how intimate her relations had been with him during his illness. It seems that often, in wintry nights, that faithful woman would arise from the side of her husband, who was lying with his dress drenched with the chilling sweat of increasing disease, and would persuade him to take her warm clothing and to lie down in the dry, warm place she had just left, while, simply throwing a blanket over it, she would take the spot that had been previously occupied by him! Upon our expressing a horror at the thought of the danger she had run, and which apparently had told with so much power upon her, she quietly remarked that she knew, at the time, the danger she was incurring. She had no thought of danger to herself, and only of her husband's comfort! 'But,' added she, 'I then got what I never recovered from.' A certain vitality seemed to go out of her; and though her nature contended many years against the encroachments of disease, she finally died, always believing that she had taken consumption from her husband, but with a certain martyr-like joy that such had really been the fact.

"We have now in our mind other and analogous cases; as, for example, of husbands having their first cough when 'inhaling the breath of their sick wives,' while administering to their necessities. We have known daughters and sisters, who, full of apparent health and strength, when consumption had seized a mother or sister, have continued to sleep with the invalid, and to breathe the same closed-up atmosphere at night, and to watch all day, without perhaps a moment of healthful out-door exercise. And we have been distressed to find not a few of such healthy young persons gradually beginning to suffer with indigestion, debility, and finally cough, and all the symptoms of consumption. In some instances, in fact, the attendant has died before the life of the original patient has ended. These facts are very significant; and, although we are well aware that, in some of them, other elements of disease may have had their fatal influences, still, the cases have been full of suggestions as to the necessities of greater precautions than we, in this country, have usually taken in this matter."

TWO INTERESTING PARASITIC DISEASES.

J. H. Salisbury, M.D., Cleveland, Ohio, (*Boston Med. and Surg. Journal*), mentions two interesting parasitic diseases, with their treatment.

1st. *Chloasma produced by the Microsporon furfur* (Robin). — A cigar-maker, aged 30, came to him in January last, covered over the whole trunk, anteriorly and posteriorly, with brownish yellow maculæ or spots of irregular outline, from the size of a pin-head to four and six lines in diameter. The spots were not elevated above what appeared to be the surrounding skin. The epidermis was soft and pultaceous, and appeared spongy when scraped with a scalpel. The colored cuticle peeled off like the epidermis from a boiled apple. The sheets and night-dresses were covered with furfuraceous scales. On microscopical examination, the epidermis was found filled with a fungus (*Microsporon furfur*), both in the spore and filamentous stages of development. The spores were developed in multitudes in the dark spots.

Treatment. — The patient was pale and emaciated, and was disturbed at night with alternate sweating and chilliness. A diet of rare beef and bread was ordered, and he was put on the following treatment: —

℞ Acid, sulphuric, aromat. ℥ iij. — S. Put two teaspoonfuls in half a pint of warm water, and wash the body and limbs all over every other night, and wipe dry afterwards.

℞ Nichols' sol. bisulphite of soda, ℥ iij. — S.

Put 1½ tablespoonfuls in half a pint of warm water, and wash the body and limbs all over every other night, and wipe dry. ℞ Tr. ferri chlorid. ℥ iij. — S. Take twenty drops in a full glass of water two hours after each meal. ℞ Tr. cinchonæ comp. ℥ vj.; potass. bromid. ℥ iv. — S. Take a teaspoonful before each meal.

On the fourth day of treatment, the spots had entirely disappeared. Sickly spores and filaments remained in the epidermis, but farther development seemed to be checked. Treatment was continued. At the end of two weeks, the vegetation disappeared, the skin was smooth and healthy, and the patient had gained several pounds in weight and was feeling perfectly well.

2d. *Parasitic Disease of the Conjunctival Membrane and Epidermis of Cheek.* — A carpenter, aged 23, came to him with a diffuse inflammation, roughness, and œdema of eyelids and the surrounding soft parts. The inflammation and scaly condition extended over nearly the whole cheek, to the wing of the nose, and from this point, up the ridge of this organ, to the forehead, involving the entire eyebrow. At first it was considered a case of erysipelas, but on examination, the epidermis was filled with a fungoid growth, in the spore and filamentous stages of development. This vegetation extended to the conjunctival membrane lining the eyelids. The following was prescribed: ℞ Dilute citrine ointment, ℥ ij.; glycerine, ʒ iij. — M. — S. Apply morning, noon, and night to the inside of eye and over the entire affected parts. ℞ Nichols' sol. bisulphite of soda, ʒ ss.; aquæ, ℥ viij. — M. With an atomizer, the spray of this mixture was thrown into the eye and over the cheek, for five minutes, morning and evening, after washing, and before applying the ointment. ℞ Tr. ferri. chlorid. ℥ iij. — S. Take twenty drops in a full tumbler of water two hours after breakfast and dinner. The use of sweets and all organic acids was forbidden; and a plain, substantial diet ordered. The patient rapidly recovered, and in three weeks there was not a trace of the parasitic growth.

TREATMENT OF SCARLET FEVER.

Dr. Charles T. Thompson publishes in the *Lancet* a mode of treatment in scarlet fever for which he claims many and great advantages. On the very first access of the fever the patient is put into a warm bath, and this is repeated as often as the strength of the patient will allow, or the severity of the attack may require. He says, "The first effect of this treatment is to produce a soothing and refreshing feeling in the patient, to be followed soon by such an eruption on the surface, of so vivid a color and in such amount, as would astonish those who have never witnessed it. Thus one of the greatest dangers of this fearful disease — the suppression of the eruption — is escaped."

After the first or second bath, appetite usually returns, so that the patient's strength may be supported by light and nutritious food. The excreta from the skin are removed as soon as deposited, thus avoiding the dissemination of the disease. Cuticular desquamation is greatly promoted. After the bath the body should be dried by soft linen cloths, with as little friction as possible.

It is added that the irritation of internal organs is at once relieved by this treatment, and the various secretions are deprived of their noxious properties; thus removing additional sources of infection. Another advantage is that a very serious case is soon reduced to a mild one, and the patient recovers in less than half the usual time.

Dr. Thompson states that during fifteen years in which he has pursued this practice he has never lost a patient from scarlet fever; nor can he recall a single instance in which the infection has been carried from the patient to any other person. He also asserts that the terrible sequelæ of this formidable disease are seldom, if ever, met with after the above mode of treatment.

Dr. Alex. Keith, of Normandy, has in the last six months treated six hundred cases of fever, scarlatina, measles, and smallpox, by the internal administration of carbolic acid, with only five deaths. He employs the following formula, "Carbolic acid and acetic acid, of each one drachm to one drachm and a half; tr. opii, one drachm; chloric ether, one drachm; water, eight ounces. Dose, one tablespoonful every four hours. The following he gives as the "physiological effects": — 1st. It produces profuse perspiration. 2d. It rapidly lowers the pulse, so much so that in twenty-four hours the pulse will fall from 120 to 60; skin cool and moist, with subsidence of fever; and in scarlatina, the soreness of the throat much diminished. 4th. After its use for the same time the appetite continues to improve. 5th. I have found it more useful at an early stage of the disease, although given afterwards it very much modifies the symptoms and carries the patient through the different stages of the disease much more quickly than any other treatment I have seen. 6th. In some cases the urine appears smoky, as if fine charcoal had been used with it.

Dr. W. T. Thomas, in the *Transactions of the New York Medical Society*, suggests how smallpox and scarlet fever may spread, in these words: —

"But the poisons of smallpox and scarlet fever will spread in spite of free ventilation, and they retain their power of causing the same disease for a long time, and, in the case of scarlet fever, for months. Then the scabs and epidermic scales are doubtless the active agents of propagation. In the one case, the poison may be a mere cloud of molecules; in the other, it may be contained in the epithelium and pus cells, thrown off from the skin in both cases, and from the throat also in one, which adhere to the walls, clothing, or carpets, becoming partially dry; but then, being dislodged by sweeping, dusting, etc., are blown up into the air and inhaled into the lungs of some one, where they again become active by means of warmth and moisture."

Dr. S. P. Dutcher, of Cleveland, Ohio, recommends in the *Medical and Surgical Reporter* the following prescription to remove dropsical effusions, —

℞ Blue mass.............................gr. v.
Pulv. digitalis,
Pulv. squills,
Pulv. gamboge, } ....aa. gr. x.

M. — Ten pills.
S. — One pill every six hours.

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. IV.—No. 1. BOSTON, JULY 1, 1869. [FIFTY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston,

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—A written receipt will be sent by return mail to all subscribers who will enclose a three-cent P. O. stamp, for return postage.

A list of premiums is offered to those who obtain subscribers.

Contents.

Familiar Science.

REMINISCENCES OF AN EXPERIMENTER.

BY THE EDITOR.

In examining recently the contents of certain dark attics and closets in some of our buildings, the impression was left upon the mind of a friend accompanying us that we had been a rather persistent experimenter in the physical and natural sciences and mechanic arts.

The evidence of this was afforded in the confused heaps of wheels, magnets, coils, batteries, retorts, alembics, beakers, pyrometers, galvanometers, &c., &c., which encumbered the shelves and floors; many of which were curious enough in rudeness of form and construction, and aptly illustrative of the science of a former period.

In these piles of rubbish, the cast-off *debris* of many years of study and toil is written the history of the progress of discovery for more than three decades. Here is an electro-magnet, with lever-attached armature, and an arrangement of wheels,—the remains of rude telegrapic apparatus which we had in operation in 1845, about the time Morse's experiment began to attract attention; here are iron cups, connected with copper and platinum conductors, designed to illustrate the practicability of exploding magazines under water by electricity; here are galvanic batteries of every conceivable form and size, most of which are now cast aside as practically useless; and also disc and cylinders, of glass and rubber and gutta-percha, for experiments in statical electricity; here is a formidable iron cylinder, which resembles a piece of ordnance, designed for the purpose of solidifying, or rather liquefying, carbonic acid gas,—a fashionable experiment twenty years ago. In overturning the dusty contents of the rooms, we discover apparatus illustrative of the discoveries and inventions of each decade. At the commencement of the last, we have the *spectroscope.* This instrument is probably the first one ever constructed and used in this country. It was made for us by the late Mr. Fitz, of New York, in 1860, immediately upon the appearance of Bunsen's and Kirchhoff's papers upon spectrum analysis.

A third of a century devoted to the study of the physical sciences, and their practical, experimental investigation, is an interesting period to look back upon. How greatly extended have been the boundaries of human knowledge, how vast and sublime the results of scientific labor and researches! How many important and useful discoveries and inventions have had their birth and development in that period! We have lived to see a thousand timid, hesitating suggestions in science ripen into demonstrated facts; to see a thousand important truths snatched from the domain of surmise, conjecture, or doubt, and transferred to that of established, unquestioned certainty.

A third of a century ago, when our labors began, we had no lines of telegraph, no ocean steamships, no street rail-cars, no photographic pictures, no aniline colors, no kerosene oil, no steam fire-engines, no painless surgical operations, no gun-cotton, no nitroglycerine, no aluminium, no magnesium, no electroplating, no spectroscope, no positive knowledge of the physical constitution of the stellar worlds, and but five hundred miles of *slow* steam railway in the United States. Our telescopes and microscopes were defective, and comparatively of low power, and we had few of those delicate scientific instruments now so important in every department of research.

The last third of a century has been the most active, the most important period of time that has elapsed since time began. Indeed, more of the great resources of Nature have been developed, more of her intricacies unravelled, a deeper penetration made into her mysteries, than in all the six thousand years since the advent of man upon our earth.

Do we who have lived, and perhaps actively participated, in the accomplishment of these results, realize the stupendous greatness of this epoch of time? It is difficult to do this. We are pleased to talk about it, but our natures do not admit of a full realization of the importance of modern scientific discovery. We are whirled past these great events, as our planet is whirled through the inter-planetary spaces: we know it moves with tremendous velocity, but its motions are wholly unobserved.

The reminiscences of an experimenter and student in science for a period of a third of a century are always of the deepest interest, but they are not always of the most pleasing character. There are recollections of so many instances of the rankest injustice done to ingenious, toiling, self-sacrificing fellow-experimenters, which have sprung from jealousy, selfishness, or hate, the desire is sometimes felt that the powers of memory might be abridged at will. Many of the books in which great discoveries are described and claimed have the wrong names upon the title-page. So powerful is the influence of *prestige* and great names, most of these errors, we fear, will never be corrected.

There are also recollections of disappointments and sad failures in the results of experiments: often some great truth or principle has apparently been within easy grasp, when, lo! unexpected hindrances or errors were discovered, and all our exalted imaginings, and dreams of a name immortal, vanished into thin air, and from a flight most lofty we were compelled to gravitate down to earth again.

In scientific research, there are always more failures than successes. The world learns all about the latter, but only one brain is agitated by the former; and that agitation, Heaven knows, is often deep and prostrating enough to seriously affect a dozen brains.

Experimental labor is exacting, expensive, and in some departments perilous. It is exacting because it demands the whole time and the most intense thought. The hours of the day when other kinds of labor are pros-

ecuted, and which cease with the setting sun, do not suffice for the experimenter. An idea or difficult scientific problem, pressing on the mind, becomes almost a material object there; and if it were a brick, or a lump of lead, it could not more effectually disorder the natural functions of the brain and prevent sleep. A great deal of agitation is made over the hours of labor at the present time, and eight hours of labor and sixteen of rest is clamored for by an influential party. This relates to physical labor. Hard work in this world is not alone the lot of those who handle the hoe and spade, or swing the sledge-hammer. The laborer in the field of experimental research reverses the modern idea, and devotes sixteen hours to work, and eight to imperfect rest.

We should venture to assert in the presence of our neighbors and friends, because they *know* it is true, that we have labored for a third of a century nearly this proportion of our time. We do not expect to have the hours reduced to eight or ten in the twenty-four, at least we shall not this year present a petition to the legislature to that effect.

Experimental research is expensive, as there is a constant drain upon the purse for the implements wherewith to prosecute the labors. Platinum and gold and silver, among the expensive metals, are requisite, and in a thousand little ways money disappears as if by magic. From imperfect memoranda in our possession, it is shown that we have expended during the past third of a century, for apparatus and materials, more than *sixty thousand dollars*. This does not relate, of course, to the large working apparatus in our manufacturing establishment, but solely to that needed in experimental labor. Most of this is now thrown aside as worthless, or retained only as interesting relics of the past.

The experimenter in some departments, as in that of chemical manipulation, is constantly liable to accidents which endanger life and limb. We can look back upon a score of explosions and narrow escapes from vapors and poisonous gases, and the indelible scars remaining show how painful have been some of these casualties. But, upon the whole, the retrospective glances of an experimenter are of the most interesting and pleasant character; and no youth who has the necessary qualifications, the intelligence, the ingenuity, the perseverance, the enthusiasm, should be deterred from entering this field because of the exhausting, exacting, or expensive nature of the labors.

HOW TO TAKE CARE OF THE SICK.

There is not a family into which the *Journal* enters but what is liable at any moment to have some one of its members suddenly stricken down by sickness. How important it is, then, that a thorough knowledge, not only of the general principles of good nursing, but of all the "little things" which contribute to recovery, should be possessed by parents, nurses, and those who have charge of the sick! The attentive, faithful physician can do but little, unless he is aided by the judicious, sensible, intelligent care of those who have his patients in charge, and tens of thousands of lives are lost every year by bad nursing. This article upon the care of the sick is the first one of a series which will appear in the *Journal*, and which will cover the whole grounds of *ventilation, disinfection, cleanliness, light, rest, taking food, kinds of food and drinks*, beds and bedding, &c., &c. The nature of disease and ventilation very naturally form the first topics to be discussed. The directions are mainly such as are given to the nurses in the Philadelphia Hospital for Incurables, prepared by one of the physicians in that institution:

Disease means *want of ease*, and, wherever found, it is a sure sign that something is wrong outside of the body or inside of it. *Discomfort* is one of the earliest signs we have of its approach, and therefore the most valuable. Pain is a later one, more solicitous perhaps, but none the less kind in its intentions for all that. They both come to warn us that something is somewhere wrong, and mean to say that sickness will surely overtake us, unless we see where the wrong is. When found, the mischief which *has* been done should be at once corrected, and its return must be prevented by avoiding in the future that which first *produced* it.

Now there are many little monitors by which these outside conditions favorable to disease are detected. The chief one, or at least the one as much relied upon as any other, is the *smell*. Whenever subtances which have been alive become dead, and are undergoing decay, little particles of them break away from the main mass, float in the air, come in contact with the nostril, and we *smell* them. These vapors, which are bred by decay in decomposing substances, are *poisons*, and, like all other poisons, a little absorbed will contaminate the health of the body, while more will so much affect the health as to produce sickness, and even death.

There is but one conclusion to be drawn from this; and it is, that wherever an unpleasant odor is detected, you may be *certain* that there is something in the air which should not be there, and, if permited to remain, it may sooner or later be attended with evil results. The true means for relief in such a case is, *removal* of the offending cause, whatever it may be. Sometimes this cannot well be done; so we must lessen, as much as lies in our power, its tendency to do evil.

Everybody knows now-a-days that these little broken-off particles or emanations from manure-heaps, refuse from slaughter-houses, drippings from the kitchen, defective privy arrangements, etc., etc., when taken into the body through the air we breathe for a long time enough, will sooner or later bring on "bad health," low fevers, and with other conditions induce fever, cholera, yellow fever, etc. Not only may they *produce* such diseases, but they certainly tend to *transform* into serious diseases what would otherwise be but a trifling affection which should yield to the simplest measures. There is not a physician in extensive practice who does not every day, in his rounds, see *some* disorder withstand his efforts, which he knows should readily yield, and which obstinacy he feels perfectly satisfied is due to the cause referred to, — a poisoned blood.

Besides these causes of disease which can be detected through the smell, and removed by the person himself, or the Health Officer, there is another class of poisons, not so readily detected, but whose presence can be quite as readily demonstrated in other ways. We call them "*poisons*," you see, for they are nothing less than poisons, and physicians, when talking to each other, give them no other name.

They are the "poison vapors" which are bred in the bodies of all living animals.

Most readers know that the bodies of animals are constantly undergoing changes; that is, the old particles, becoming worn out and useless, are thrown into the blood, and carried away, while new ones are taken from the blood and put in their places. These new ones answer the purpose for a while, become old, as did the new ones they supplanted, and in due time yield their places to newer ones, better adapted to the purpose intended. This constant *change* goes on until death, or, more correctly speaking, *life continues so long as those changes take place.* It will be seen that these old decaying particles, as they become useless, must be carried away through the blood and out of the body as soon as possible. The chief means by which this end is accomplished is through the use of pure air, which, as it were, washes away these impure particles from the blood. This air enters pure through the mouth and nostrils into the lungs, and comes out laden with these poisonous materials. If these decaying particles are taken into the lungs again, they not only *prevent* the escape of the poisonous materials from the body, but really add *more* poison to the already laden blood.

Soiled air can no more purify soiled blood than soiled water can cleanse soiled clothes. There is one thing which can do it, and that is, *plenty of pure air*.

Now the question is, how much pure air does it require to answer this purpose? You may have some idea of it, when you remember that an ordinary man spoils not less than a gallon of pure air every minute. This is sixty gallons an hour, or near five hundred in eight hours. In round numbers, about *twenty-five flour barrelfuls of pure air are required in a single night for breathing purposes alone.*

Not only is the air of a room made impure by breathing, but it is made impure by the gas we burn as a light. It is estimated that an ordinary burner consumes as much air as eleven men would do; that is, one gas-burner in three-quarters of an hour consumes as much air as would answer a man for a whole night.

If there is an ordinary stove in the room, it destroys as much air as would twenty-five men. All these things and estimates must be thought of when you hesitate sometimes about putting up or letting down a sash of lights a few inches.

If the house is an old one, there may be a "fireplace" in the room. If so, do not attempt to seal it up, "because the air comes in," as it is just the thing you want, but leave it open, or at least the best part of it. If the house is a more modern one, there is perhaps a "flue"; if so, do not upon any excuse attempt to close it, but let it alone.

A great many persons have an idea that this letting in of pure air, or "VENTILATION," means raising a window a little from the bottom, or opening a door a short distance. They never mind much *where* the window or door opens into; it is all the same so they open somewhere. The idea is not correct. Ventilation means providing a means for the *pure* air to come *in*, and for the *bad* air to get *out*. This can usually be accomplished by drawing down the top sash a few inches, which will let the heated impure air *out* of the room, and by raising up the lower sash a few inches to let the fresh air *into* it. If you wish to know that the hot air really goes out at the upper opening, some time hold a lighted candle near it, when the blaze will be carried outwards by the force of the escaping current; and, if you will hold it to the opening below, the flame will point inwards, from the current of cool air which comes from without. A more certain way to secure the proper amount of fresh air is to have an opening on opposite sides of the room, so that the air will circulate *through* the chamber as much as possible. *Remember not to have the current play over the bed on which the person lies sleeping, as the person might catch a cold.* But, if there is no other way, and some rooms are so constructed that no other means appear possible, it is better to open the windows, and escape the effects of the "draught" by putting an extra covering over the person. Should there not be two windows in the chamber, raise the only one you have, and open the door a little. If no means suggest itself to you by which a desirable amount of pure air can be permanently secured, bear the matter in mind; and some day when your physician comes in, ask him about it. Persons who habitually sleep in such badly ventilated houses are seldom compelled to wait long for an opportunity to ask a physician such things, as it is to the occupants of these houses that he is most frequently summoned.

If pure air, as stated on the preceding page, is so important to people who call themselves in health, how much more important is it to those who are *sick!* Especially is it the case with those who have fevers, etc., which physicians now tell us are conditions of the system overcharged with poisonous materials, poisonous vapors, which, for some reason, have not been thrown out of the blood. Perhaps they were *produced* simply from the want of pure air. The lungs try to throw the load off, as can be detected by the heavy odor the breath has; the skin is trying to do the same thing, as you will see by the sticky, clammy feeling detected there; and a physician will see that a dozen different attempts are made, in one place or in another, with the same object in view. These noxious materials, as they are cast off, tend to poison the air around more and more; so we must assist nature in relieving the patient by keeping a constant supply of fresh air in the chamber where he lies. Not only do we assist in *curing* the patient, by carrying away these poisonous materials by plenty of pure air, but, at the same time, we greatly lessen the

chances of other persons *contracting* the disease by breathing the concentrated poison.

If we add a pint of pure water to a pint of impure water, we *dilute* the impure water, and it is made that much the more pure. If we add a dozen pints of pure water to it, we dilute it still more, and bring it nearer purity yet; but, if we add a certain number more, instead of the impurity becoming *diluted*, it is absolutely *destroyed*, and Dr. Letherby, of London, says that the water is perfectly *pure*. It is the same way with impure air. A certain quantity of pure air, added to it, dilutes the bad air and makes it *less* noxious; while, if a certain quantity more is added, the impurity of the air is destroyed, as is the case with the impure water.

Any person can judge from this of the good effect of much pure air upon bad air.

Most observers have noticed that certain contagious diseases, such as small-pox, scarlet-fever, etc., are very apt to prevail during the winter. The reason of it is a simple one, and is because the poisonous or contagious principle is kept *confined* in the room from the fear of admitting the cold. It becomes so concentrated and virulent that it is capable of producing the disease in others. In warmer weather this prejudice against the fresh air does not exist; the doors and windows are kept open; the fresh air enters in abundance, and *dilutes* the emanations so much that they lose their *power* to extend the disease. These diseases then cease until closed doors come again with the cold weather.

If pure air can do so much in the warm weather, it should be made to do as much for us at all times; and it will do it, if we but give it the opportunity.

This is not only the case in low fevers, scarlet-fever, etc., but the same principle holds true with most other diseases; so the first thing and the last thing a nurse should do is this:

Keep the air the sick person breathes as pure as the air outside, without chilling him. Many persons think, as before remarked, that the thing has been done if a door or window is opened, never mind where the air comes from, whether from a close entry, a foul kitchen, or even from an untidy water-closet. If the air does come from any such place, the sick-room is not "aired," as the saying is, but only *more* poisoned. The kind of air one wants is the best air of the neighborhood, and this usually comes from the outside of the house.

With air, as with water, it should not only be apparently *pure*, but it should also be certainly *fresh*.

With plenty of open windows to let in the pure air, and a little burning fuel to take off the chill, it is an easy matter to get the kind of air all sick persons need. It is a rare thing indeed for a person in bed to "catch cold" while in bed. Indeed, some physicians say they never saw a case of it from such a cause; and, if the bed-clothes are properly tucked in about the shoulders, it is hard to imagine how such a thing could occur.

The time when people are apt to catch cold is just after getting up from the warm bed, when the skin has become somewhat relaxed from many hours or perhaps days of lying there, and rendered less capable of reaction. The same temperature which refreshes a patient in bed, while *protected* by the bed-clothing, might destroy the patient just arisen. Common sense will tell us from this that, while we want pure air, we of course want that which cannot *chill* the sick person.

In most diseased states there is much less heat produced than in health; and there is a constant tendency to a decline and ultimate extinction of the vital powers by the call made upon them to sustain the heat of the body. In such cases, the patient should be looked at with care every little while; and as soon as this *tendency* is discovered, the temperature of the body should be kept up by heat externally applied, as by means of warm bricks, bottles filled with hot water, etc. Such cases of decline of the heat of the body occur at all times, even in summer. This coldness, indicating a decline of vitality, is most apt to happen towards morning, at the time the effect of the preceding day's diet begins to be exhausted. Everybody knows that it is usually towards the morning when we begin to suffer from the effects of cold, and it is because the vital forces are then beginning to slacken from the want of food. If this is the case in health, it is the same in disease. Hence, from midnight until nine or eleven o'clock the next morning, the condition of the patient should always be carefully *watched;* and, as soon as want of heat is noticed, the nurse should at once take means to counteract it.

Although fresh air of the proper temperature is absolutely necessary, the prudent nurse will always arrange its entrance so as *not to allow a current over the patient.* No rule can be laid down here to avoid this, but it must be left much to the judgment of the attendant. If the nurse sees no way to avoid the "draught," be sure to ask the physician, when he comes.

If we are to preserve the air within the room as pure as that without, it is needless to say that the fire must not smoke, and a fire is very apt to smoke if fresh fuel is added in too great a quantity at once. In cities, however, physicians have less frequently to notice a smoke in a room than they have the presence of "gas" from a stove. There are few things more annoying to the sick, especially to those suffering from diseases of the throat, lungs or heart, than the prevalence of this "gas."

In the beginning we spoke of the injurious effects of effluvia or vapors known as "bad smells," and we shall here revert to the subject again in a special manner.

Nothing should *ever* go into the "slop-pail" of a chamber but the refuse water from the wash-basin, etc., and then it should stand no longer than necessary. *Under no circumstances whatever should the contents of any utensil used about the bed ever go into it.*

Arts.

INFLUENCE OF OIL OF SASSAFRAS UPON TOBACCO.

Editor Boston Journal of Chemistry:

The interesting article in the May number of the *Journal* reminds me of experiments made some years ago, when I was a smoker. I think I can suggest to your readers a more agreeable antidote, or denicotizer, than the tannic acid.

A valuable little "Treatise on Fever," by Dr Rezin Thompson, Nashville, Tenn., contains the following statement:

"On one occasion, while waiting upon a tedious case of labor, I amused myself, along with the matrons present, in the enjoyment of the pipe rather freely, and suffered a good deal of vertigo as a consequence. In the course of the conversation which the incident gave rise to, one of the company observed that the dry bark of the sassafras combined with tobacco would prevent its unpleasant effects. On the first opportunity, I made the experiment, and found it true; the sassafras not only preventing the injurious effects of tobacco, but speedily removing them when produced. I tested this repeatedly by smoking in a strong pipe until my head was very disagreeably impressed, and then reloading with a mixture of sassafras bark, a few puffs of which invariably dispelled the unpleasant sensations."

I have again and again, in my own person, verified the statement of Dr. Thompson; but have generally used the oil of sassafras, putting a few drops on the end, and allowing time for its absorption and diffusion through the cigar.

Is there any chemical analogy between oil of sassafras and tannic acid? Or is there any explanation of this identity of effect? Is their action purely chemical and on the nicotine? or is it physiological, and on the nerve-tissue?

Indulge me in some other extracts, which appear to me of great practical value, if true, in reference to the anti-narcotic and other powers of the sassafras:

"I added a drop of the oil of sassafras to every two grains of extract of hyoscyamus. Being very susceptible to the influence of nervous stimulants, I began by taking a common-sized pill, and increased the dose until I took five at once, without producing any other effect than a most delightful sleep, such as I had not enjoyed since, when a child, I used to fall down under the shade of a tree when at play."

He made for a lady a syrup of butternut, containing sixty grains of hyoscyamus and thirty drops of oil sassafras to the half pint. Her little daughter, in the absence of the family, drank a quantity which "contained at least thirty grains. No injurious effects followed."

He gave to a negro suddenly seized with spasm in his presence, during the prevalence of cholera, a quantity of a like mixture, containing "forty grains of hyoscyamus. In a few minutes the spasm relaxed, and the man assisted all day in burying the dead."

"I had tested its power (oil sassafras) fully in destroying the poison of insects and reptiles, such as mosquitos, fleas, spiders, bees, wasps, etc.; and, on one occasion, had an opportunity of testing its powers over the venom of the snake known as the copperhead, and found it succeed promptly."

The little book from which the above extracts are taken was published ten years ago. I have seen no notice of it by the medical journals. He writes like an accurate and truthful observer and narrator of facts, and it seems to me that the statements in reference to the properties of the sassafras are worthy of being known and tested. Let any one susceptible to the disagreeable influence of nicotine put a few drops of the oil on the end of a cigar, or on the tobacco in a pipe, and he will very soon be convinced that it is a complete antidote.

In making the experiment with the pipe, it is best to cover the oiled portion of the tobacco with some that is dry, or it will not burn so readily; or, if a blaze is used to light it, will burn too rapidly, and prove pungent and disagreeable. D. SHELBY, M. D.

HUNTSVILLE, ALABAMA, May 15, 1869.

PLATINIZED LEAD FOR GALVANIC BATTERIES.

Editor Boston Journal of Chemistry:

Some ten or a dozen years ago, having occasion to furnish a number of Smee's batteries for medical use, I found it difficult to procure platinized silver for the negative plates. The idea suggested itself to my mind that, as *lead* is unaffected by sulphuric acid, it might perhaps be substituted for silver in Smee's battery. Knowing the position which lead occupies in the scale of electrical relations, and the comparative feebleness of its conducting power, I confess that my expectations were not very flattering. In order to test the matter under the most favorable circumstances, the purest and cleanest sheet-lead was first roughened by rubbing in two directions with coarse, sharp, clean sand-paper, in order to increase the amount of surface, and also to increase its power to liberate hydrogen. It was then electro-plated with silver, after which a coating of platinum was added.

The plate was then substituted for the silver plate in a Smee battery made by one of the best manufacturers in the United States. I was no less pleased than surprised to observe a considerable increase in the electrical action of the battery. I attributed the improved action mainly to the *roughening* process.

In the next experiment the *silvering* of the lead was omitted, and the platinum deposited directly upon the roughened lead surface. The energy of the electric excitation did not appear to be materially affected by the omission of the silver coating. Since that time I have always substituted platinized lead for platinized silver

in the construction and use of Smee's batteries. It is useless to allude to the gain in point of economy. The difference in the cost of the two metals is not the only advantage.

The glass cell used to hold the acid solution of the ordinary Smee battery may be entirely omitted, and a platinized lead cell used as negative plate in its stead. The platinizing of the lead is an exceedingly simple process. To the physical technologist, electro-platinizing suggests itself, and needs no explanation. Practically, however, all that is necessary is to immerse the plates in, or fill the leaden cell with, a weak solution of platinic chloride. A few hours produces a deposit of sufficient thickness. Parties who may try the substitution of lead for silver plates as described, would confer a favor upon the writer by publishing or communicating the results of their observations. J. B. Hough, M. D.

Ridgeville, Warren Co., O., May 4, 1869.

PROFESSOR HENDRICKS ON FORCE.

Editor Boston Journal of Chemistry :—

On page 136 of the *Journal*, June number, I notice Dr. Hendricks's very ingenious but somewhat speculative article upon "force" as originated and transmitted by molecular motion or vibrations. I will not quarrel with his principal points, but wish to call attention to a single statement, viz : "A stage of condensation of the nebules would ultimately be reached, in which the *radiated* molecular motion would exceed that *absorbed* from the ether, after which the *sum* of the force pertaining to the mass would diminish."

Taking a previous statement of your correspondent, that "all vibratory motion is by the ether," as my basis, I would ask how it is possible for a constant force applied to an inert mass to impart more power than itself possesses, so that it shall react upon itself.

The radiation of force in form of heat from combustion of matter will not react upon the burning matter itself, nor diminish so long as the combustion continues; and, until the source of molecular force is enfeebled, the mass acted upon cannot overcome and return the borrowed force. Water charged to saturation with any soluble salt will not receive more, nor will it exert force upon the denser mineral, thereby weakening itself.

Your correspondent's theory would ultimately deprive the nebular masses of all molecular vibration or force, it having been received from the "luminiferous ether," to which it must return if it diminishes at all, and thus necessitate the admission of a third party to this molecular transaction, which should exert the same power as the spring of a clock upon the pendulum, forever changing the balance of vibration.

As this is not claimed by him, and is of course inadmissible, my theory would be that, when the absorption of force from the superior vibration of the molecules of the ether exactly equalled the radiation from the aggregated matter, that an eternal neutrality would be established, neither force exceeding the other.

I would like to hear your correspondent's explanation of this point.

O. P. Baston.

Newport, N. H.

TELEGRAPHING DURING MAGNETIC STORMS.

Few of our readers understand how seriously magnetic storms affect the telegraphic lines in the country, or how by ingenious expedients the disturbing influence is overcome. Mr. G. B. Prescott, a distinguished electrician, makes the following observations:

"On the evening of the 15th of April a magnetic storm of unusual force prevailed over the entire Northern section of the country, which so seriously affected the operation of the wires that, on some circuits, they could only be worked by taking off the batteries, and employing the auroral current instead. The effect of this great disturbance of the earth's magnetism was manifested with particular power upon the wires between New York and Boston, and for several hours the lines upon this route depended entirely upon this abnormal power for their working current. During the prevalence of this storm, however, I operated upon two wires between the above cities by a plan which rendered them as free from the effects of these earth-currents as a local circuit.

"Every one has observed that the auroral current comes in waves of ever-changing polarity, corresponding in length and direction with the scintillations of the visible aurora. Sometimes these waves continue but a few seconds, and sometimes for a longer time; but their constant change of polarity prevents the successful operation of a wire, because at one moment the auroral wave may augment the strength of current on the line, while at the next it entirely neutralizes it. Therefore it has frequently been found advisable to remove the batteries entirely, and work with the auroral current alone. But the operation of the lines in this manner is very unsatisfactory, owing to the uncertain and fitful character of this force; and therefore any feasible plan by which the wires may be worked under such circumstances is worthy of adoption.

"The plan by which I overcame the difficulties arising from the disturbance of the earth's magnetism was by disconnecting two wires from the earth at Boston, and connecting them together, while I grounded them both at New York, thus forming a loop extending from New York to Boston. As the two wires were both upon the same supports, the auroral wave travelled over each in the same direction, and, by uniting the two wires at one end, the auroral influence upon one wire was made to neutralize that upon the other, and thus the wires were left entirely free.

"Of course it makes no difference how often the polarity of the auroral current changes, or how much the strength of this current may vary, since the direction of the current, and its strength, change as much upon one wire as the other, and therefore the current upon one always exactly equals and neutralizes the other."

NEW PAINT FOR FLOORS.

We learn that a new kind of paint, especially good for floors, is made out of water-glass. It unites not only the qualities of beauty and durability, but is also advantageous as a means of protection against the action of fire. In order to lay on a covering of this paint, first of all the floor is neatly cleaned, then any cracks or crevices between the boards that may exist are luted with a thick dough, made of water-glass and pulverized chalk or gypsum. By means of a stiff brush, a coating of water-glass of the consistency, say, of syrup, is then spread over the floor. Again, in the same manner, a second coating is laid on consisting of water-glass mixed with the desired color. It must, however, be a mineral color, from the fact that the alkalies of the water-glass commonly decompose vegetable colors. This coating having become dry, other layers of water-glass may be thereafter given, until the floor has taken on the required lustrous appearance. In order to give the surface a brightness indicative of polish, it is ground off a little, oiled, and thoroughly dried. In this way a coating for the floor is obtained which is very durable, since the water-glass is not worn away either by means of heat, or yet, on account of its hardness, by means of continued use. As regards beauty and utility, floors coated in this manner are found to be fully equal to the best laquered or varnished ones.

ON NEW EXPLOSIVE POWDERS.

BY M. DESIGNOLLE.

Many improvements having lately been made in the art of war, and particularly in the adoption of breach-loading arms, the want has been felt of new powders to meet the requirements of the present artillery. This want has been supplied by M. Designolle, who has invented a new system of powders, of which carbazotate or picrate of potash is the base. These powders are of four kinds, viz, a musket powder, gunpowder for short-bore cannon, slow gunpowder for cannon with long bores, and an explosive powder for torpedoes and projectiles, destined for the undermining of fortifications. The principal advantages of these new powders are the following : Increase of balistic power, without increase of explosive power, the base remaining the same ; possibility of regulating and varying the effects between the limits of one to ten ; also of regulating at will the rapidity of combustion of this powder, and of increasing the balistic power without changing the mode of manufacture. Other advantages are — regularity in the manner of acquiring the mode of manufacture. Other advantages are — regularity in the manner of action ; suppression of sulphur, and consequently of the vapors of sulphide of potassium and sulphuretted hydrogen ; absence of action on metals; and almost entire suppression of smoke. Into the explosive powders only two components enter,— picrate of potash and nitrate of potash ; the musket and gun powders contain carbon in addition to the above-named ingredients. To prepare these powders, the ingredients are beaten from three to six hours with a proportion of water varying from 6 to 14 per cent, according to the nature of the mixture ; the powder is condensed by means of the hydraulic press, with a pressure of from 30,000 to 100,000 kilos; graining of the powder, and pressing and drying it according to the method employed for the black powder. In order to increase the balistic power, the relative proportion of picrate of potash in the mixture must be increased. For musket powder it has been proved that not more than 20 per cent of picrate of potash is required; while for gunpowders its proportion varies from 8 to 15 per cent. This component (picrate of potash) is of a beautiful golden-yellow color, and crystalizes into prismatic needles possessing a brilliant reflection ; it is insoluble in alcohol, but soluble in about 260 parts of water at 15°, or 14 parts of boiling water. Heated with care, it becomes orange-red at a temperature of 300°, but, on cooling, it assumes its original color. Heated to 310°, it detonates with violence. The researches of M. John Casthellaz on the action of nitric acid on phenic acid improved the method of manufacturing picric acid, and produced chemically pure picrate of potash at such a reasonable price that the new powders are not more expensive than ordinary black powder.

MM. Designolle and Casthellaz give the following proportions for preparing deflagrating mixtures with colored flames :

Golden fire	Picrate of ammonia	50
	Picrate of iron	50
Green fire	Picrate of ammonia	48
	Nitrate of barytes	52
Red fire	Picrate of ammonia	54
	Nitrate of strontian	46

Chemical News.

ON THE USE OF THE CHLORIDE OF GOLD IN MICROSCOPY.

Perhaps no re-agent has of late years played so important a part in microscopy as the chloride of gold. By means of it Conheim first demonstrated the terminations of the nerves in the cornea; and since it has been very generally used, particularly in investigations of the nerves. Its application is very difficult, and it is only after a long series of experiments and failures that proficiency is obtained.

Having had considerable experience with this re-agent in the laboratory of Professor Stricker, in Vienna, and having obtained some very satisfactory results, I hope that a few words on its application may not be out of place. The chloride should be dissolved in distilled water, and the solution should never be stronger than the half of one per cent. The object to be examined should be as fresh as possible, and should remain in the fluid from

three minutes to perhaps an hour, according to its affinity for the re-agent, during which time it assumes a pale straw-color. If the piece be small enough to be readily acted upon, ten or fifteen minutes is almost always sufficient. It is then laid in distilled water, to which just enough acetic acid has been added to give it the faintest possible re-action. In two or three days it will have become purple, verging sometimes on blue, sometimes on red; the latter is the least favorable. The preparation is now enclosed in glycerine, and improves for several days as the color becomes deeper, and as the finest fibres are the last to be affected. If the experiment has succeeded, for it sometimes unaccountably fails, the picture presented is one of the most beautiful and instructive that can be imagined. The nerves, muscular fibres and fibrous tissue appear black on the purple background. Epithelial cells are also colored, but not so well as by nitrate of silver.

Although the color makes fibres visible which are so fine that they can be seen by no other method, it does not determine their character. To prove beyond all doubt that a minute fibre is a nerve, we must be able to follow it to a larger branch. On a very successful preparation of the cornea of a frog, I observed nerve fibres of such minuteness that, with a magnifying power of nearly two thousand diameters, it was impossible to follow them to their terminations. I particularly endeavored to verify the connection, asserted by Kühne, but not generally accepted, between the nerves and the corneal corpuscles. With every advantage, such a connection is very difficult to prove. I often thought I had found one; but, when examined by a higher power, and placed in different lights, it proved to be only apparent, except in a single instance, and then it was not certain that the fibre in question was a nerve. I mention these facts as proofs of the value of the method; for it is no paradox to say that the better the preparation, the more difficult it is to obtain results. As the magnifying power is increased, elements come into view which, by inferior methods, are never seen; and spaces are discovered between bodies supposed to be in connection. The use of the chloride of gold, however, is not yet thoroughly understood, and offers a large field for original investigation.—*T. Dwight, M. D., Boston Medical and Surgical Journal.*

Oil among the Ancients.—The ancients knew no method of refining oil. As a great luxury they mixed it with perfumes, such as essence of roses and sandalwood; but this rather detracted from than added to the burning properties of the liquid, and all that was obtained by the process was an increase of fragrance and a diminution of light. The dwellings of wealthy men like Verres, Mæcenas and Lucullus, who expended extravagant sums upon scented oils, would not have borne comparison, in point of lighting, with the grimiest taproom of a gas-lit public house. The gold and silver lamps, hung by slender, well-wrought chains to marble pilasters, only yielded at their best a lurid tapering flame, that gave out an enormous deal of smoke, fluttered in the slightest breeze, and went out altogether at a gust of wind. Neither was it possible to steady the light by closing the apertures through which the air came; for, had Roman or Grecian houses been possessed of glass windows, they would soon have become uninhabitable. The fresco paintings of Pompeian villas, the delicate colors on the walls of urban palaces, would, in less than a month, have been hopelessly coated with lamp-soot. At the end of an hour's conference of an evening, a party of noble Romans would have resembled a congregation of chimney-sweeps. A tunic dyed in Tyrian purple would have acquired a mourning hue in no time.—*Scientific American.*

Photographers' Baths.—Photographers who use glass-baths will find it a great protection to them if they would place in the bottom of them a layer of pounded glass. If a plate should fall off the dipper, the pounded glass prevents it from striking and breaking the bath. Moreover, the small pieces of film, and other things that sometimes float around in the bath, are caught by the pounded glass, and kept from doing injury to the sensitized plate.—*Philadelphia Photographer.*

Albumenizing Glass.—S. B. Tressler sends to the *Philadelphia Photographer* the following formula for albumenizing glass:

White of 1 egg beaten to a froth,
Rain water 6 to 8 ounces,
Iodide of potassium, 5 to 12 grains,
Liq. ammonia, 2 or 3 drops.
Filter through either cotton or filtering-paper.

I cleanse the glass from dirt and grease by immersing it in a strong solution of nitric acid and water. Wash it well under the tap, then flow with the albumen and rear away to dry. As soon as dry, it is ready for use. Never brush the albumen side. If the dust cannot be blown off, clean the plate over again.

Solvent for old Putty and Paint.—Soft soap mixed with solution of potash or caustic soda, or pearlash and slacked lime mixed with sufficient water to form a paste,—either of these laid on with an old brush or rag, and left for some hours, will render old putty or paint easily removable.

Agriculture.

SOUTHERN AGRICULTURE.

Editor Boston Journal of Chemistry:

As one of the Commissioners of the Louisiana State Board of Emigration, and as a native of the South, I feel called upon to acknowledge the just and generous tribute paid to our people and their beautiful country in the last number of your interesting journal. Allow me to say that sectional animosity here has always yielded to candor and conciliation, and that the Southern heart is as accessible to kindness as are the Southern fields to the universal sunshine in which they are deluged.

An honest and cordial welcome awaits every Northern man and woman who may be attracted by our "green pastures" and "still waters." The truth of every Southerner is pledged to a generous hospitality, and he is prompted by every sentiment of honor to defend his guest and his neighbor.

Political asperities have sometimes disturbed these pleasant relations, but they might have occurred anywhere else, and both parties are generally to blame.

In the name, then, of this State, I invite your people to come and see for themselves. We offer them a salubrious climate, a fertile soil, and a cordial and courteous reception.

Very respectfully, your ob't serv't,
V. O. King, M. D.

New Orleans, La.

Remarks.—We print Dr. King's note, although it was not designed for publication. It will do good, coming as it does from one of the most distinguished and cultivated Southern physicians. Since the article was published in the *Journal* alluded to by Dr. K., several parties have written us, stating that the views presented were incorrect, that Northern people could not live comfortably at the South, owing to persecutions from Southern men and women, etc. *We know better than this.* Such statements only serve to show the utter unfitness of the parties making them to live comfortably *anywhere.* Every community harbors more or less complaining, jealous, and usually conceited individuals, who are not happy unless engaged in efforts to make others as miserable and unhappy as themselves. These persons endeavor to keep up sectional prejudice and hate, which is so detrimental to the interests of the whole country. More than a dozen of our most candid, reliable and intelligent citizens, who have just returned from extended tours through the Southern States, all concur in stating that they were everywhere received with the utmost kindness, and that in no section of the South is there more insecurity to life or property than in any Northern State. It is high time honest, worthy citizens of the North understood this matter.

THE HAYING SEASON.

The season for cutting and curing the grass crop having come round again, we have a few remarks to make and some advice to give, which may be of service to farmer friends. In the first place we advise to begin the work of cutting grass *early.* This we especially recommend, if the hay is to be fed to milch cows during the winter. But few farmers are correctly informed in regard to the great value of early-cut hay as milk-producing food. We made an experiment the past season which proved its high value conclusively. One acre of grass, a mixture of red-top and clover, was cut the nineteenth day of June, cured in two days, taken to the barn, and stored upon a scaffold by itself. On the first of March we put our herd of ten milch cows upon this hay, and almost immediately the increase in the flow of milk amounted to *ten quarts* per day. The hay fed to them up to the first of March was of the same variety, grown upon the same kind of soil, but it was cut in July, from the middle to the last of the month. No more of the early-cut hay was consumed; it spent as well, lasted as long as the later cut. It was fresh, and full of the rich, succulent juices, dry, but perfectly soluble. The money value of the product from this hay, fed to ten cows, was greater by nearly one dollar each day than that from the later cut. If hay is cut early, a good second crop is almost certain to be secured, and this adds greatly in keeping up a good flow of milk during the winter and early spring. The advantages of cutting hay early for milch cows must not be overlooked. In the second place, hay must not be dried too much. We state here what we have often before stated, that, if grass is *entirely* freed from *external moisture,* as that in the form of *dew* and *rain, it will cure better in the mow than anywhere else,* provided enough exposure to wind and sun is had to cause one-half of the water circulating in the vessels of the plant to be evaporated. This is accomplished in six or eight hours of favorable weather. Hay is often spoiled by storing it when it holds considerable moisture arising from dew or rain, but very *seldom* or never when it holds no other than that which is natural to the circulating juices. These are important facts to remember. If grass is cut early in the morning, and thoroughly worked so as to drive off all the dew, it may be safely stored the same day, if it be a favorable one. A pound of over-dried hay is worth only half as much as that which is properly cured. Do not saturate your mows with *salt.* Salt does not *preserve* hay. Its action is unfavorable to curing hay in the mow, as it is a hygrometric substance, or one that attracts moisture. It holds, besides, considerable water of crystallization, and this affords moisture, and helps defeat the end had in view. Wet or damp hay will keep no better by throwing over it salt; and, when this substance is used largely, it is upon the whole injurious to animals who are compelled to eat the hay. Who among men could live upon "salt junk" continually? We must use reason and sound judgment in all our proceedings.

Analysis of Ripe Grapes.—Dr. Classen has done good service to science, as well as technology, by supplying us with these analyses; the grapes, three different kinds, grown in the neighborhood of Kreuznach, were brought promiscuously in the market-place there:—1,000 grammes of fruit yielded—(1) 577, (2) 951, (3) 1032 grammes juice; this consisted in 10,000 parts of solid substance dried at 100° *C.*—(1) 1644, (2) 1897, (3) 2046; grape sugar—1499, 1624, 1740; free acid—72, 68, 40.8; ash—27.83, 30.95, 40.08. The ash contains, as might be expected, a large proportion of potassa and phosphoric acid as the chief constituents, and beside chlorine, sulphuric acid, lime, silica, and small quantities of magnesia, and oxides of iron and manganese.

Boston Journal of Chemistry,

BOSTON, JULY 1, 1869.

☞ Any person sending us the names of *three* new subscribers, with full pay inclosed, will be entitled to a *fourth copy of the* JOURNAL *gratis*. For *five* new subscribers, we will send the *petite microscope*, or one set of Twenty Small Carpenters' Tools in a Hollow Handle — a most convenient article. For *ten*, we will send a copy of Dr. Nichols' book, "*Chemistry of the Farm and the Sea*," or Messrs. Rolfe and Gillet's "*Handbook of the Stars*," or the "*Handbook of Chemistry*," by the same authors. *These are all beautiful and instructive books.* For *twenty* subscribers, we will send the "*American Naturalist*," published by the Peabody Academy of Science, Salem, for one year. This is one of the most interesting and useful publications in the country, devoted to Natural History. Or a Boy's Tool Chest, 13 inches long, 8 inches wide, 8 inches deep, with a complete set of Carpenters' Tools, — Saw, Plane, etc. (The express charges on the Chest to be paid by the receiver.) For *thirty* subscribers, we will send the *Naturalist* and the "*New England Farmer*," an agricultural paper, published in Boston. For one hundred and twenty-five subscribers, a Silver Case American Watch. Price, $30.

☞ Premiums are allowed only upon *new* subscribers, not on renewals of subscription by old subscribers.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States. We will furnish, to those sending for them, specimens of any or all the numbers.

☞ Correspondents are particularly requested to give their names in full, with their Town and State; and, in case of change of residence requiring a corresponding change in the mailing of their papers, to give not only the new address, but the old one also.

☞ Subscribers who are physicians, dentists, or apothecaries will confer a favor by informing us of their profession, as we wish to know accurately the amount of our medical subscription list.

☞ We are unable to supply complete files of either Volume I. or II. of the *Journal*. Of Volume I. (originally issued bi-monthly), Nos. 1, 2, and 3 (July, September and November 1866), are now out of print. Of Volume II. (monthly), Nos. 1, 3, 6, and 12 (July, September, and December, 1867, and June, 1868), are also out of print. Of the remaining numbers we have a few copies left, which we will forward to our friends at the following prices: Volume I., three numbers, twenty-five cents; Volume II., eight numbers, fifty cents; Volume III., one dollar.

STEREOTYPING THE JOURNAL.

We take pleasure in stating that we commence printing Vol. 4 of the *Journal* from *stereotype plates*. After the pages are made up and corrected, they are taken to the foundry and stereotyped, and the plates are used for printing the editions of the paper.

This labor with us, although involving much expense, is unavoidable. We have been greatly troubled to supply back numbers to new subscribers, although at the commencement of each volume many thousand extra copies were printed. With stereotype plates this embarrassment ends, and hereafter any number of copies of this and future issues of the *Journal* can be promptly supplied. The plates are stored in fire-proof vaults, and can at any future period be used in reproducing copies. We have a few full sets of Vol. 3 which we cannot supply at less than *one dollar* unbound. No copies can be furnished *free*. Any one desiring single numbers can procure them, if applied for immediately, by inclosing *ten cents*.

TELESCOPES.

Mr. Tolles of this city, the celebrated optician, has just completed for us a very fine telescope, with a three-inch object-glass. Mr. Tolles has introduced into this instrument some improvements, which are new, and which add very much to its value.

The mechanical appliances for directing it, and easily retaining the object in the field, are admirable, and perfect in construction. It has attached to it a *finder*, with other appliances, also a terrestrial and two celestial eye-pieces. This instrument resolves many double stars, and brings out the moons of Jupiter and the rings of Saturn with great clearness. The moon is brought within about 1,500 miles of the observer, and the ragged openings of its craters and the shadows of its mountains are distinctly defined. The least distance at which objects upon the moon have ever been seen is 42 miles. This would be about the distance of Worcester from Boston, and the view of the moon through Lord Rosse's telescope would afford as distinct conceptions of objects as looking from Bunker Hill Monument at objects in Worcester with the naked eye. In a very clear day, if the elevation was sufficient, it might be that large buildings could be distinguished. Since Locke's celebrated "moon hoax," published thirty years ago, we have had no very minute description of occurrences upon our satellite.

Some of our readers may be curious to inquire why it is, if we can bring objects upon the moon within a range of 42 miles, they cannot be brought within one mile. To overcome the remaining 40 miles, or to bring the moon within one mile of the earth, would require an enormous increase of power in our instruments. It would require at least *ten times* the power of Lord Rosse's great reflector, and in the construction of such telescopes there are at present practical difficulties which seem insurmountable. Beside the difficulties pertaining to instruments, it must be understood that the very augmentation of power defeats the end desired,— clearness of observation. The vibratory motions caused by radiated and reflected solar heat, and the mechanical impurities in our atmosphere, are all hindrances to clear, accurate observation, and the higher the power the more formidable do they become. These obstacles are undoubtedly to be in part removed, but *how*, it is difficult at present to understand.

DEPILATORY POWDERS.—Superfluous hair, as it appears upon various parts of the face and neck, is a great annoyance to ladies, and we are often asked if there is any depilatory which is safe and reliable. Chemistry has not yet suggested a perfectly satisfactory agent for removing this evil. There are, however, several formulas which answer very well for the purpose. The three following are the best:

I.—Take sulphuret of calcium, fresh,
Quicklime, of each equal parts.

Reduce them separately to fine powder; mix, and keep the mixture in a well-stoppered bottle. Safe and effective.

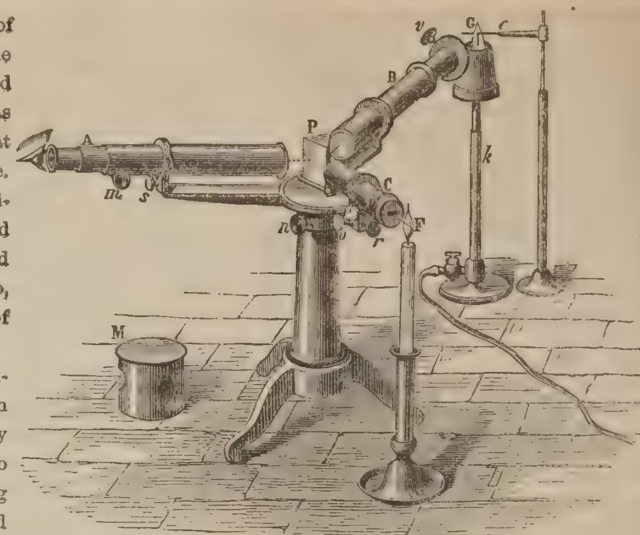
II.—Take hydrosulphuret of sodium, crystallized, 3 parts,
Quicklime, 10 parts,
Starch, 11 parts.

Mix. It should be applied not longer than two minutes. preserve as No. 1.

III.—Take sulphuret of potassium, 1 part,
Pearlash, dry, 1 part,
Quicklime, 8 parts.

Mix. These depilatories, which are in a state of powder, are made into a paste with warm water, and immediately applied to the part, previously shaved close, a little starch being generally added to those which do not contain it, in order to render the paste more manageable.

☞ Those of our subscribers who are in arrears will find bills inclosed in this issue of the *Journal*. It may happen that some bills will be placed in the wrong papers: if this occurs, our friends must excuse us. Those who have *forgotten* us for a year or more, and those who have not paid in *advance* for Vol. 4, will please notice the inclosed *reminder*. *It is only fifty cents.* Inclose it in a letter.



THE SPECTROSCOPE.

We have already devoted several articles to the spectroscope and its wonderful revelations, but the subject is so important and so interesting that many of our readers desire us to recur to it again. We are inclined to gratify this wish, because it is evident that those who have not seen the instrument, and become practically familiar with its operation, have found it difficult to get a clear idea of it from the descriptions usually given. As it is not easy to understand a description without the aid of a figure, we have therefore borrowed from Rolfe and Gillet's *Natural Philosophy* the excellent woodcut given above. With the aid of this illustration, we think that we can make the construction and the use of the apparatus intelligible to most of our readers.

The form of the instrument here represented consists of three small telescopes mounted on a single stand, and directed towards the faces of a prism of flint glass, *P*, by which the *spectrum* to be examined is formed. The telescope *B* is for throwing the light upon *P* in order to *form* the spectrum ; *A* is for *viewing* the spectrum thus formed ; and *C* furnishes the means of *measuring* the parts of the spectrum ; *m*, *s*, *n*, *o*, *i*, and *r* are screws for adjusting the position and focus of the telescopes, and require no detailed explanation.

k is a *Bunsen's lamp*, which is simply a gas-burner, so arranged that it gives a very hot flame with very little light; *c* is a platinum wire, by means of which any substance can be introduced into the flame. Suppose, for instance, that this wire be dipped into a solution of common salt and then put into the flame. The light, before pale and quite colorless, becomes at once of a bright yellow. The lenses of the telescope *B* concentrate this light upon the prism *P*. In passing through the prism, the rays are turned aside from their course, or *refracted*, and at the same time separated so as to form a spectrum upon the object-glass of the telescope *A*. A magnified image of this spectrum is formed within the telescope, and it is this image which is examined by the observer at the other end.

The telescope C, as we have said, merely aids in the measurement of the spectrum. It contains a delicate *micrometer*, or scale of equal parts, very minutely sub divided and marked on glass. This is placed at the end of the telescope nearest the candle *F*. The light of the candle, passing through the micrometer and the lenses of the telescope, forms an image of the micrometer upon the face of the prism *P*. From this the image is reflected into the telescope *A* in such a way that it falls directly over the image of the spectrum, and thus affords the means of measuring with the greatest precision the

relative distances of any dark or bright lines which occur in the spectrum.

The cap *M* is used to cover the prism *P*, to cut off all light except that which comes through the telescopes *B* and *C*. It is removed in the figure, in order that the prism may be seen.

The light from *G* is admitted into the telescope *B* through a very narrow upright slit, the width of which can be adjusted by the screw *v*.

There are various forms of the spectroscope, adapted for various kinds of investigation, but the principle is the same in all.

We have assumed that the reader understands the action of the prism upon the light which passes through it. He knows, of course, that the white light of the sun is not *simple*, but *compound;* a bundle of colored rays some of which are bent more than others (or are more *refrangible*, to use the technical expression,) inside the prism, and thus spread out (or *dispersed*) so as to form the colored band called the *spectrum*. He is aware, too, that not only sunlight, but almost every form of light, is compound, and may be decomposed, forming its characteristic spectrum. It is this last fact which is the foundation of all *spectral analysis*, or the examination of various kinds of light by means of the spectroscope.

So much for the instrument, and the way in which it is used. We wish next to state, as briefly and simply as possible, a few general facts concerning spectra, which ought to be understood before we go on to give an account of the wonderful discoveries that have been made by spectral analysis.

The spectra of all highly-heated bodies may be referred to *three types* or classes:

1st. The spectrum may be *a continuous colored band*, unbroken by either bright or dark lines.

Now, such a spectrum tells us that the body which emits the light is in the *solid* or *liquid* state, but nothing as to its nature. This is a general rule, though in certain cases a gas may give a continuous spectrum. To some of these exceptions we may have occasion to refer in another place.

2d. The spectrum may be made up of *bright lines*. These tell us that the source of the light is *luminous gas;* and, since each gas has its own set of lines, we can tell by an examination of the lines what gas it is which gives a light.

So far, but one exception has been found to this rule. According to Bunsen, solid *erbia* (an oxide of the rare metal *erbium*) gives a spectrum of bright lines.

3d. We may have a spectrum in which a colored band is broken by *dark lines*. These dark lines tell us nothing of the source of the light, but show that *between us and that source* there are *vapors of low temperature* which "by a selective power of absorption" peculiar to them have *quenched* certain of the rays of light, and have not been able to replace them by light of their own. Now, it is a law of light, that *gases absorb the same kind of light as they emit when heated*. The kinds of light absorbed by each vapor, then, producing the *dark* lines just mentioned, will correspond with the set of *bright* lines in the spectrum of the light emitted by the vapor when luminous. A comparison therefore of the *bright* lines in the spectra of *known* substances with the *dark* lines in a spectrum will enable us to tell whether the vapors of low temperature *contain those substances*. Let this fact be understood and remembered, for it is the key to some of the most striking discoveries made by the spectroscope, to which we shall refer in another article.

POPULAR LECTURES ON SCIENCE.

In our April number, under the heading, "A Bishop on Science," we made a few comments upon the newspaper reports of a lecture by Bishop Coxe, of New York. Our criticisms have drawn forth the following letter from the bishop, published in the Buffalo journals, which, in justice to him, we are very happy to reprint: —

BISHOP COXE'S LETTER.

Bishop Coxe presents his compliments to the editor of the Boston *Journal of Chemistry*, and begs to thank him for some very just statements as to the "inaccuracy of reporters," which appeared in the *Journal*, in the course of certain strictures of which he was the subject. So long as such strictures were confined to mere newspapers, quarrelling with their own loose and disproportionate recollections of what was said, the bishop felt himself at liberty to adhere to his ordinary rule of making no reply. When respectable scientific periodicals take up such loose reports and comment on them, although with liberal abatements for their inaccuracy, it may be worth while that truth should be briefly told. The truth is this: *The bishop stated no scientific theories of his own*, but mentioned that of Humboldt as to earthquakes and internal heat, and that of Olbers as to the asteroids. His plan was to show the uncertainties of science and the stability of divine revelation. Consequently, it is with Humboldt and with Olbers that the *Journal* quarrels, and not with the bishop. The contempt with which the *Journal* dismisses the theories of these very learned men merely confirms one point in the bishop's position, which was, that, if their views be true, they do not conflict with the Bible, but confirm it; if false, they illustrate the fact that "*scientific* men are often *very rash and dogmatic* on disputed points," a vice which the *Journal* attributes to "*un*scientific men," as if they were alone in this fault.

BUFFALO, May 7, 1869.

So far as this particular case is concerned, we should be very willing to leave it just as it now stands; but there are one or two points of general interest suggested by the bishop's letter, and upon these we have a few words to say.

In the first place, we believe that popular lecturers who discuss scientific topics, without having prepared themselves for the task by a thorough study of those topics, cannot be acquitted of the charge of *rashness*. They are rash and presumptuous in attempting to do what cannot be done properly without special and elaborate preparation. They get but a partial or one-sided view of the subject, and go before the people with the oracular tone of the teacher; and the mischief of it is that they *are* the popular teachers of science. Thousands of people have had no instruction in science, have not even read popular books on science (many of which, by the way, are open to these very same objections), and they look up to the lecturer as one who "speaks with authority." The newspapers, as we have seen, give their blundering reports of the crude and incomplete statements of the lecturer, and the mischief is thus multiplied and extended.

Bishop Coxe (we refer to his case merely as the one nearest at hand) tells us, for instance, that he stated no scientific theories of his own, but mentioned that of Olbers as to the asteroids; and he did this "to show the uncertainties of science" as contrasted with "the stability of revealed religion." Now, the theory of Olbers was enunciated at a time when but *two* asteroids had been discovered. He found that the orbits of these two planets came very near each other at one point, and this circumstance led him to conjecture that the two were fragments of a larger body shattered by some great convulsion. A third was soon discovered; and Olbers himself, by searching just where, according to his theory, he was most likely to pick up more of the broken pieces, actually found a *fourth*.

This was all that was done in this field of investigation before the death of Olbers (and for nearly forty years afterwards), and it all tended to give great plausibility to his theory. But in 1845 a fifth asteroid was discovered, and the number has now increased to 108. A dozen were discovered in 1868, and several have since been detected. These planets are spread through a zone of more than one hundred and fifty millions of miles in breadth; and it is no longer conceivable that they are the fragments of one original body. As Loomis concisely states it:

"If these bodies ever composed a single planet, which burst into fragments, then, since the orbits all started from a common point, each must return to the same point in every revolution; in other words, all the orbits should have a common point of intersection. Such, however, is far from being the case. The orbits are spread over a large extent, and the smallest known orbit is everywhere distant from the largest by at least fifty millions of miles."

Now, wherein does this illustrate "the uncertainties of science"? All that science can do is to classify *facts already found*, and to deduce from the facts the most plausible theory as to their causes. If fresh discoveries refute the former theories, it must devise new theories which will explain the new facts as well as the old. Olbers explained the existence of his four little planets as well as he could; but, had he lived to see the large increase of the family, we believe that he would have discarded his theory. Very likely he would have adopted the nebular hypothesis of Laplace, which, as we have shown in a former article (Feb., 1869), explains fully *all* the known facts of our planetary system.

In the second place, it does not seem to us that scientific men, and especially those of the very first rank, are apt to be "rash and dogmatic" in the enunciation of their theories. Preachers, lecturers, and newspaper writers are continually making the accusation, but there is really very little ground for it. Indeed, it appears to us to be a marked characteristic of the best modern writers on science that they draw the line very carefully between *fact* and *speculation*, between what we *know* and what we *may believe*, and that they state their *theories* with all becoming modesty. And it is specially to their credit that they are most careful to do this in familiar and popular presentations of scientific subjects. We open at random a book that lies on our table, — Tyndall's "Lectures on Sound," a model work of its class, though the author has often been abused for theological views which never appear in his books, — and on page 324 we read these words:

"I do not ask you to consider these views as established, but only as probable. They present the phenomena in a connected and intelligible form, and, should they be doomed to displacement by a more correct or comprehensive theory, it will assuredly be found that the wonder is not diminished by the substitution of the truth."

We could readily quote many such expressions from the writings of the great leaders of modern scientific research, and they show how the spirit and temper of these men are misrepresented by more than one popular lecturer, who, in his blundering report of what they have done, is guilty of the very "rashness and dogmatism" which he unjustly ascribes to them.

☞ The great Musical Peace Jubilee, which occurred in this city in June, was a splendid success. Electricity was used for the first time to discharge the cannon employed in the choruses.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—Our readers who are members of this association are reminded that the next or eighteenth meeting will be held at Salem, Mass., commencing Wednesday, August 18th, and we most sincerely hope that a large number of the members will be present. It will undoubtedly be a pleasant and profitable meeting, and the good people of the quaint old city of Salem are preparing to give to all a hearty welcome. On the afternoon of Wednesday, the first day of the meeting, the association will be invited to participate in the dedication of the Museum of the Peabody Academy of Science. This is a noble, and in many respects an unique collection of objects of natural history, rare curiosities and coins, and works of art. The collection in itself is worth making a long journey to examine; and the beautiful hall, and tasteful scientific arrangement of specimens, add greatly to the effect.

Salem is fast becoming a point of great scientific interest, and the corps of indefatigable laborers in the several fields of scientific research, who now are connected with the Peabody Academy of Science, are fast making themselves known throughout the world. If more self-denying, industrious, accurate investigators can be found anywhere than Professors Putnam, Morse, Hyatt, Packard, &c., we shall be glad to know of them, and record the results of their labors. Among the distinguished gentlemen expected to be present at the meetings of the association is Mr. George Peabody, the founder of the Academy.

☞ Dr. Wm. H. Helm, of Sing Sing, N. Y., has collected at considerable cost one hundred card photographs, of distinguished foreign physicians, surgeons, chemists, specialists, etc., and is willing to supply copies of the same to any one desiring them, at the low price of $15.50 per set, or $2.00 per dozen. It is a positive *luxury* to possess a set of these carefully selected cards, affording, as they do, perfect and clear likenesses of such men as *Virchow*, *Hoffman*, *Bock*, *Bunsen*, *Helmholtz*, *Liebig*, *Ricord*, *Becquerel*, etc., etc. In looking over the collection, we are almost pained to observe the changes which *fifteen years* have produced upon Liebig, Bunsen, Wurtz and others. Liebig, at Heidelberg in 1855, had but few gray hairs, or deep furrows upon his face, but the photograph before us shows him to be *now* an *old man*. And so we are all growing old. Doubtless many of our readers have been pupils of these distinguished men, and they will be glad of an opportunity to procure these photographs.

We will procure and send one dozen cards to any party who will send us the names of twelve new subscribers to the *Journal*, with full pay inclosed, or we will send the full set (one hundred) for sixty new subscribers.

ONE MORE SUBSCRIBER.—We think there is hardly any good and sufficient reason why each and every one of our present subscribers, cannot add another name to our list at the commencement of Vol. 4. How easy it will be for each one to take a copy into a neighbor's house or workshop, and say: "Here is a little journal that you and your family should read. Every paragraph found in it is useful and instructive; it is good, safe, practical reading, *and it costs only* 50 *cents a year*." But few will refuse; the value is so great, and the cost so insignificant. We do not hesitate to ask all of our subscribers to do us this service, inasmuch as the paper can be made to pay the cost of publication only by securing a very large number of subscribers. How many will respond to this suggestion?

Medicine and Pharmacy.

CINCHO-QUININE.

In response to the requests of many physicians, we present some specific formulæ, for the guidance of prescribers in the use of cincho-quinine. The article in the last number of the *Journal* explains in full its chemical, and therapeutical character, and its obvious advantages over the sulphate of quinine as a tonic and anti-periodic. We have sent specimens to several hundred physicians for trial.

FORMULÆ, AND METHODS OF USING CINCHO-QUININE.—A perfectly clear solution of *cincho-quinine* may be made by taking 10 grains, rubbing it fine in a mortar, and gradually adding 2 fluid ozs. of water, in which is dissolved 30 drops of No. 8 acetic acid, or 6 drops of sulphuric acid. The solution is not disagreeably bitter, and a pleasant elixir may be made from the solution by adding syrup and aromatic flavors.

CINCHO-QUININE PILLS.

℞ Cincho-Quinine (finely powdered), xx gr.
Acid Sulph. Aromat. (Elix. Vit.), xx gtts.
Fiat pil., xx.

Mix, and rub in mortar until it becomes hard enough to form into pills. The mixture is at first quite liquid, but soon it hardens, and pills can be readily formed from the mass. This is the preferable form in which to administer the remedy, as the pills are small and can be readily taken. They need no *sugar coating* to render them palatable.

CINCHO-QUININE ELIXIR.

℞ Cincho-Quinine (finely powdered) grs. xlviii.
Aqua Rosæ (fresh) . . . ℥ viii.
Syrupus Simplex . . . . ℥ iv.
Tincture Cardamon . . . ℥ ii.

Mix. Dose, as tonic, a dessertspoonful three times in the twenty-four hours. The elixir should always be shaken before it is administered.

CINCHO-QUININE POWDERS.

℞ Cincho-Quinine . . . . ℥ i.
Sacch. Alba, (powdered) . . ℥ iv.

Rub together in mortar and divide into powders of any size desired.

When cincho-quinine is required to be given in large doses, as in intermittents, the pill form is preferable, as the pills can be made into those containing five grains, and not be inconveniently large.

There are many other ways in which it may be prescribed, which will suggest themselves to the physician.

CARBOLIC ACID AND SMALL POX.

Editor of Boston Journal of Chemistry:

I hope your agitation of the question of carbolic acid solutions in the *Journal* will result in the adoption of solutions with uniform strength, and a nomenclature that will preclude the possibility of error in filling prescriptions. In the late fearful epidemic of small-pox here, I have tested the disinfectant and prophylactic power of the acid in a way that leaves no doubt in my mind of its superior merit. Indeed, during the latter part of the course of the epidemic I trusted to it exclusively. In thirty-six instances of this exclusive use, the disease spread in but one; and that was in a family of very filthy habits, where cleanliness and proper nursing were unattainable.

Respectfully yours, O. O. BURGESS, M. D.
SAN FRANCISCO, CAL.

THE bitterness of sulphate of magnesia may be removed by boiling a little coffee in a solution of the salt The flavor of a decoction of senna may be masked in the same way.

PRESERVATION OF MEDICINES.

Editor Boston Journal of Chemistry:

The question is often asked of the dispenser of medicines, "How long will it retain its properties?"

Having graduated in 1846 as an M. D., I procured some anti-bilious pills which were a most excellent cathartic. I have retained some of them until the present time, and have given them to friends several times in the last month, and find them just as active as ever. They were made twenty-five years since.

C. A. GREENE, M. D.
CAMBRIDGEPORT, MASS.

THE EFFECTS OF ALCOHOL ON THE SYSTEM.—Dr Letheby states that the effects of alcohol are much modified by the substances with which it is associated in different alcoholic liquids: beers and ale, for example, act on the respiratory function by reason of the saccharine and nitrogenous matters they contain; wine also, as well as cider and perry, have a similar action; and, in proportion to their saccharine and acid constituents, brandy and gin lessen the respiratory changes, and the latter acts on the kidneys by reason of the volatile oil it contains; whiskey is uncertain in its effect upon the lungs; while rum, like beer and ale, is a true restorative, as it sustains and increases the vital powers; and he says that the old-fashioned combination of rum and milk as the most powerful restorative with which he is acquainted.—*Medical Record.*

DR. ALEX. BOGGS, according to the *Richmond and Louisville Medical Journal*, recommends, as a substitute for tincture iodine, carbolic acid, and glycerine, the following mixture,—Tr. iodine, one drachm and a half; glycerine, two ounces; solution of chlorinated lime, six ounces. This solution, which is colorless and not disagreeable, may be used advantageously as an injection in diseases of the vagina and rectum, and for allaying severe itching in vulva pruritus, and also in leucorrhœal affections.

LIME-WATER.—Take a piece of unslaked lime (never mind the *size*, because the water will only take up a certain quantity of it); put it into a perfectly clean bottle, and fill the bottle up with *cold* water; keep the bottle corked, and in a cool, dark place, such as a cellar. In a few minutes it is ready for use, and the clear lime-water can be poured off whenever it is needed. When the water is exhausted, fill the bottle again. This may be done three or four times, after which, some new lime must be used, as in the beginning.

COD-LIVER OIL WITH HYPOPHOSPHITES.

Editor Boston Journal of Chemistry.

I have a female patient twenty-five years of age, unmarried, who has been treated through three lung fevers by me; the third one last winter or autumn, the second about two years ago, and the first about four years ago; since the second one, she has been gradually failing, with very evident symptoms of phthisis, and was so low in January, 1869, that all hopes of her recovery were lost. I could do no more than to put her on the cod-liver oil and hypophosphites of lime and soda, and did so. After taking one and a half pints she began to amend rapidly. Before beginning its use she was unable to move herself in bed, cough bad, raised continually, and cavities were easily diagnosed in the apex of both lungs; now she can walk a mile as quick as any one, and looks strong, has little or no cough and expectoration, gains flesh fast, says she owes her life to the oil. Several other patients of mine, with symptoms of incipient phthisis, are taking it, and are improving rapidly. I find it excellent in convalescence from severe attacks of pneumonia; also in some cases of general failure of the vital powers, for which affection it is hard to find a name.

WM. H. GRANT, M.D.
OSSIPEE, N. H., June 15, 1869.

Danger of giving Strong Doses of Camphor. — A case illustrating the above has recently been brought under the notice of the Société de Médecine et de Pharmacie de Grenoble. An enema consisting of five grammes of camphor dissolved in the yolk of an egg was given to a child three years of age suffering from typhoid fever. Symptoms of poisoning soon manifested themselves, — convulsions, lividity of the countenance, stupor, arrest of the urinary secretions, etc. The employment of coffee sufficed to restore the child. — *N. Y. Medical Record.*

The Relief of Pain in Open Cancer. — The field for experience in cancer at this Middlesex hospital is, as is well known, an unusually large one, and opportunity has therefore been afforded for testing fairly the action of remedies in affording relief in this distressing disease. We learn that the exquisite pain which belongs to open cancer is found to be best relieved by the stramonium ointment, which is employed at this institution. The following is the formula for this in the hospital pharmacopœia: Half a pound of fresh stramonium leaves, and two pounds of lard. Mix the bruised leaves with the lard, and expose to a mild heat until the leaves become friable, then strain through lint. The ointment thus prepared is spread upon lint, and the dressing changed three times a day. — *Lancet.*

ILLUMINATION IN LARYNGOSCOPY.

(Concluded.)

Artificial Light derived from Carboniferous Gases, and from the burning of Animal and Vegetable Oils. — Typical of these, *only* the use of the kerosene light and the ordinary gas light will be described, as they will show the principle of the use of light derived from other sources.

(1) Direct kerosene light, without any special shade used. A good, clean burner, with a clean chimney, is to be mounted on a table or stand, and the observer in auto-laryngoscopy takes such a position that the light will illuminate his throat and not shine in his eyes, and conducts his observations. This is accomplished by holding the mirror of observation in such a manner as that it shades the eyes. Subjective observations may thus be made, but with difficulty.

(2) Direct kerosene light with a special shade: that used by the writer is simply a cylinder of Russia sheet-iron, open at both ends, of sufficient diameter just to encircle the glass shade, Fig. 7. It is made by rolling up a lamina on itself, the longitudinal ends not being soldered, but overlapping each other. It thus can be adjusted to lamp chimneys of different sizes. At the lower part of the cylinder, against the flame of the lamp, is a perforation about one inch in diameter, to which is attached a second cylinder of the same material, open at both ends, of the diameter of the perforation, and two inches in length. This shade covers the light completely, except where it is perforated. The use is obvious. The lamp, protected with this shade, is so placed that its rays shine directly into the mouth. In the case of subjective laryngoscopy, it is either held in the hand of the observer or of an assistant; or it is mounted upon an upright stand, which may be made of an ordinary stair balluster, provided with a sufficiently firm base in the case of a male patient. With a female, unless she stands up for examination, the light must be mounted upon an arm extending at right angles to a stand similar to but heavier than that just mentioned. The use of this shade is very convenient, as it dispenses with all reflectors. The light is strong and steady. It is recommended to those who wish cheaply to practise laryngoscopy by artificial light.

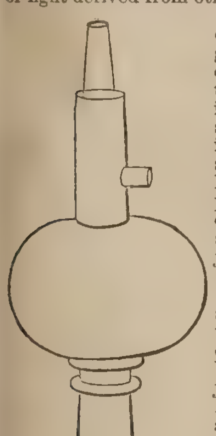


Fig. 7.

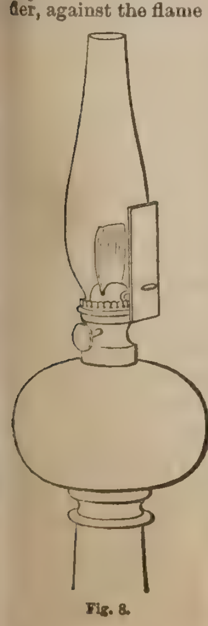


Fig. 8.

It is easy to apply this shade to light, if obtained by burning other oils, only modifying it to accommodate it to the size of the flame, whether it is provided with a shade or not.

Another method of using direct kerosene light is to attach a common visiting card to the lamp so as to exclude the rays from the observer's eyes, Fig. 8. On many lamps there is a spring which stands out at one side, its direction being upwards and outwards. By perforating the card at and near one end downward and inward, when it is shoved on over the spring there is tightness enough to hold it steady and retain it in its place.

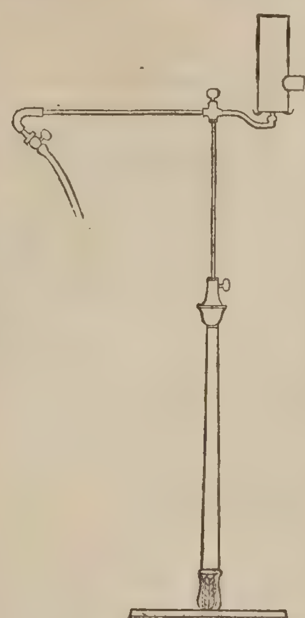


Fig. 9.

(*h*) The Light Obtained from Ordinary Illuminating Gas, used directly. The argand and the carcel burners are the best *forms*, though the others can be used (1) without any special shade. A drop-light or table-light should be employed in the same manner as indicated with the kerosene light, without any special shade; (2) with a special shade, similar to that just described. Here the light is used with the same precautions as have been indicated. It may be held in the hands, placed upon a table, or hung to the fixture overhead.

The best form of *stand* is that employed by photographers for a head-rest; only, in place of the horizontal bar against the forked end of which the head of the sitter leans, a gas pipe eighteen inches long is substituted, one end of which is provided with a burner and the other with an India-rubber tube, to be attached to a feeder. It is capable of adjustment to patients either sitting or standing, male or female. It is firm, easily moved, reliable. A similar horizontal gas-bar arrangement may be attached to a table gas light, but it is limited in its application.

The shade, of Russia iron, is supported by the same wings that hold the glass shade in the argand burner and in the carcel burner. Some of the pickets on the brass holder outside of the glass shade may be turned down for the same purpose.

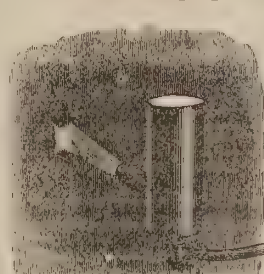


Fig. 10.

Artificial Light Refracted.—In this case the illumination is effected by light thrown into the throat by means of a plane convex lens, of 10 or 14 inches focus, and 1 inch to $2\frac{1}{2}$ inches in diameter. The plane surface is placed next to the light, and the convex towards the mouth to be observed. Such lenses may be adapted to the shade employed in direct artificial light, just described; or they may be applied to a frame-work, as in the case of Dr. Moura Bourillon's pharyngoscope; or they may be adapted to a simple mechanism known as Dr. Morrill Mackenzie's refractor, which is fully described in his late excellent work.

The laryngoscopic lantern of Dr. Oliver, of this city, is of this pattern. It is a very excellent instrument.

Artificial Light Reflected.—This division embraces a large and important portion of the art of laryngoscopy. It is perfectly obvious that, whatever be the superiority in every respect of sunlight, it has the objection that it can be obtained only at certain hours, and then only when the sky is clear. The climate of the United States, in its eastern portion, is generally favorable to clear sunny days, but in other portions of this country, and in most foreign countries, clouds, fogs, mists and haze obscure the heavens so frequently as to render the constant or even occasional use of a ray of sunlight entirely out of the question. Czermak's great credit is that he devised simple reflectors of artificial light which renders laryngoscopy practicable at any time. The principle is that an illuminating ray is thrown into the fauces by reflection upon the laryngscopic mirror, giving reflex visual rays enough for observation. These reflectors, as found in this country, are usually made of glass silvered, about three inches in diameter, and with a focus varying from 10 to 18 inches. Borrowed from Ophthalmoscopy, they are usually perforated in the centre, with a view that the pupil of the eye should observe directly in the axis of the illuminating ray. Here it may be remarked that this method of observation is very well indeed, but it can be entirely dispensed with, leaving the advantage of giving the observer much less to do, and straining his eyes the less.

The reflectors differ more in their mode of mounting than anything else. The simplest method (*a*) known to the writer is that employed by himself. The mirror is attached on a stem $4\frac{1}{2}$ inches long, and $\frac{3}{8}$ inch wide, which has a single hinge joint, capable of movement through one half a circle, yet stiff enough to stay wherever set. A staff about 3 feet long is mounted in a simple block of wood for a base. The upper end is perforated in the long axis for the reception of the stem of the reflector. A stair baluster of mahogany mounted in a turned base of black walnut makes an elegant and cheap stand.

The method of use is very simple. It is placed directly in front of the subject, at about the focal distance, the illumination behind the head of the subject, and the mirror adjusted to throw the light in.

In cases of women whose garments are much in the way, I have used the photographer's head-rest, removing the forked knobbed extremity, and introducing a rod perforated at one end. This is very convenient, as it is capable of adjustment very satisfactorily. The instrument-makers sell an apparatus embodying the same principles, intended to stand upon a table. They must be made heavy enough not to tip over.

Fig. 11.

(*b*) Another method is to mount the reflector upon the forehead of the observer. A strip of metal bent to fit the forehead, perhaps one inch wide, one-eighth thick, and three inches in length is attached to an elastic band large enough to surround the head. The reflector is attached, by means of an universal joint, to the middle of the presenting surface of the metallic strip.

Its application is obvious. In this case the perforation is unnecessary.

(*c*) The reflector placed over the eye. This is accomplished by the means indicated in (*b*), and also preferably by an attachment to a rather heavy frame, such as is used to hold spectacles. The reflector is perforated, and the observation is conducted through the fenestra. This method was suggested by Dr. Semeleder, of Vienna, and once of Mexico; and, under his sanction, has beenvery largely introduced.

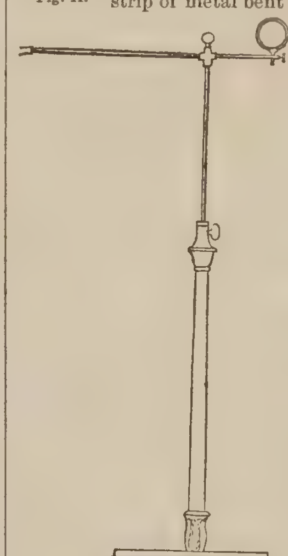


Fig. 12.

(*d*) Another method is the attachment of the reflector to an occipito-frontal band, or a sort of truss iron, extending from the forehead to the occiput, the natural spring of the band holding the instrument in place.

(*e*) Still another mode is to attach the reflector to a shade corresponding to that described under the head of direct artificial light. In this case the mirror is placed at right angles to the axis of the ray of artificial light. Most laryngoscopists employ this method. This combines refraction and reflection. It is the method of Tobold's refractor which is so generally and deservedly used.

(*f*) Yet another way is to place the reflector behind the light; the reflected ray is caught upon the second reflector, and thrown into the mouth. Probably the ingenuity of successive laborers will bring forth other methods of reflection to supersede those already known.

From the perusal of this chapter it is easily seen that direct sunlight, when obtainable, is the light of lights in the exploration of the hidden recesses of the larynx and posterior nares. The great advantages of this light cannot be too strongly impressed upon the reader. It is available to the practitioners in the country, and much simplifies the apparatus. Indeed, with this light, and with the apparatus furnished from a common tinman's shop, laryngoscopy is possible without any special apparatus from outside. A distinguished physician of Boston was called to a patient in the country. Desirous, after his arrival, of viewing the larynx of his patient, and being without his instruments, he acted upon a suggestion previously given him, resorted to a tin-shop with a portion of common broken looking-glass, and in twenty minutes improvised a mirror, with which he made a successful and satisfactory exploration of his patient's larynx.

Magnesium Light.—Owing to its expense and difficult management, it has not been much employed. It gives a lurid, corpse-like aspect which is very unnatural and unpleasant. It is best employed with the direct-light shade.

Oxyhydrogen Light.—This has lately been introduced by an English laryngoscopist. It is questionable whether there is any advantage in such intense illumination: there is a possibility of confusion and dazzling such as is experienced outdoors in a very clear day.

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" " " C.P. bot. 20 lb.	1.80
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" Citric c.b.12,	1.33
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" " . . . . c.v. 5 oz.	.35
" Hydrosulphuric . . c.b.11 lb.	1.00
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" " concent. . . g.s.v.8 oz.	1.02
" Nitrate Mercury . g.s.v.10 oz.	.25
" Phenic, Crystals . . . v.8 oz.	.20
" Phosphoric, 50 p. . c.s.b. 9 lb.	1.41
" " 25 p.c. anhyd. c.b.9 lb.	.71
" Prussic . . U. S. P. g.s.v.7 oz.	.13
" Pyrogallic . . . . . c.v.5 oz.	1.10
" Sulphurous, solu . . c.b.11 lb.	.30
Acid, Valerianic, ... g.s.v.7 oz.	1.33
Ammonia, Spirits, . . 5 lb. c.b.25 lb.	.47
" " Aromatic, 5 lb. 25 lb.	.52
" Borate, ... c.v.4 oz.	.56
" Hydrosulphide (Hydrosulphuret) g.s.b.20 lb.	.80
" Hypophos. . . . c.b.12 lb.	3.63
" " 1 oz. vials, c.s.v.4 oz.	.26
" Iron Alum . . . c.v.4 oz.	.20
Ammonia, Nit. pure, C. P. bulk lb.	.85
" Valerianate, crys. g.s.v. 7 oz.	1.23
Ammonium, Bromide (c.b.8 lb. 2.92) v.4 oz.	.21
" Iodide, ... v.7 oz.	.70
Amyl, Acetate of Oxide, . g.s.b.20 lb.	6.80
Antimony, Sol. Chloride c.s.b.11 lb.	.39
Arsenic, Donovan's Sol. c.s.b. 10 lb.	.40
" Fowler's Sol. c.s.b. 10 lb.	.25
Iodide . . . . 1 oz. vials, g.s.v.7 oz.	.73
Atropia, in ⅛ oz. vials, . . ⅛ oz. ea.	3.75
" Solution, Fleming's, 4 oz. v.	.50
Bismuth, Citrate (Salt), . c.s.v.4 oz.	.66
" Elix. Cal. & Iron (doz. 10) lb.	.90
" Liquid (Ammon.), c.s.b.11 lb.	1.24
" Tannate, ... c.s.v.4 oz.	1.46
Black Drop, ... c.b.10 lb.	6.70
Caffeine, ⅛ oz. vials, . . . ⅛ oz. each	1.37
Calcium, Chloride, sol., c.s.b. 10 lb.	.90
Cantharidal Rubefacient, ... oz.	.45
" Vesicant, ... oz.	.50
" Collodion, ... oz.	.42
Collodion Surg. . . . . doz.	3.50
" " . . . . . . b.10 lb.	1.90
Cerium, Oxalate, 1 oz. vls, c.v. 4 oz.	1.36
Chlorine Water . . . . . . c.b.11 lb.	.64
Chloroform, C. P. . . . . g.s.b.13 lb.	1.87
Cinchona, Sulph., in oz. vls, vial 5 oz.	.55
Codeine, ⅛ oz. vials . . . . . . ⅛ oz.	2.50
Cod-Liver Oil . . . . doz.	8.00
Cod-Liver Oil with Hypophosphites of Lime and Soda combined doz.	8.00
Collodion, Surgical . . . . . . doz.	2.75
" " . . . . c.b.10 lb.	1.65
Creosote . . . . g.s.v.14 lb.	1.21
Dover's Powder . . . . . . c.b.9 lb.	3.66
Egg Preservative (Judd's) . . . doz.	8.00
Elixir Calisaya . . . . doz.	10.00
" " . . 3 Gath. Demi. free	5.50
Elixir Cinch. Iron & Strych. . . . lb.	.90
" Phosph. Iron & Quin. . . . lb.	.90
" " " & Soda, . . . lb.	.90
" Rhei. & Magnesia	1.00
" Pep. Strych. & Bismuth, . . lb.	.90
Ether, Acetic . . . . c.b.10 lb.	.90
" Butyric, conct. . . . c.b.10 lb.	4.40
" Chloric . . . . c.b.10 lb.	.90
" " conct. C. P. . c.b.10 lb.	1.50
" Spirits Nitros, C. P. . c.b.10 lb.	1.15
Ether, Spirits Nitros, FFFF, c.b.10 lb.	50
Ether, Sulphuric, fort., ext., c.b.10 lb.	1.15
Extract Cannabis Indica . *true*, 7 oz.	1.68
" Nux Vomica . . in jars, 7 oz.	.58
Extract of Flesh . . . . oz.	1.10
Ferrated Tincture Bark . . . b.12 lb.	.88
Fusel Oil, purified . . . . . c.b.11 lb.	1.39
Glycerine, chem. pure, *extra*, inclrding white gl. bottle and carton, lb.	1.25
Glycerine, condensed . . g.s.b.15 lb.	.70
" " . . c.s.b.10 lb.	.70
Glycerole Hypophosphites, c.s.b.9 lb.	1.11

Glonoine, Tincture . . . . oz.	.55
Gold, Chloride, 15 grain bots. 24 doz.	8.50
" " and Sodium, 15 gr. bot. 24 doz.	4.25
" " " ⅛ oz v. 30 oz.	11.00
Granville's Lotion, ... c.b.10 lb.	.50
Hoff. Anodyne, ... c.b.10 lb.	50.
" " c.b.10 lb.	.45
Hoffman's Anodyne, officinal U.S.P. c.b.15 lb.	2.85
Hypophosphite of Iron, in 1 oz. vials c.v.4	.56
" Lime, " c.v.4	.26
" Manganese, " c.v.4	.86
" Potassa, " c.v.4	.26
" Soda, " c.v.4	.26
Infusion Opii Deod. . . . c.s.b.15 lb.	4.50
" " per doz.	4.00
Iodide of Lime . . . . v. 7 oz.	.58
" " g.s.v.7 oz.	.53
Iodide of Sodium, 1 oz. vls, c.v. 3 oz.	.52
Iodide of Sulphur . . . . g.s.v.7 oz.	.53
Iodine, resublimed . . . . . b.20 lb.	7.80
Iodine, Carbolate . . sol. c.s.b.11 lb.	1.24
Iodoform . . . . . ⅛ oz. plain vials	5.75
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" " Citrate, c.v.4 oz.	.11
Iron Citrate, readily sol. w.b.15 lb.	1.50
" " " v.4 oz	.16
Iron Citrate and Quinine, w.b. 15 lb.	11.10
" " . . . . c.v.4 oz.	.71
Iron Citrate & Strychnia, c.v. 4 oz.	.71
" Citrate Quinine and Strychine, v. 4 oz.	.81
" " and Manganese, v. 4 oz.	.63
" By Hydrogen . . . . c.b. 11 lb.	2.64
" Hydrated Sesquiox. c.b. 10 lb.	.80
" Hydrocyanate, ... c.v.4 oz.	.83
" Iodide, 1 oz. vials, g.s.v. 7 oz.	.53
" Muriate, Tinct. . . c.s.b. 10 lb.	.50
" Nitrate . . . . . . c.b. 14 lb.	.21
" Perchloride, dry, g.s.v. 7 oz.	.13
" Perchloride, sol. c.s.b. 10 lb.	.42
" Perchloride, sol. 36° B.c.s.10 lb.	.65
" Pernitrate . . . . . c.b. 10 lb.	.45
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" " Mon's Styp., 1 oz. vls. doz.	2.00
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" " Mon's powder, c.b. 16 lbs.	1.64
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" Carb. Proto., pure precip., c.b. 14 lb.	.41
" Carb. Proto. (Vallet's mass.) pots 10 lb.	.50
" " " Saccharine, 1 lb.c.b 14	.76
" Pyrophosphate, ... 4 oz.	.16
" " in scales, w.b. 15 lb.	1.50
" " Elixir . . doz.	10.00
" " " and bark,	10.00
" " and Mang. 14 lb.	2.00
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" Syrup Iod. . . . . g.s.b. 14 lb.	.75
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" " plates, c.v. 4 oz.	.15
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" Protoxide, Solu " "	1.00
Lactucarium, C. P. . . . . oz.	1.10
Lead, Acetate, Chem. pure, c.b.11 lb.	1.14
Lead, Iodide, 1 oz. vials, c.v. 3 oz.	.57
" Sub. Acetate Sol. c.b. 10 lb.	.64
Liebig's Nutritive Food . . . . doz.	2.50
Lime, Carbolate, boxes 10 lbs. ea.	1.50
" " boxes 25 lbs. ea.	2.50
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" " C. P. for sick-room, 2 oz. v. doz.	2.25
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" " " per doz.	3.00
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" Acetate, " 8 v. & box, 30c. oz.	

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" Valerianate, " 8 v. & box, 24 c. oz.	
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" Bi-Meconate Sol. bo. 10c. lbs.	
Narceine . . . . . 10-grain vials, ea.	3.75
Oil of Cubebs, C. P. . . . c. b. 10 lb.	4.15
Paper, Litmus . . . . . sheets, doz.	.85
" Tumeric . . . . " "	.85
Pepsine, pure . . . . oz.	6.50
" Wine . . in wine bots. doz.	33.00
Piperine . . . . c.v.4 oz.	1.56
Platinum, Chloride . . . g.s.v.10 oz.	1.40
Potassa, Acetate . . . . . c.b.15 lb.	.85
" Carbolate . . . . g.s.v.10 oz.	.50
" Chlorate, . . C. P, c.b.20 lb.	1.10
" Liquor . . . . . . c.b.11 lb.	.19
" Permanganate, crys. c.v. 4 oz.	.41
" " solution, ... doz.	6.50
" " " demi. 55 gal.	4.00
" Sulphuret, ... c.b.11 lb.	.39
" Yellow Chromate . c.b. 15 lb.	.85
Potassium, Bromide, . . . c.b.4 oz.	.13
" " . . . . c.b.8 lb.	1.92
" Chloride . . . c.b.20 lb.	1.10
" Iodide . . . . . c.b.9 lb.	5.66
Propylamin, 1 oz. and ½ oz. vials, oz.	2.50
Proteine . . . . ½ oz. vials, oz.	2.75
Quinine, Cincho. . . . . oz. (Discount 15 per cent.)	2.35
Santonine . . . . c.v.4 oz.	1.31
Soda, Bi-Sulphite Liquor . . c.b.9 lb.	.66
Soda, Chloride, Liquid . . . . gall.	.50
" " " . c. b. 11 pt.	.29
" Silicate, (soluble glass) . . lb.	.25
" " Solution, demi. 55 gal.	1.50
Silver, Bromide . . . . c.v.4 oz.	2.76
" Chloride, ... c. v. 4 oz.	1.63
" Cyanide. . . . . . . c. v. 4 oz.	2.66
" Iodide . . . . c. v. 4 oz.	2.66
" Oxide . . . . c. v. 4 oz.	2.11
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" Chloroform, U. S. P. c. b. 10 lb.	.90
" Rosemary . . . . c. b. 10 lb.	.45
Strychnine, Sol. Fleming's, 4 oz. v.	.45
" Valerianate, g. s. v. 8 oz.	5.92
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Sugar of Milk, C. P. . . . c. b. 12 lb.	.75
Syrup of Hypophos. Comp. . doz. (Lime, Soda, Potassa, Iron.)	10.00
Syrup of Citrate Iron . . c. b. 15 lb.	.95
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" Hypophosphite of Iron, . lb.	.90
" Hypophos. of Iron & Quin. lb.	1.20
" Hypophosphite of Iron and Mang. lb.	1.20
" Iodide of Iron and Manganese, lb.	1.20
Syrup of Iodide Manganese . . . lb.	1.20
" " Lime . . . . . . lb.	.85
Syrup of Lime . . . . . . c. b. 11 lb.	1.14
" Phosphates . . . . . . doz.	8.50
" Phosphate Iron, Quinine and Strychnine, (doz. 6.50, small bots.) . . . lb.	1.75
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" Protox. Iron with Iodide of Potass, lb.	.90
" Protox. of Iron with Quinnine, lb.	1.00
" Protox. of Iron with Rhei and Col. lb.	.90
" Pyrophos. of Iron, 1 lb. bots. lb.	.85
" Super Phosp. of Iron 1 lb. bots. lb.	.85
Tin, Solution, Muriate, c.s.b. 10 lb.	.30
" " Ox. Muriate, c.s.b. 10 lb.	.30
Valerianate Ammonia Elix. c.b.15. lb.	1.65
per doz.	3.50
" " and Quin. 4 oz. v. doz.	6.50
Zinc, Chloride, dry, . . . g.s.b.7 oz.	.18
" " Sol. medic. bot. 14 lb.	.26
" Tannate . . . . . c.s.v.4 oz.	.71
" Valerianate . . . ½ oz. vials	1.25

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Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. IV.—No. 2. BOSTON, AUGUST 1, 1869. FITFY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE

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Contents.

Familiar Science.

THE INTERIOR OF THE EARTH.

We all feel a natural curiosity to know what is inside of this round ball we live upon, and to the scientific man the inquiry is one of peculiar interest. Many investigations have been made with a view to settling the question, and many speculations and theories have been the result. The most important of these theories will form the theme of this familiar chat with our readers.

It must be borne in mind from the outset, that the examination of the structure of our globe is necessarily of a very *superficial* character, in the most literal sense of the word. The distance to which we can penetrate the earth is even more insignificant than it seems at first thought. If we represent the earth by an ordinary 12-inch terrestrial globe, the greatest depth to which all natural cavities and artificial borings and minings extend would be shown by a delicate scratch made by the point of a pin on the varnish. If the scratch were more than the *hundredth of an inch* deep, it would be an exaggeration of the reality. We need not wonder, then, that scientific men differ widely in their theories concerning the interior of the big ball whose surface has been scratched so slightly by their most extended explorations.

These theories, setting aside many wild speculations which have no scientific basis to rest upon, are mainly the four following:

First. That the earth consists of a relatively thin crust, filled with molten matter.

Second. That it is nearly or quite solid to the core.

Third. That it has a solid shell and a solid core, with a zone of molten matter between.

Fourth. That it is a solid shell, filled with gaseous matter enormously compressed.

We will take up these theories in turn, stating as briefly and simply as possible the leading arguments which have been urged for and against each of them.

In favor of the first theory—that the earth is a solid shell enclosing a molten mass—we have the following facts:

(1.) The temperature of the earth is found to increase as we go down beneath its surface. This increase varies somewhat in different localities, ranging between one and two degrees Fahrenheit for every one hundred feet. At this rate of increase, the temperature at a depth of forty or fifty miles would be sufficient to melt every known substance.

(2.) Hot springs and artesian wells prove the same increase of heat as we descend into the earth. At Paris, the water from the depth of some 1,800 feet has a temperature of 82°; at Salzworth, in Germany, from a depth of about 2,150 feet, 91°; a hot spring in Arkansas has a temperature of 180°; and many similar instances might be quoted.

(3.) Volcanic phenomena, and especially the pouring forth of streams of lava, which are simply molten rock, are additional proofs of the intense heat which must prevail at great depths.

(4.) The fact that all lavas have essentially the same composition indicates that they probably come from one source, and are not *local* in their origin.

(5.) There are evidences of volcanic action on a most extensive scale in former geological ages.

(6.) The elevation and depression of great areas of the surface of the globe indicate that the crust cannot rest upon an unyielding foundation, but that when one part goes down another goes up. The solid earth is not so solid as it seems, but is slowly heaving up and down in enormous waves. The "everlasting hills" themselves are only the ripples of this world-wide undulation, and even now are rising and falling with the lapse of centuries.

The reasons for the second theory—that the earth is solid to its centre—are purely astronomical.

Experiments made with two pendulums of the same length, one solid and the other a hollow glass ball filled with mercury, show that the latter swings faster. This fact led Prof. Hopkins, of Cambridge (England), to make a series of elaborate mathematical calculations, by which he proved, or *thought* he proved, that certain motions of the earth (known to astronomers as *precession*, *nutation*, etc.) would not be just what they are if the earth were a hollow ball filled with liquid.

It might have been seen, at the outset, that the ball of polished glass filled with the slippery and mobile mercury was not exactly like the earth-ball, with its rough and jagged shell filled with a liquid like molten lava; but this does not appear to have occurred to Hopkins and those who adopted his views. But last summer Delaunay, an eminent astronomer and mathematician, re-examined the problem, showed the fallacy of the premises, and reversed the decision; and also proved *experimentally* that the two spheres—one solid, and the other filled with melted matter—would behave exactly alike.

The astronomical objections to the first theory were thus removed, but these are not the only ones which have been brought forward. In 1849, Thomson asserted, on theoretical grounds, that the melting-point of bodies must rise *under great pressure;* and, in 1854, Hopkins and Bunsen proved this experimentally in the case of certain substances, as spermaceti, wax and sulphur. Hence they inferred that the enormous pressure to which the matter deep down in the earth would be subjected, on account of the weight resting upon it, would render it impossible for it to be melted, even if the temperature were as great as it had been assumed to be.

But further experiments showed that, while the melting-point rises under pressure *up to a certain point*, it then *falls;* so that the matter at great depths, instead of being *less* fusible on account of the superincumbent weight, would be *more* fusible than at the surface. Moreover, experiments on metallic substances gave

wholly different results from those obtained with wax, sulphur, etc.; and, in 1861, Fairbairn proved conclusively, by experiments on much greater pressures than had been tried by Hopkins and Bunsen, that "it is only in the more compressible substances that the law holds true."

If the earth is solid, volcanoes must have a local origin; but, as we have said above, the fact that lava in all parts of the earth is essentially the same compound is against this view. Moreover, recent researches appear to show a *tidal* character in the eruptions of Vesuvius, which would be inconsistent with the theory that their cause is a merely local one.

The third view — that the earth has a solid shell and a solid core, with liquid matter between the two — makes our globe a sort of "gigantic egg." It is a compromise between the first and second theories, and, like most compromises, is not at all satisfactory. It was based on the views of Bunsen and Hopkins, which have been already mentioned; and these, as we have explained, have been completely overthrown by the investigations of Delaunay and others.

The fourth view — that the earth is a shell filled with gases enormously compressed — is based upon purely theoretical grounds. The earth has been *weighed* by several different methods, which it would take too long to explain here, and its mean density is found to be about five and a half times that of water; in other words the earth weighs about five and a half times as much as a globe of water of the same size, or some eight thousand miles in diameter. Now it is argued that, if the interior of the earth were either solid or liquid, and were made up of such substances as we find near the surface, the *condensation by pressure* would inevitably give a greater mean density than five and a half.

But this depends entirely on the assumption that density increases in *direct* ratio to pressure. If this were the case, air, at the depth of eighty miles, would become as dense as water; while water, three hundred and sixty miles down, would have the density of mercury; and clay, which at the surface weighs one hundred and twenty-five pounds the cubic foot, would weigh six *tons* the cubic foot. Hence it is contended that the central mass may consist of gases, which under such enormous pressure could not become more dense than five and a half.

Experiments, however, do not show such unlimited rate of condensation under pressure. It used to be thought that the immense pressure at great depths in the sea would squeeze everything solid, and render all animal life impossible; but deep-sea soundings show that, even at the depth of several miles, there are slimy deposits replete with varied forms of animal life.

Again, there are few gases that can bear a very great pressure without becoming liquid or solid. Under such enormous pressure as this theory assumes to exist deep down in the earth, it is probable that every known gas would be liquefied.

We have given only an outline of the arguments brought to sustain or to demolish these various theories, for our limits permit us to do no more. It will be seen that, on the whole, the balance of argument seems to be in favor of the first and the older theory, that we live on a thin shell, separating us from a heaving sea of liquid fire, of which volcanoes are merely the safety-valves. This theory, moreover, is in harmony with the nebular hypothesis of Laplace, which we have briefly described in a former article (February, 1868), and which is now almost universally accepted as the most simple and satisfactory explanation of the origin and development of our whole solar and stellar system, which can be devised in the present state of our knowledge.

HOW TO TAKE CARE OF THE SICK.

(Continued.)

Before dismissing the subject of ventilating and disinfecting sick-rooms, it is important to remark that the practice of burning rags or sugar, or vaporizing vinegar, to *cover up* unpleasant odors, is a bad practice, and should not be allowed in these days when so many really excellent disinfectants are provided which *destroy*, or chemically change, fetid gases and impure emanations. The smoke, or vaporized particles, of the bodies named, only serve to make filthy odors less perceptible: they exist just the same, and are as potent for evil, as when oppressive and disgusting to the sense of smell. The best purifying agents are chloride of lime, solution of chlorinated soda, sulphate of iron (copperas), and carbolic acid. These are all cheap and easily procured. For purifying sink spouts, cesspools, and vessels used in sick-rooms, any one of these is good, but unquestionably the carbolic acid is the most effective. An aqueous solution holding five per cent of the acid is prepared by the writer, which is very convenient and safe. A spoonful placed in the vessel for receiving the fæcal discharges will completely deodorize and disinfect the contents, and it should always be used in the sick-chamber: vessels of every kind may be cleaned with it, and the clothing carried to the laundry may be sprinkled with the solution. The carbolate of lime, prepared perfectly pure, may be exposed in saucers in sick-rooms with great advantage. In all cases of malignant disease, as diphtheria, scarlet and other fevers, etc., this agent is of the highest consequence. If the odor of carbolic acid is disagreeable to the patient or those in charge, the permanganate of potassa, and the nitrate of lead, supply disinfecting agents entirely odorless and of great power. The attending physician will, however, direct as regards the use of these, and other substances of a like nature.

Dependence should not be placed alone on any chemical purifying agent: there must be *general cleanliness, an abundance* of fresh air and sunshine, in the houses and apartments where the sick are confined.

A house may be filthy where there is not a *pile* of dirt anywhere to be seen. Carpets filled with dust, saturated with grease, etc., uncleansed furniture, old papered walls of years' standing, are just as much sources of impurity to the air as a refuse heap in the cellar. They defile the atmosphere quite as much, and more or less tend to encourage disease. Sweeping with a broom certainly can remove much dirt from a floor, but what it does not sweep out it scatters through the air, making little true improvement. After the dust "settles," the room is usually "dusted," which practically means whipping the dust from one piece of furniture to another with a bunch of feathers. It really seems that the dust had better be left alone, unless it can be *removed* altogether, and the only way to do this is to *wipe* everything with a damp cloth. The floor of a sick-room should really be without a carpet, or, if there is one, it should be well beaten before the patient goes into the room, and again well beaten and aired as soon as the person is done with it.

Few people, never mind who they are, have any idea of the exquisite cleanliness required in the sick-room. The smoky chimney, the dusty furniture, the utensils emptied but once a day, even in the best houses, keep the air of the sick-room constantly dirty. What a person in health "may put up with" for a night only, may really prove a source of suffering, postponement of recovery, or even the hastening of a fatal end, to a sick person who is confined there, perhaps in one posture, for twenty-four hours.

PERSONAL CLEANLINESS IS OF THE HIGHEST IMPORTANCE.

In almost all affections, the function of the skin is more or less disturbed; and, in many important diseases, nature relieves herself almost entirely through the skin. The poisonous materials are merely thrown out by the skin, not carried away from the body by it. Nothing but soap and water can do that. If we permit the sick to remain unwashed, or their clothing to be worn after it has become saturated with perspiration or other excretions, we interfere just as much with the natural process as if a slow poison were given by the mouth; only it is not so rapid perhaps in its operation.

None, but those who have been sick and know from personal experience, can tell how much delicious comfort may be secured after the skin has been carefully washed and properly *dried*. It is not the mere *feeling* of comfort which has been obtained, but it is a sign that the vital powers have been relieved by removing something which was *oppressing* them.

Cleanliness of skin, and ventilation, have much the same end in view,— the removal of noxious materials from the system as rapidly as possible.

The various modes of washing the sick cannot be given here for want of space; besides this, the physician is always ready to give any advice which may be needed. Care should be taken, in all these operations of sponging, washing and cleansing the skin, not to expose too great a surface of the body at once, so as to check the perspiration, which might retard recovery from the disease, or renew the trouble in some other form. In several varieties of diarrhœa, dysentery, etc., when the skin is hard and harsh, the relief to the sick person, from washing with water and using a good deal of soap, is almost beyond calculation. In other cases, sponging with tepid water and soap will be ordered, then tepid water alone, and afterwards properly drying the skin with a soft, warm towel. Sometimes, when water alone is to be used, a little vinegar added to it makes the sponging more refreshing. Of course no one would think of using vinegar at the same time soap is used. Bay rum is very acceptable, also, to the face, neck and hands of sick people, when used after sponging or bathing. If not convenient, some common spirits diluted with water may be substituted.

LIGHT.

A dark house, never mind where it is found, is always an unhealthy one, and usually a dirty one, too. Want of light discourages growth, promotes scrofula, encourages "consumption," and in fact everything else which is bad. It is the unqualified experience of all who have had opportunities of judging, that light is second only in importance to fresh air; and the next worse thing after a close room is a dark one. Many suppose that it is upon the "spirits" only that sunlight acts, and not upon the body. It is just the other way. It does the body good, and the brighter spirits show it. Most persons know that light *purifies* the air; and any one who does not has only to go into a room when the shutters are kept closed, to see what a close and corrupt smell the air has there. It is because the sunlight has not purified the atmosphere.

If possible, the sick-chamber should be the room of the house which has the most sunshine coming into it, and, if the bed can be so placed that the person lying on it can see a good piece of the blue sky, so much the better it will be. If the patient can see out of two windows instead of one, he will be twice as well off. It is found in all hospitals that those rooms facing the sun have fewer deaths, all other things considered, than those which are upon the shady side of the house; and, where statistics have been kept for a period of years, it is found that the average time for recovery is less upon the sunny side than upon the shady side of the building. Not only do fewer patients die, perhaps, in the southernly exposed sides of hospitals, and sick people get well there faster than those on the northern exposure, but it has been shown recently that in asylums, prisons, etc., more of the inmates become ill who are compelled to dwell on the shady side of the building than those who live on the sunny side. Readers know of the sad variety of idiocy (*cretinism*) found on the sides of deep valleys in Switzerland, to which the sun has not free access; while on the other side, more favored by the light, there will, perhaps, be found nothing of the kind.

These facts at once demonstrate the value of sunlight, and it will be a very unwise person, indeed, who neglects to apply his knowledge of its importance to affairs of every-day life.

There are some few diseases — very few, as certain affections of the eye, or of the brain — where a subdued light is required for a time. Even in these, a room on the sunny side of the house, with curtains to the windows, is usually better than one on the shady side.

The first time the reader of this passes through the ward of a hospital, let him observe how almost all the patients lie with their faces turned towards the light. Ask one of them *why* he does so, and he will scarcely be able to give you an answer; but you see he *does* it. The reason is deeper down than his understanding. It is his *nature* to do so, just as it is the nature of plants to always make their way towards the light, and their leaves or flowers to incline towards the sun. While you are looking at the faces turned towards the sunlight, count how many sick you see lying with their faces towards the wall. Among a hundred patients, not more than half a score will be seen avoiding the light.

REST.

It is rarely that the *loudness* of a noise hurts a patient, but it is usually the *kind* of noise that produces an *expectation* upon the mind of something more happening, or being about to happen, — he does not know what it is. The putting up of a scaffold near by perhaps will not trouble him; he knows what that is; while whispering or talking may annoy him beyond endurance. To some, however, any kind of noise is disturbing. A sharp and sudden noise, which is not steady, usually gives more distress than other kinds. Anything which *suddenly* awakens a patient out of his sleep will throw him into greater excitement, and consequently do him more harm, than any continuous sound, however loud it may be.

When a patient sleeps, never under any circumstances let him be awakened, unless you have the sanction of the physician. A sick person who has been asleep but a little while, and is then awakened, very seldom can go to sleep again; while, had he slept a few hours, and then been aroused, he might have fallen asleep again in a few minutes, with but little effort. The reason is something like this: In a sick person, the brain is, as a general thing, weakened and debilitated, like the other parts of the body, and needs strengthening. It gets this by sleep, which is rest. If rest is interrupted a few minutes after it begins, the brain is weakened so much the *more*, and tends the less to sleep. The brain, therefore, not only loses the good of the little sleep it has had, but also its ability to sleep; becoming what physicians call "irritable." If a patient sleeps for a time, the brain becomes that much the stronger, and can the more readily rest the next time.

As before mentioned, no noise which excites a patient's *expectation* should be made in his room. Hence no one should ever speak in low tones near the bed of the patient, or hold a conversation in a room or passage where the sick person can *occasionally* overhear a word. This is absolutely cruel. Such carelessness very frequently induces delirium, especially if the patient is apprehensive about his own condition, and *most sick persons are, no matter how reluctant they may be to admit it.*

While mentioning this matter, there is another thing which occurs to me, and one which is frequently done by a thoughtless nurse. It is when she wishes to make some special inquiry of the physician in regard to the condition of the patient. She usually remains in the room until the physician is ready to leave it, and then calls, with an air of conscious importance, that she has "something particular" to ask him about the patient. The lugubrious countenance assumed by her, to harmonize with her conceptions of importance, sometimes severe enough to make the well feel sick, usually confirms the fears of the sick person to a remarkable degree, indeed, and the nurse returns to a new field of labor in quieting the apprehensions she has cruelly excited. These conversations are usually held just outside of the chamber door, where a word now and then can be overheard by those in the room; and, as intimated, what is overheard, with what is *suspected*, by the poor patient, is frequently the beginning of the worst. Remember always that a cheerful face "doeth good like a medicine."

Unnecessary noises, though slight, disturb a sick person much more than necessary noises of a much greater amount.

A good nurse will see that no door opens with a creak, that no window rattles, and a *very* good one will also see that not even a curtain flaps.

All appearance of *haste* is painful to the sick. The rule is, *do things quickly, and do things quietly.* When you visit the sick, always sit where he can see you without turning his head, and never speak to him from behind, or while he is doing anything. Never divide a sick person's attention by speaking to him while he is in the act of doing anything. Most of the accidents which occur by feeble persons falling, etc., will be found to have happened while the person was attempting to answer some question proposed by a heedless individual.

Never lean against, sit upon, or even shake, the bed in which the sick person lies.

It is the experience of most nurses that, when a person is too sick to read, he is too sick to listen to any one else. If you do read, let it be done slowly, distinctly and steadily. Sick people always prefer having a thing *told* to having it *read* to them.

(*To be continued.*)

"INDUSTRIOUS FLEAS."—A NOVEL EXHIBITION.

Editor Journal of Chemistry:

In your June number is a very interesting article on "The Strength of Man and Insects." Permit me to state a fact that came under my own observation.

In London, Eng., some thirty years ago, was an exhibition of "industrious fleas." I can hardly expect any one who did not witness the marvellous exhibition will credit my statement. Nevertheless, *it is a fact that thousands in America*, doubtless, can certify to as well as myself. Among the wonders exhibited was the following:

A train of Liliputian cars, three, with an engine and tender, made of gold-foil, say one inch high by four long, and three-quarters of an inch wide (one by four and three-quarters), perfect in construction, was propelled by one flea tied to the forward part of the engine. The train moved slowly, but it did move, as could easily be seen by the eye and magnifying glass, say a foot a minute, and the estimated weight of the train was *three thousand* times the weight of the flea dragging it; proving that a flea had the power to propel a body three thousand times its own weight. There were several other fleas attached to the feet of miniature horses and buggies, which ran along the table at different rates of speed, varying in their ages and power. They were exhibited on a circular table, with a circular groove running along the outer edge. When they run into the groove they could not get up the other side, or, if they could, they could not drag up the little vehicles after them.

It may be a matter of interest to say how they were trained. A baby flea was taken immediately after being born, and placed under a watch-glass. Its natural instinct, of course, induced it to jump; in doing this it struck its head with terrific force. After a while it *learned to do anything but jump;* it would walk or run, *but not jump.* After a fortnight's probation, it was *tied* to its work. Some were made to draw teams, some to drive, with little cocked hats tied to them; others again were made into footmen, and stood behind carriages; others, dressed *a la* Napoleon, rode over other fleas, *a la cheval;* others had little steel swords, half an inch long, tied to their wrists, and learned to fence, etc. They were fed at night from the palm of the exhibitor's hand, and put carefully to bed in pill-boxes.

There are doubtless many people in Boston who saw this exhibition, and would willingly corroborate the statements made in this communication.

GEORGE G. W. MORGAN.

SAN FRANCISCO, CAL., June 24, 1869.

THE BLESSINGS OF SUNLIGHT.

There are no blessings which we enjoy here upon this earth — that is, material blessings — but what come to us through the agency of sunlight.

Throughout your whole existence you will find, by following up the same reasoning, that your most trifling act, your most thoughtless movement, has derived its origin from the sun. A blow with the fist, a breath, a sigh, can be exactly estimated in rays of sunshine. Whether you trifle or whether you work, to make such an effort you have been obliged to expend so much strength; and that strength had already been stored in you by the sun, through the agency of a series of transformations. Your clothing is all borrowed from the sun. It is he who has spun every thread of your linen, and fed every fibre of your cloth and flannel. He either bleaches it snowy white, or dyes it purple and scarlet with indigo and madder. He furnishes leather for useful service, and furs and feathers for finery and parade. He gives you your bedding; whether you repose luxuriously between eider-down and wool, or stretch your weary limbs on straw, chaff, Indian corn husks, seaweed, or on even a naked plank, as is the lot of not a few, it is the sun who gives both the one and the other. And what do we receive from regions where the sun, as it were, is not, — from the immediate neighborhood of either pole? We receive just nothing. We cannot even get to them. The absence of the sun bars our progress with an impenetrable zone of ice and snow.

In like manner, your fine cellars of hock, burgundy, and claret are nothing but bottled sunshine from the banks of the Rhine, the slopes of the Cote d'Or, and the pebbly plain of the Medoc. Your butter and cheese are merely solid forms of sunshine absorbed by the pastures of Holland or Cambridgeshire. Your sugar is crystallized sunshine from Jamaica. Your tea, quinine, coffee and spice are embodiments of solar influences shed on the surfaces of China, Peru and the Indian Archipelago. It is the sun's action which sends you to sleep in opium, poisons you in strychnine, and cures in decoctions of tonic herbs. You taste the sun in your sauces, eat him in your meats, and drink him even in your simplest beverage, — water. Without the sun, no blood could flow in your veins; your whole corporeal vitality, your very bodily life, is the result of the overflowings of his bounty.

Nor is this all we owe to our great central luminary. The physical forces with which we are acquainted, — heat, light, electricity, magnetism, chemical affinity, and motion, — dancing their magic round, and alternately assuming each other's form and action, are now believed in all probability to be one in their common birth and origin, — are direct emanations from the sun.

But how grand and beautiful is the theory that *all* material blessings here below come to us entirely and alone from the sun! Its simplicity and unity are completely consistent with the attributes of the Maker. Given motion, and given matter, all the rest follows as an inevitable consequence. All nature, from the simplest fact to the most complex phenomenon, is nothing but a work of destruction or reconstruction, a displacement of force from one point to another, according to laws which are absolutely general.

Arts.

PROFESSOR SANDERS ON GAS PRODUCTION.

We have received a second note from Professor Sanders, in which he expresses the fullest confidence in his ability to furnish a mixture of highly combustible gases (hydrogen and carbonic oxide) at from ten to fifteen cents the 1,000 cubic feet. He says:

"I feel myself again justified in venturing my former assertion, that I can supply a mixture of hydrogen and carbonic oxide gases at a cost of from ten to fifteen cents the 1,000 cubic feet. But this I assert after having only made about 100,000 feet of the gas by this process. Perhaps a more extended experience may modify my assertion, by the addition of five or six cents more to each 1,000 feet of the gas, but certainly not more than this. I have in this city, at No. 276 West Street, a furnace in operation for the production of the steam-gas. As the public will feel an interest in this matter, I think it would not be irrelevant to give a brief description of

the apparatus and its *modus operandi.* I have a furnace made of thin boiler-iron, and lined within with fire-clay tiles. One foot from the bottom of this furnace (which is five feet high) I have the grate. This furnace may be built entirely of common bricks, if necessary, as the best guarantee in the decomposition of the steam, if not very intense. To produce this gas is the simplest of all things. Steam, at seventy or eighty pounds pressure, is allowed to enter below the grate. It passes up through the grate, and, in passing through the furnace (filled with ignited coke), it is, of course, decomposed, being converted into carbonic oxide and hydrogen. I find also that there is likewise a little, light carburetted hydrogen produced. The furnace has a large opening at top, fitted by a slide, to enable the products of the combustion of the coke, as it is being brought up to a red-heat, to pass off into the air. This latter is produced by a fan-blower. This little furnace holds one and a half bushels of coke. If the steam is of a very high pressure (or is very dry), it does not cool down the coke, but this will happen if it be of low pressure, or wet steam. It is really wonderful what a vast volume of gas this little furnace will deliver! My gasometer holds one hundred and twenty-five cubic feet. I can fill it while I hold my breath.

Experiments extended through all last winter to the present time, have demonstrated that this is the cheapest permanent gas that we can get; and that its cost will fill the great desideratum sought, — a cheap gas for heating purposes. I predict, as you have done, that the time will come (and very soon, too) when heating-gas companies will deliver cheap heating-gas to the public, as some gas companies do now their illuminating gas. This will be verified, perhaps before the present year is gone by.

Very respectfully,

J. Milton Sanders.

New York, June 30, 1869.

From the brief description of the method used by Professor Sanders, as presented above, we fear he has fallen into the error which has proved so disastrous to many former inventors and enthusiasts. We do not learn in what respect it differs from the well-known method of decomposing steam as practised in France several years ago, and which was so fully tried in this city in 1863. A gentleman of our acquaintance expended (contrary to our advice) $50,000 in trying experiments like those described in the above note, and yet he failed utterly. There were found to be practical difficulties in the way, which were insurmountable. These difficulties are not all simply mechanical, but relate to the theory of the process, which chemists ought to well understand.

COOKING WITHOUT FIRE.

At the Paris Exhibition in 1867 a curious box was exhibited in the Norwegian department, which cooked food most admirably after the supply of heat was suspended. This box is doubtless one of great utility, and we are surprised that they have not been supplied in this market by some of our enterprising, ingenious artisans. If carefully made, and afforded at reasonable prices, they would meet with a large sale. Any one almost can make the box after the following directions:

Take a box a foot square, line it with successive layers of felt, leaving a round space in the centre large enough to hold the kettle customarily used for cooking food. Have a thick cap to cover up the kettle after it is introduced, so that is in the middle of the box, surrounded by a thick layer of a non-conducting material. When it is required to boil meat, it is only necessary to heat the kettle for a few minutes up to the required temperature, and then to put it into the snug place prepared for it. Here the cooking will go on by itself as long as may be desirable up to certain limits, and the meat will remain warm for five or six hours. By having a series of these boxes, the dinner can be prepared at no expense save the original cost of starting the fire. A little experience will enable the cook to determine the length of time to leave the kettles in the boxes. It is easy to be inferred that the same arrangement will serve to keep ice-cream from melting, or substances from growing warm which have been previously cooled in ice. The value of the felted boxes from a sanitary point of view is to be found in the possibility of providing poor mechanics and laborers with warm food. By portable contrivances it will be easy to keep food warm for some hours, and the advantages to poor workmen cannot be overestimated. To the rich it also insures thoroughly cooked food, while even by them the economy will not be despised.

BISULPHIDE OF CARBON DEODORIZED.

The important uses of bisulphide of carbon in the arts are well known; but its unpleasant odor has been a great drawback to its use in many processes. A process has lately been devised in France for removing this odor. The bisulphide is washed several times with distilled water, and is then transferred to a large retort containing lime. After twenty-four hours' contact with the lime, it is distilled, and received in a flask partly filled with copper turnings (previously roasted to remove all fatty matter, and afterwards reduced by hydrogen), when all odor, except a faint ethereal one, will have been taken away. The lime becomes highly colored.

By the aid of this deodorized bisulphide, Millon and Commaille have succeeded in separating the perfume of milk, and have even detected in it the odor of particular flowers (*Smyrnium olusatrum*, for example) which had been eaten by the cow.

Bleaching Soap. — This is a soda soap prepared according to the excellent prescription of the Prussian pharmacopœia, which prescription has been copied in almost all other works of the kind. The soap is separated by common salt, and after this one-fourth of its weight of sulphite of soda is added, which has been previously made into a homogeneous paste by means of a little water; the soap is next dried in the usual manner. In order to apply this soap, chiefly intended for the bleaching of straw hats, but perfectly fit for application to silk and wool, it is dissolved in its own weight of cold water, and to every two pounds of soap half an ounce of liquid ammonia is added. As soon as the mass has assumed a gelatinous aspect, one part thereof is dissolved in eight parts of warm water. The materials which it is desired to bleach are washed and scrubbed by means of a brush in these soap-suds; while yet moist, the materials are placed in acidulated water (twenty-five parts of water and one and a half hydrochloric acid), left in this liquid for two hours, and then well washed, and rinsed with pure cold water, and dried. This soap is very largely and successfully used in Russia, and was first prepared in that country by Dr. Werner. — *Pharm. Zeitschr, f. Russl.*

Ineradicable Writing. — A French technical paper, specially devoted to the art and science of paper manufacture, states that any alterations or falsifications of writings in ordinary ink may be rendered impossible by passing the paper upon which it is intended to write through a solution of one milligram (0.01543 English grain) of gallic acid in as much pure distilled water as will fill to a moderate depth an ordinary soup-plate. After the paper thus prepared has become thoroughly dry, it may be used as ordinary paper for writing, but any attempt made to alter, falsify, or change anything written thereon, will be left perfectly visible, and may thus be readily detected.

New Marking-Ink for Linen. — M. Kuhr recommends the following preparation: One part of hypophosphite of soda and two parts of gum arabic are dissolved in sixteen parts of distilled water. The tissue, linen or cotton to be marked is thoroughly moistened with liquid, and then left to dry. After having become well dried, the following liquid, composed of one part of nitrate of silver, and six parts of gum dissolved in six parts of distilled water, is used as marking-ink with a quill pen. The mixtures here described are stated to yield an indelible and very deep black-colored ink.

New Mode of Producing Oxygen. — Messrs. Montmagnon and Delaire produce oxygen from the atmosphere by means of charcoal and water, or by saline solutions. They state that 100 litres of fresh charcoal, when exposed to atmospheric air, will absorb 925 litres of oxygen and only 705 litres nitrogen. If the charcoal so saturated with gas is then saturated with water there will be expelled 650 litres of nitrogen and only 350 litres of oxygen. Thus 575 litres of oxygen and only 45 litres of nitrogen are left in the charcoal. These gases they remove by the means of an air pump, when the charcoal is again ready to absorb oxygen and nitrogen from the air.

Agriculture.

BIRDS AND FRUIT.

Editor Journal of Chemistry:

I see by your *Journal* and others that the birds get more than their share of the cherries. Perhaps the little songsters believe the old adage, that "fair exchange is no robbery," music being subject to the laws of traffic as well as fruit. But, if the high price of fruit in the market is chargeable to the voracity of the birds, I would like to have horticulturists try the following experiment for holding them in check, and divide their savings with consumers who have to pay for their cherries in hard-earned scrip.

Issue proposals to the boys to procure the skins of all the stray cats that make night hideous with their music (?), and have them stuffed with some light material, and placed among the branches of cherry-trees, vines, etc. Cheap imitations, made of black cloth, with glass eyes, answer a good purpose.

E. Fairfield.

Portland, June 15.

A Curious Melon. — The wonders pertaining to organized structures are not confined to animals, but there are many plants whose form, instincts and capabilities are most curious and interesting. In a tract of country in the southwestern part of Africa, distinguished for its dry but rich soil, a gigantic perennial melon has been discovered, which is a most delicious, wholesome fruit, and which is largely consumed by the native inhabitants as food. In order that this melon may flourish, it is necessary that it should strike its roots down through the sand *thirty* feet to reach permanent moisture. This it does, and grows in great luxuriance where all else is shrivelled and parched by heat. But this is not all. If it were simply a huge melon, with smooth and delicate skin, every one would be destroyed by wild beasts before half matured. To prevent this, nature has armed its outer rind with a covering of long, sharp, terrible thorns, which so lacerate the mouths and noses of animals that they are glad to leave them alone in all their tempting freshness. Man, with his hands and sharp knives, finds little difficulty in opening the luscious fruit. The natives have no necessity for putting fences about their melon patches, for the plants are self-protective.

Black Knot in Plum-Trees. — It is generally supposed that the black, ugly excrescences found on the limbs of the plum and cherry, and which are now beginning to appear upon some other kinds of fruit-trees, are caused by an insect which perforates the bark, deposits ova, and thus produces a diseased condition called the black knot. Dr. Michener, of Chester, Pa., writes to the *Philadelphia Medical and Surgical Reporter* that this notion is not correct; that the black knot is a parasitic cryptogamous plant belonging to the class fungi, and that it is propagated by *spores* in the same way that all fungoid growths are produced. We believe this statement to be true. The idea that they are produced by insects has arisen from the fact that flies often penetrate into the old, decayed knots, and the larvæ are found there. Destroying the ova or flies does not destroy the black knot; they have nothing whatever to do in originating or maintaining the trouble. The spores of this peculiar fungus float in the air, lodge on the limbs, vegetate, and in this way the annoying parasite soon destroys vast numbers of fruit-trees. No application of whale-oil soap, petroleum, or any other substance, will arrest the growth. By cutting off the excrescences with a sharp knife, a few years of life may be afforded to some trees, but it hardly repays for the trouble. In the war against fungi, no matter what class or order we combat, human skill and science are powerless. If it comes in the form of *rust* upon our wheat, or *smut* upon our corn, or *black knot* upon our plum-trees, we can only look on and see the ruin progress; we can do nothing to avert it.

Value of the Journal to Farmers.—We do not often copy the many pleasant remarks made concerning us by the agricultural press, but the following from *The People*, a large and ably conducted journal published at Concord, N. H., is so hearty and generous in its praise, we are constrained to print it:

"The *Boston Journal of Chemistry*, edited by Dr. Jas. R. Nichols, is published monthly at Boston, at the low price of fifty cents a year. The fourth volume commences with the next number. We have not seen a single number of it but what contained in its agricultural department reliable information of many more times value to any farmer than its cost for the whole year. It treats upon the very subjects upon which farmers need information most. Fifty cents might be expended to better advantage than by subscribing for the *Journal*, but we don't know how."

Tomatoes. —Hull states that his mode of managing tomatoes was to run a knife uncer the plants when they are two or three inches high, so as to cut off the tap-root. This he regards as equal to one transplanting. Some days afterwards he removed the plants, and in a few days more he root-pruned them. They are again transplanted and again root-pruned, —the object being to bring the roots into a compact mass, so as to receive but little check when finally set out. This object is assisted by lifting up with a trowel, and allowing them to fall back. The sash is removed two or three weeks previously, to harden them. During this time, the tops are kept pinched back to about ten inches. When set in the field, they are always tied to stakes, —which saves half the labor of cultivation, keeps the fruit clean, prevents injury to the vines, and facilitates gathering. —*Country Gentleman.*

Lima Beans.—A correspondent of the *Rural New-Yorker* recommends the following method of raising Lima beans: "Take an ordinary nail-keg, as near water-tight as possible, bore quarter-inch holes in every third stave an inch from the bottom. Spade and pulverize thoroughly a circle of ground three feet in diameter. Place the keg in the centre, filled nearly full of good stable-manure, well pounded in; plant the beans end downwards, two inches deep, eight inches apart, and as many inches from the keg, all around it; pour on a pail of water, or as much as the manure will absorb, which may be repeated once a week in dry weather. Place five or six poles a foot from the keg, letting the tops meet over it, and the work is done. Four hills will be found to raise enough for any family. I have adopted the keg and pole cucumbers, and find it works splendidly, as you can pick them without disturbing the vines."

A Novel Method of Catching Mice. —Having on several occasions noticed mice in our seed barrels, I bethought me of some method of how I might trap the little intruders; they having gained entrance by eating through the chime. To kill them with a stick was impracticable, as the little fellows would invariably escape as soon as the lid was raised to any height. I then thought of saturating a piece of cotton with chloroform and throwing it in and then closing the lid. On raising it again in a few minutes, I would find that life had almost or quite departed. Having on one occasion left the piece of cotton in the barrel, on again returning, found three little mice with their heads in close contact with it, and dead. In the evening I saturated another piece and placed it in the barrel, and, on opening it the next morning, to my surprise I found *nine dead mice.*—*Journal of Pharmacy.*

Coal Tar on Shingles.—The *American Agriculturalist* states that coal tar paint causes shingles to decay when applied to roofs. We doubt the correctness of this statement. It seems quite reasonable to suppose that this paint would render shingles in a measure impervious to moisture, and thus prevent decay. We have felt no hesitation in applying it to the roofs of some of our buildings recently.

Boston Journal of Chemistry.

BOSTON, AUGUST 1, 1869.

☞ Any person sending us the names of *three* new subscribers, with full pay enclosed, will be entitled to a *fourth copy of the* JOURNAL *gratis*. For *five* new subscribers, we will send the *petite microscope*. For *eight*. We will send one set of Twenty Small Carpenters' Tools in a Hollow Handle—a most convenient article. For *ten*, we will send a copy of Dr. Nichols' book, "*Chemistry of the Farm and the Sea*," or Messrs. Rolfe and Gillet's "*Handbook of the Stars*," or the "*Handbook of Chemistry*," by the same authors. *These are all beautiful and instructive books.* For *twenty* subscribers, we will send the "*American Naturalist*," published by the Peabody Academy of Science, Salem, for one year. This is one of the most interesting and useful publications in the country, devoted to Natural History. Or a Boy's Tool Chest, 13 inches long, 8 inches wide, 8 inches deep, with a complete set of Carpenters' Tools,—Saw, Plane, etc. (The express charges on the Chest to be paid by the receiver.) For *thirty* subscribers, we will send the *Naturalist* and the "*New England Farmer*," an agricultural paper, published in Boston. For one hundred and twenty-five subscribers, a Silver Case American Watch. Price, $30.

☞ Premiums are allowed only upon *new* subscribers, not on renewals of subscription by old subscribers.

☞ Physicians, students, clerks in drug stores, young lads, etc., who may be induced to solicit subscribers, will find the labor much easier than they anticipate. The interesting character of the *Journal*, together with its low subscription price will lead almost every one of intelligence to become its patron. It is the only journal of practical chemistry published in the United States.

☞ Correspondents are particularly requested to give their names in full, with their Town and State; and, in case of change of residence requiring a corresponding change in the mailing of their papers, to give not only the new address, but the old one also.

☞ Subscribers who are physicians, dentists, or apothecaries will confer a favor by informing us of their profession, as we wish to know accurately the amount of our medical subscription list.

☞ We are unable to supply complete files of either Volume I. or II. of the *Journal*. Of Volume I. (originally issued bi-monthly), Nos. 1, 2, and 3 (July, September and November, 1866), are now out of print. Of Volume II. (monthly), Nos. 1, 3, 6, and 12 (July, September, and December, 1867, and June, 1868), are also out of print. Of the remaining numbers we have a few copies left, which we will forward to our friends at the following prices: Volume I., three numbers, twenty-five cents; Volume II., eight numbers, fifty cents; Volume III., one dollar.

METALS.

Everybody knows that the technical use of a word is often very different from its ordinary application. It means one thing to the scientific man, and quite another thing to people generally. This sometimes leads to misapprehension of the meaning of what we read or hear. One of these words of double signification occurs in a connection where we think we understand it; but it may be that we interpret it in its familiar sense, while it is really used in the less familiar one.

Certain terms much used in chemistry may serve to illustrate what we have said. The word *metal*, for instance, is one which conveys very different meanings to the chemist and to the non-scientific man. The latter associates with it the qualities which are familiar to us in the *true* metals, as they are sometimes called, like iron, lead, tin, copper, gold, and silver. He has no conception of a metal without the metallic lustre, so called, considerable density and tenacity, more or less of malleability or ductility, and the power of conducting heat readily. He is aware that mercury, though liquid, is a metal, and *that* appears to him the one anomalous member of the family. He would be a good deal astonished to be told that the lightest of all known substances, the gas *hydrogen*, is undoubtedly a metal. He would never have thought that a balloon has a metallic filling. But, on account of its chemical behavior, this lightest of gases has long been viewed as virtually a metal; and quite recently its metallic character has been proved beyond a doubt by the English chemist, Graham, who has obtained a definite alloy of hydrogen, and another metal called *palladium*. From the properties of this alloy, he has been able to state pretty definitely what the density, color, etc., of *solid* hydrogen would be; from all which, it appears that it would have some of the familiar metallic properties in a more marked degree than certain solid metals well known to the chemist. For instance, its *density* or *specific gravity*, would be 2; that is, it would weigh twice as much as the same bulk of water. But *lithium*, the lightest of solid elements, is also a metal, with a specific gravity of only .059; that is, it is a little more than half as heavy as water. There are other metals light enough to float on water; as *sodium* and *potassium*. *Calcium* has a specific gravity of only 1.58, and the beautiful metal *magnesium* of 1.75. Aluminium, which is hard, lustrous, and remarkably sonorous, weighs only about two and a half times as much as water; while gold has more than nineteen times, and platinum more than twenty-one times, the density of that liquid.

On the other hand, antimony, bismuth, and arsenic, which have often been classed among metals by chemists, and always reckoned as such popularly, are *not* true metals in their chemical relations, and are now classed by the best writers among the "non-metallic elements."

THE SPECTROSCOPE.

In the last number of the *Journal* we described the spectroscope, and the different classes of spectra with their relations to the luminous bodies giving rise to them. We will now give a brief account of the most important discoveries made by means of this instrument, and especially of its recent revelations concerning the fixed stars and the nebulæ.

Spectrum analysis has led to the discovery of no less than four new metals, whose existence had not been so much as suspected; namely, *cæsium*, *rubidium*, *thallium*, and *indium*. The first two were detected by Bunsen and Kirchhoff, in their examination of the water of a saline spring at Durkheim; the former showing a blue line, and the latter a dark-red line, distinct from those produced by substances previously known. Thallium was discovered by the English chemist, Crookes, while examining the soot of a furnace for burning iron pyrites in the manufacture of sulphuric acid. It shows its presence by a peculiar green line in the spectrum. Indium was detected by Reich and Richter, by certain lines which are found in the indigo portion of the spectrum.

The spectroscope has also given us no little insight into the nature and composition of the photosphere, or luminous envelope of the sun. It has proved that the sun is a solid or liquid body in an *incandescent* or white-hot state, and surrounded by an atmosphere containing the vapors of many metals known to us here on the earth. After what we have said with regard to the different kinds of spectra and their significance, no detailed explanation is necessary to make it clear how this discovery has been made. The solar spectrum is crossed by numerous *dark* lines, called *Fraunhofer's lines*, from their discoverer. Many of these dark lines coincide exactly in position with the *bright* lines produced by certain metals when in the state of luminous vapor. This, as we have seen, is precisely the kind of spectrum which we get when the light of a body has passed through the vapor of other bodies. We infer, therefore, that the sun is an incandescent mass, whose light is partially *absorbed* or quenched by the vapors which surround it; and that among these vapors are such substances as iron, sodium, magnesium, nickel, copper, and zinc. These and several other metals have been identified beyond a doubt by the presence of all their characteristic lines as *dark* lines in the solar spectrum.

The light of the fixed stars has also been analyzed by means of very powerful spectroscopes, and the solar character of these heavenly bodies has thus been demonstrated. A classification of the stars according to the peculiarities of their spectra has been commenced, and

is rapidly becoming perfected. They can nearly all be grouped in a few families, corresponding in the main to the more obvious characteristics of their light. Thus, the *red* stars are found to be related not only by the color of their light, but by the general nature of their photospheres, as indicated by the substances vaporized therein. We may recur to this point at a future day.

Under certain conditions the spectrum of a star may tell us whether the body is *moving* towards or away from the earth. We know that many of the stars are in motion; for, although we call them "fixed," careful measurements prove that their relative positions are not exactly the same from year to year. Their *proper motion*, as it is called, is to our eyes exceedingly small, and the observations of years have been required to detect it; but in the case of many stars it has been accurately measured. It is obvious, however, that, unless the motion is *transverse* to our line of vision, it cannot be detected in this way. If the star is moving directly towards the earth or directly away from the earth, it will appear to be stationary. We might at first suppose that, if the star were thus coming nearer or receding, we should know the fact by the increase or the diminution of its brightness. But the stars are at such immense distances that a motion of many miles in a second, for many years, would make no difference in their brightness which would be detected by the eye, or even by our instruments for measuring the intensity of light. Besides, the transparency of our atmosphere is subject to many variations, and the light of many stars is known to be variable. But here the spectroscope comes to our aid.

Color has been found to depend upon the *length* of the waves of light, or, since they all have the same velocity, upon the *number* which fall upon the eye, or upon a prism, in a second of time. The waves of red light are nearly as long again as those of violet light, but the velocity of both is about 185,000 miles in a second; so that a series of waves of that length enters the eye in a second. Anything which would alter the length of the waves *with relation to the observer*, or, in other words, would cause a larger or smaller number of waves to enter the eye in a second, would cause a change in color. Now, it is obvious that the velocity of the light is virtually altered to an observer who is moving in the direction in which the light is travelling. If he moves *towards* the light, a larger number of waves will enter the eye in a second; if he moves *away* from the light, fewer waves will enter the eye in a second. It does not matter, of course, whether it is the observer or the star that is moving; the effect will be the same.

Certain phenomena of *sound* illustrate the same principle. The pitch of sound depends upon the *rapidity* of the vibrations, or the number reaching the ear in a given time. If the sounding body is rapidly approaching us, the pitch of the sound will rise, since the vibrations will enter the ear faster; while, if it is swiftly receding, the pitch will fall. Every one has probably noticed such changes of pitch in the sound of a locomotive steam-whistle, though he may not have understood the cause.

Light moves so much faster than sound (the latter having a speed of only 1,090 *feet* in a second), that a luminous body must have a velocity of twenty or thirty miles a second, in order that its motion towards us, or away from us, may produce a change of color sufficient to be detected by the most powerful spectroscope.

Our limits will not allow us to give even an outline of the method by which the result has been obtained (though there is nothing about it which could not be explained in a familiar way, if we *had* the space); but changes in the color of Sirius have been detected by the spectroscope, and have been proved beyond a doubt to be due to the fact that its distance from the earth was at the time *increasing* at the rate of about forty-one *miles a second*. This does not, however, give the exact rate at which the star is moving away from us. The earth itself has a velocity of nineteen miles a second, which at the time when these observations were made was in such a direction with reference to Sirius that we must cut the forty-one miles down to thirty. Again, our whole solar system is moving at the rate of four or five miles a second away from Sirius, reducing the thirty miles to about twenty-six. We have also to take into account the *proper motion* of the star, which proves that it is moving not *directly* but *obliquely* away from us. After making this final correction, we come to the conclusion that the true velocity of Sirius is twenty-four miles a second, if we adopt the smaller of the distances which different astronomers have assigned to the star. If we take the distance obtained by other calculations, the velocity will be forty miles a second.

We can add but a word now concerning the other revelations of the spectroscope, of which we intended to give an account. The instrument has done much to give plausibility to the nebular hypothesis by proving that, while many of the nebulæ are made up of multitudes of stars, so distant that their light blends in a mere luminous whiteness which cannot be resolved into separate points, there are many others which are nothing but enormous *masses of luminous gas*, in which we can detect hydrogen and nitrogen by their characteristic lines. It has also begun to tell us something of the nature of *comets*, the physical constitution of which has been as great a mystery to the astronomer as their sudden appearance in the heavens has been to the uneducated. The spectrum of a small comet, which was seen last year, was found to agree exactly with one of a series of spectra of *carbon*, obtained by Mr. Huggins, showing that the comet consisted of carbon in a state of vapor.

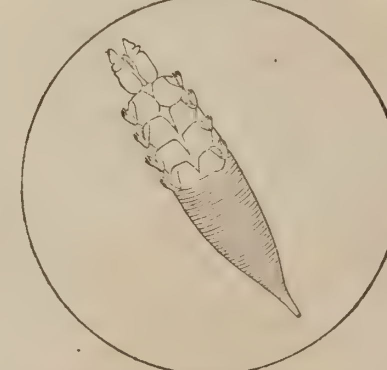
Very recently the spectroscope has been applied to the examination of the spots on the sun, and of those singular protuberances of various forms, and of a reddish light, which have been seen about the edge of the sun at the time of total eclipses. They are invisible at other times, on account of the imperfect transparency of our atmosphere; but their spectra can nevertheless be obtained and examined. We may expect that these and other investigations made with the aid of this wonderful instrument will ere long add largely to what we know about the sun.

ANOTHER PARASITE IN THE PIG.

The occasional presence of trichina in man and the pig is well known, but this community of parasitism is not confined to the trichina. Not long ago a portion of pig's flesh and skin was sent to that most indefatigable microscopist, Dr. J. H. Salisbury, of Cleveland, O., for examination under the supposition that it contained trichinæ. It had small, hardened, whitish nodules buried in the substance of the skin and flesh. Dr. Salisbury found that these masses were conglomerations or colonies of a parasite entirely distinct from the trichina, but well known as a human parasite which inhabits the sebaceous and hair follicles, particularly of the nose. It is called the *steatozoon folliculorum*, synonymes *demodex folliculorum, entozoon folliculorum, simonia folliculorum.*

These animals may be obtained by pressing out the contents of one of the nasal follicles, especially when these appear enlarged, whitish, and exhibit a terminal black spot. Topping found a species of this parasite in the pustules of the skin of a dog affected with the "mange," of which it appears to constitute the essence, as Gruby found that a disease, similar if not identical with the "mange," was produced by inoculating the dog with the human parasite.

The discovery by Dr. Salisbury of the *steatozoon folliculorum* in the pig adds to our knowledge, and the query may be raised whether man may not have derived this parasite from the pig. The fact of the very large number found in the portion examined, compared with their fewness in man, seems to indicate a more favorable nidus in the lower animal. The accompanying cut represents a female steatozoon, drawn from one of the original specimens discovered by Dr. Salisbury. It is magnified about five hundred diameters.



The application of this is to have pork thoroughly cooked, if you would avoid the parasites of the pig. A temperature of 212° Fahr. coagulates albumen. When this is done, the germ and protoplasm are destroyed.

"SUNLIGHT OIL" AND POTATOES.

An enterprising quack out West has discovered a new use for potatoes. He employs them in the manufacture of a new "sunlight oil," the formula for making which, and the "right to use," he is busy in peddling to the good people of Columbus, Ill. One of the "victims" sends us his "family right," for which he paid *two dollars*. We give the recipe for the benefit of our numerous readers:

"To make one gallon, take three quarts of *naphtha*, one and one-half ounces alum, two ounces of cream of tartar, two ounces sal soda, *one pint of potatoes* cut fine, two tablespoonfuls of fine salt, two drachms gum camphor; mix and shake, and the 'oil' is ready to use in two hours."

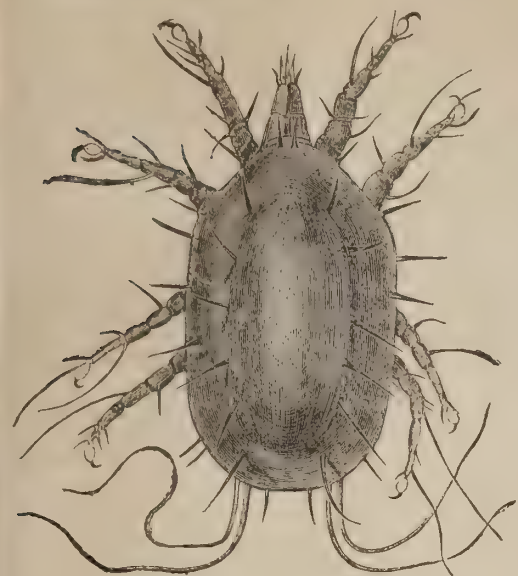
We hardly know which to admire most, the cool impudence of "*M. Wagner & Co.*," who sell the recipes, or the extreme simplicity of purchasers who buy them at two dollars each. Now we can save those desiring to purchase the formula for making "sunlight oil" all this expense and trouble. Our formula is as follows:

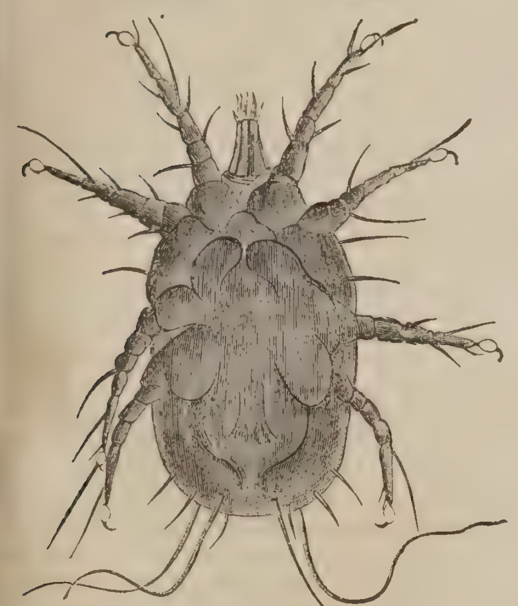
TO MAKE "SUNLIGHT OIL."

Take three quarts of naphtha, one quart of clean sand; mix, and the "oil" will be fit to use instantly. If sand cannot be procured, pebble-stones, or *buckshot*, will answer just as well.

These substances are as readily *soluble* in naphtha as *potatoes*, cream of tartar, alum, or sal soda, and will render the naphtha just as "inexplosive"; and they have the advantage of being capable of being used "over and over again." We most sincerely hope no reader of the *Journal* is deceived by the villains who are travelling over the country selling "rights" to make and use "sunlight" or any other kind of naphtha "oil."

THE SUGAR INSECT.





In the essay, "Chemistry of a Lump of Sugar," in the May number of the *Journal*, some statements were made regarding certain disgusting insects common to raw or unrefined sugars, and the promise was made to present, from microscopic drawings, engravings of the *acarus sacchari* for the benefit of our readers. The promise is redeemed in this number, and two large figures, the first representing the under side and the second the upper side of the insect, are given. The cuts present them accurately, as magnified about two hundred diameters. They are not pleasant creatures to look at, and yet it must be remembered that nearly or quite all the impure or dark-brown sugars sold by grocers are crowded with them. Dr. Hassel, of London, examined seventy-two specimens of these sugars, and found the insects in sixty-nine of them. He estimates that every pound of the cheap Muscovado sugar contains no less than 40,000; and Dr. Barker states, as the result of his investigations, that some specimens contain 268,000 in the pound. They are found in the brown and white Havana sugars, so largely sold and used in every town in the United States, and in some qualities they are very numerous. In wet sugars, containing much molasses, they are often present. They cannot exist in refined sugars, as they feed upon nitrogenous impurities not present in those kinds. The consumption of sugar containing these insects must prove detrimental to health, and therefore the refined sugars should be substituted for the unrefined in families

INTESTINAL WORMS.

We are pleased to notice that the views first presented through the *Journal*, regarding the place of deposit of the ova of *Oxyuris vermicularis* in the alimentary canal, have received the sanction of so distinguished an observer and physician as Prof. Zenker, of Erlangen. He was the first to observe and recognize trichina disease in the living subject, and may be regarded as the highest living authority upon all matters pertaining to parasitic animals in man. In his recent report to the Congress of German Naturalists and Physicians, he states that "the ova of pin-worms *are only set free in the rectum, near the anus*, or after the worms have been discharged from the bowels." Any physician can verify this by taking a piece of silk or linen, and passing it across the external orifice of a child suffering from pin-worms, and examining the surface of the cloth with a lens of thirty or forty diameters. Hundreds of the minute white ova can be seen by the most inexperienced observer. As regards the use of lard or other fats as a remedy, externally applied, we can only say that its entire success is vouched for in numerous cases by physicians and others, and it is worthy of fair, extended trial. The parasite is exceedingly common, and very troublesome and vexatious; and, if the value of so simple and cheap a remedy is fully established, it will indeed prove a boon to thousands of suffering children and adults. It is probable that the application should be thorough, and the surfaces of the spinchter muscle fully anointed.

☞ The *Manufacturer and Builder*, published by Messrs. Western & Co., N. Y., one of our most interesting, substantial and valued exchanges, contained in the June number a prominent paragraph, which, as it relates to statements made in the *Journal*, we copy, and append to it some comments:

"A Poor Prospect for the Year 1900.

"The *Boston Journal of Chemistry* lately gave us a glowing account of the wonders which were to be brought to light ere the year 1900 shall appear as the date of our letters and periodicals. All our old systems of lighting, heating, and producing power are to be modified, or superseded by different and far superior methods. And yet, in a recent number, the editor gravely tells us that '*there is not, nor can there be*, any oil or liquid substance devised, suited to household illumination, which is cheaper, safer or better than well-manufactured kerosene of legal standard.' The italics are his own."

Well, what of it? The statements are perfectly correct and consistent. Is it probable or *possible* that in the future we shall discover or devise any *oils* or *liquid* substances suited to household illumination *cheaper* or *better* than the products of distilled petroleum? We think not. Petroleum is a rich hydro-carbon liquid, a product of nature, stored up in the earth in such vast quantities that, when a way of escape is provided through artificial openings, all our energies are taxed to secure it. Certainly, nothing of *the kind*—that is, no *oils* or *liquid* substances from which light can be obtained—will ever be supplied to us at less cost, or which can prove safer or better. This being true, it does not follow that no improvements will be made in light-producing materials or agencies in *other directions*. We certainly have good grounds for believing that, within the next thirty years, methods of artificial illumination will be discovered so good and cheap that even the petroleum products will fall into disuse. The gaseous bodies and electrical forces offer promising fields for research, and so we conclude that the "prospect for the year 1900" is not very "poor" after all.

SOMETHING NEW.

The cuts with which we illustrate the articles on the sugar insect, and the new insect found in pork, are stereotyped from regular *castings* made by the Metallic Compression Casting Company of this city. It is the first time any journal has ever been illustrated by cuts cast from metal after the new method. Upon examination it will be seen that all the fine lines are brought out with much distinctness, and the cuts are as clear as are afforded by the electrotype process. By this method the most beautiful and perfect castings are rapidly made, and the new art promises to be of the greatest utility. The two principal points of interest in the invention are the use of *fine potters' clay* instead of sand for the mould, and the injection of the molten metal at the *bottom* under *great pressure* by a piston moving in a cylinder. The progress of art and invention was never greater than at the present time, and every month almost we are astonished and delighted with new discoveries brought to our notice.

☞ One of our advertising patrons writes as follows: "I am well satisfied with the advertisement in the *Journal*. It has evidently *gone into every nook and corner* of our country, as we have letters of inquiry from all sections. The advertisement of our Medical College *has certainly reached more physicians* than it could through any other channel." No doubt of this. Every number of the *Journal* is read by *more than ten thousand* M. D.'s who are regular subscribers, residing in every State and territory of the Union, from "Maine to Georgia," and from Alaska to Texas. They, however, constitute *only one class* of our numerous family of readers.

☞ When a subscriber to the *Journal* sits down to write a letter to the editor making numerous inquiries, and soliciting some service which it would require time and thought to render, he must remember that he is not alone in the work. At the same time, ten, twenty, thirty, perhaps fifty, other subscribers in the North, South, East and West, are also writing letters of a like nature, and these communications will reach us in the same mail. However much we may desire to oblige our correspondents and friends, it will be seen at once that it is *impossible* to respond to all, or even one-half, of the letters of inquiry. We have no objection to receiving and examining these letters, so far as time will permit; but our friends must not regard us as wanting in courtesy if no response is made.

BOOK NOTICES.

Spectrum Analysis: Six Lectures delivered in 1868 before the Society of Apothecaries, of London. By Henry E. Roscoe, B. A. F. R. S. London: Macmillan & Co. 1869.

This book, sent to us by the eminent book-publishing house, Macmillan & Co., London, is not only a beautiful specimen of English typography, but of the chromo-lithographic art also. The spectra of the metals of the alkalies and alkaline earths presented, as made from the drawings of Bunsen and Kirchhoff, are wonderful examples of chromo coloring, and are as accurate as they are beautiful. Prof. Roscoe, in the treatise, has endeavored to present elementary principles, and at the same time afford a complete view of the science of spectrum analysis. Of course, a science in such a rapid state of growth can only be kept up with by a careful reading of the foreign and domestic scientific journals, as they appear from month to month: but in this work the general reader will find everything essential to a clear understanding of the subject; and he will find exact copies of Kirchhoff's, Angostrom's, and Huggins's maps, together with the tables of the positions of the dark solar metallic lines, which are of the highest interest. Our readers, who do not care to make extended

study of this new and wonderful science, will find in the articles now appearing in the *Journal* all the prominent facts and results attained up to the present time, presented in a plain and familiar manner.

HANDBOOK OF NATURAL PHILOSOPHY, for School and Home Use. By W. J. ROLFE and J. A. GILLETT, Cambridge. Woolworth, Ainsworth & Co., Boston. 1869.

Messrs. Rolfe and Gillett have done a good service to the youth of our country by placing in their hands treatises upon the natural sciences so clear, accurate and attractive as this "Handbook," and the others which constitute the "Cambridge course" of studies upon the sciences. This series of books is *admirable*, both in matter and illustration. Whilst careful, in example and statement, to maintain the true dignity of science, they have succeeded in throwing around philosophical subjects a charming simplicity and attractiveness; and the language employed is chaste, accurate, comprehensive. The Handbook of Natural Philosophy is well adapted to household reading, and the experiments are easily performed and understood. The publication of such treatises leaves but little to be desired in the way of text-books for schools, or books for family reading, upon the natural and physical sciences.

HALL'S ALPHABET OF GEOLOGY; OR, FIRST LESSONS IN GEOLOGY AND MINERALOGY. By S. R. HALL, LL.D. Boston: Gould & Lincoln. 1868.

This little work is, in some respects, to be commended. It affords to the general reader a summary of the principal facts connected with geological science, and it has the merit of succinctness and plainness of statement. We do not altogether like the plan or arrangement of topics, and fear the book is not sufficiently attractive, or that it will not infuse into the reader a sufficient amount of enthusiasm to lead to attentive study. It affords evidence also that the writer is not a practical geologist, but an amateur who has read some popular works upon geology, and has attempted to compile a book upon the basis of that kind of reading. There are too many works of the kind printed in this prolific book-making age.

WATCH-REPAIRER'S HANDBOOK; being a Complete Guide to Young Beginners in Watch-repairing, etc. By F. KEMLO, Watchmaker. Boston: A. Williams & Co. 1869.

A beautiful and interesting little book, which must be of special service to all interested in watch making and repairing. It presents a history of watch-making, both in Europe and this country, and gives directions how to select and keep in order timekeepers. The elegance of typography, and the beauty and clearness of the illustrations found in this book, reflect great credit upon the publishers.

Medicine and Pharmacy.

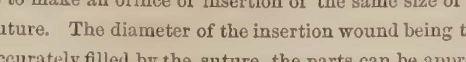
A NEW METALLIC SUTURE.

BY EPHRAIM CUTTER, M. D., BOSTON.

Editor Boston Journal of Chemistry:

Instead of threads of linen, cotton and silk, the surgeon prefers those of gold, silver, copper, or iron, because the former act like setons, and become centres of purulent irritation. A metallic suture absorbs nothing, and is borne well by the most sensitive and delicate tissues. An objection to metallic sutures arises from the fact that they are difficult to introduce. If an ordinary needle is employed, there is an unpleasant hitch at the eye caused by the loop which is formed by the bend of the wire. Three elements form this loop: First, the wire; second, the end of the needle beyond the eye, and between the two parts of the suture; third, the wire again. The same elements are present in the iron metallic suture, but the soft, yielding nature of the silk, cotton, or linen allows of an easy compression of the loop, so that the hitch is practically avoided. Not so in the metallic suture. Its unyielding nature allows of no such compression: hence it must be forced through, tearing its way, and making a hole much larger than is necessary. Hitherto this difficulty has been met by making the needle so large that the loop would be embraced in grooves in the needle, as in Lister, of Glasgow. Another way is to have a hollow cannular needle pointed, the suture lying within the hollow. The difficulty with these methods is that the needle is too large. The ideal, then, is to make an orifice of insertion of the same size of the suture. The diameter of the insertion wound being thus accurately filled by the suture, the parts can be approximated with the greatest precision. To carry out this idea it would only be necessary to sharpen the end of the suture and introduce it. But this is impossible from the necessary flexibility of the material.

It occurred to the writer to *solder* the needle *directly* to the wire. The needle used is the ordinary three-sided one, and its diameter bears a close relation to the diameter of the suture.



CODMAN & SHURTLEFF, BOSTON

It was found difficult to make them, but the instrument makers whose name is on the cut have surmounted the obstacles, and furnish an article of superior work. Silver is the best material for ordinary use. They are made of all sizes, from the large copper sutures for autopsies down. The writer can speak from experience of the satisfactory use of these sutures, which have no hitch. He is permitted to refer to Dr. L. Elsburg, the eminent laryngoscopist, of New York, and Dr. J. Solis Cohen, his worthy confrère, of Philadelphia, for commendation of their use and efficiency.

MAY, 1869.

DIPHTHERIA AND ITS RELATIONS TO MEMBRANOUS CROUP.

At a recent meeting of the Essex North Medical Society of Massachusetts, Dr. John Crowell read a paper upon the above subject, of which a brief abstract is presented below:

In its pathology, diagnosis and principles of treatment, diphtheria may be ranked among the modern diseases. Yet, from the writings of old physicians, we are certain that it existed and prevailed extensively at different times in the 16th, 17th and 18th centuries. It broke out in epidemic form in France in 1818, and was described by Butormeou under the name of diphthérin, in Mémoires communicated to the "Académie Royal de Médicin," in 1821. About the same time also, some cases seem to have occurred in Scotland, and a few in England and in this country. But only slight attention was given to the subject until the outbreak of the epidemic at Boulogne, in January, 1855.

In England, the first epidemic cases were minutely observed in the year 1856, and the attention of the profession was directed to the disease in this country at about the same date.

We speak of the disease in its distinctive and positive character, as it invades the soft parts of the throat with the peculiar grayish-white, leathery exudation, invading the system with its poisonous influence. No portion of the mucous surfaces is exempt from the exudation. It may be formed on abraded cutaneous surfaces, on the conjunctiva, on the vaginal mucous coat, or the lining membrane of the rectum. Under the microscope, the diphtheritic exudations will be found to consist of molecular particles, epithelium, pus cells and blood corpuscles. Fibrillæ are but rarely seen. The *oïdium albicans* may occasionally be detected, but the occurrence of this fungus is only exceptional, and when the membrane has begun to undergo an acid putrefaction.

The most insidious phase assumed by the disease is when the air-passages directly communicating with the lungs become involved, producing the physical signs peculiar to laryngitis, bronchitis, congestion and membranous croup.

Dr. C. cited five cases that had come under his observation where the local signs of diphtheria had disappeared, and the patients were apparently convalescent, when all the physical signs of membranous croup suddenly supervened, resulting in death from asphyxia in each case.

The general principles of treatment were then discussed, reference being made to the plan adopted by Dr. Cox, of Ohio, during the prevalence of the disease in epidemic form in several sections of that State, a few years since. This *sustaining* treatment is now generally adopted by the profession.

When the exudation invades the larynx, producing the croupy complication, the treatment indicated is similar to that adopted in membranous croup. The authority of Dr. George Buchanan, of the Royal Infirmary, Glasgow, was cited in favor of tracheotomy in all cases where it would be justifiable in membranous croup. Dr. B. has saved about one-third of the cases operated on in this form of the disease.

Dr. Bennett, in his valuable "Clinical Practice," strongly advises the adoption of the method of Dr. Horace Green, of New York, of applying topical remedies directly to the fauces, larynx and trachea. Dr. E. Nutson, of Glasgow, and Dr. Bennett, have both employed this method with good results.

Strong solutions of argent. nit. are used, as these act chemically on the mucous, pus, or other albuminous fluids they come in contact with, throw down a copious white precipitate in the form of a molecular membrane, which defends for the time the tender mucous surface or irritated ulcer, and leaves the passage free for the act of respiration.

The conclusions deduced from this argument were,—

1st. "That the diphtheritic exudation, invading the larynx and trachea, produces physical results similar to those of membranous croup."

2d. "That *practically* there is no essential difference in the pathology of the two diseases."

3d. "The principles of treatment in both conditions are identical in their practical application."

In the discussion which followed the reading of this paper, the opinion of Dr. J. R. Nichols was called for in regard to the relative chemical analysis of the membranes formed by the two conditions of disease. Dr. N. remarked that he was not prepared to give an accurate analysis of the diphtheritic exudation, but he felt convinced that it was wholly unlike that of membranous croup,—the former being albuminous, and subject to speedy decomposition; while the latter was fibrinous and more tenacious, and unyielding to the inflammatory action. He did not like the term "diphtheritic croup," as diphtheria and croup were entirely distinct diseases, the former to be classed as *zymotic* in its nature, the latter not.

Dr. Garland contended that the physical signs in the croup complication of diphtheria were unlike those of true croup; that the patient died of exhaustion rather than by asphyxia. According to his observation, the croupy signs in diphtheria ceased before death, whereas in true croup they continue to the last. Croup is a disease peculiar to childhood; diphtheria, in all its phases, attacks all ages. Diphtheria is confined more especially to the poor and destitute, and dependent upon local causes; croup attacks families in the most favored localities, and seems to have no relation to local causes. Dr. Howe was of the opinion that the croup, in diphtheria, was simply accidental, and had no pathological relation to the disease.

Dr. Drinkwater contended that whatever produced the physical phenomena of croup might properly be called croup. He would call the croup of diphtheria membranous croup, although the chemical structure of the two membranes might be unlike.

This view was favored by Drs. Flint and Johnson.

The discussion was continued to some length, and the facts adduced in illustration of the positions were interesting and instructive.

TREATMENT OF LEAD-POISONING. — Dr. William Frank-Smith states (*Lancet*) that, in lead-poisoning, the treatment by iodide of potassium has been less efficacious in his practice than that by sulphuric acid and the sulphates. The formula used by him, which acts, he says, "with remarkable celerity and certainty," is as follows: Sulphate of quinine, sulphate of iron, of each one grain; strychnia, one thirty-sixth of a grain; dilute sulphuric acid, five minims; sulphate of magnesia, one drachm; water, one ounce: three times a day.

SUBSTITUTE FOR DOVER'S POWDER.

A correspondent of the *Medical and Surgical Reporter* remarks as follows of a valuable diaphoretic powder:

The late Dr. Brinsmade, of this city, a short time before his death, substituted sugar for liquorice-root in preparing Tully's powder, very much to his satisfaction, and in his modest way mentioned the fact to a very few of his most intimate friends, from whom it gradually spread. All once using this form continued to do so. The addition of sugar renders this powder readily miscible in water, and the most convenient form for administering small doses of morphia, especially to children and persons of delicate stomachs, within my knowledge. As Dr. Tully's name has become inseparably associated with his modification of Dover's powder, I have ventured to send the annexed formula, and call it

DR. BRINSMADE'S DIAPHORETIC POWDER.

℞. Morphiæ sulph. ʒj.
Camphor,
Cretæ prep.
Saccharum, aa. ʒxx.
Misce (intimately).

Of this, ten grains contain very nearly one-sixth of a grain of morphia; and any person who tries that quantity in a teaspoonful of cold water will at once realize its eligibility over any other anodyne powder.

MILK FOR INFANTS.—There can be no doubt that it was intended that every infant should have the milk of its own mother to nourish it; but sometimes this cannot be had, and then we are compelled to use another kind. Whenever infants are fed with milk, it should always be of the purest kind, and drawn each morning and evening from the cow. When this can be had, it should not be given until it is made more like human milk, by adding a little loaf sugar to it, and about one-third or one-fourth of water. The water should be hot, and the sugar dissolved in it; then slowly pour it into the milk, and allow it to simmer just a little over the fire. If you scorch it in the least, throw it out.

This is the way you do in the morning with the fresh milk, which is to last until evening; and at night you must do so again with the evening's milk, which is to last until morning. A very good vessel to keep the prepared milk in is a stone bottle, such as mead has come in, which should be put into the best order with soap and plenty of hot water. It is better than a tin can, and costs but a few pennies.

If you do not *know* that the cow's milk is of full strength — and you will find very little that is, in a large city like this — it may be better if you add no water at all, or, at least, no more than enough to dissolve the sugar.

What is better than the ordinary milk, such as we get in the stores or out of wagons, is the milk of the common goat, which can always be had, fresh, in this part of the city (the south-western), all the year round, every night and morning, with but little trouble and at small expense. Not only has it these advantages, but it resembles human milk more than does that of the cow, so much so, that it requires no sugar and but little water. Many physicians, who have seen both kinds used, have learned to prefer the milk of the goat to that of the cow. When brought home fresh in the morning or evening, it should be heated to a gentle simmer, cooled and then put away into the stone bottle, closely corked with a nice, clean cork, and kept in a cool, dark cellar.

When an infant is to be fed, do it in this way: have a cup and spoon, which should never be used for any other purpose whatever; scald them in hot water, and then pour into the cup as much of the prepared milk as you think the infant should use at once. If it uses a bottle instead of a cup, you should be *very* careful that it has been thoroughly cleansed and scalded, especially about the neck and nipple. After the wants of the child have been satisfied, what is left in the cup or bottle should be thrown out, especially during the hot weather, and milk fresh from the stone vessel used the next time. The bottle, or cup and spoon, should now be washed in hot water, then scalded and allowed to stand awhile in the sun. If the infant soon needs more food, have another cup and spoon which can be used, and, after they are used, go through the same trouble again with them —if you call it trouble. If you do not give everything this care, the infan may become ill, and you will have a great deal more of a different kind of trouble, and run the risk of losing the little one besides.

If possible, get the milk fresh every morning and evening; and this can be done if you use that of the goat. If at any time you find that the "child's stomach turns," as the saying is, after taking the milk, you may be quite sure that the trouble is *want of neatness*, which "turned" the milk a little before the child swallowed it. A trifling thing about the milk, which the mother's sight or taste cannot detect, may not only make the infant sick, but disturb its health for several days. If the vomiting continues, take a tablespoonful of lime-water and add it to a tablespoonful of cold water, and give it to the infant as a drink, between the times of nursing. If the vomiting still continues, take the child to some physician, and ask him where the trouble is.

Dr. W. K. Bowling, of the *Nashville Journal of Medicine and Surgery*, is one of the few "jolly writers" on the solemn subjects of "physicians' fees," "ingratitude of patients," "delinquent patrons, etc.," and draws "fun" from all such topics, as the bee sucks honey from the freshest clover-blossoms. Read the following description of his method of "charging" his patients:

"'Do you charge anything for this?' said a substantial countryman, eyeing the hieroglyphics upon a prescription paper we had handed him after we had thumped every rib in his body and every vertebra in his backbone, placed the bulb of a thermometer under his tongue and made a note of its revelation, and, with equal care and accuracy, secured the temperature of both axillæ; had placed a drop of his blood under a microscope of three hundred dollars' power, and written down what it said, besides with gaslight, bull's-eye and laryngoscope illuminating his 'interior basin' down to his umbilicus; while all the time our steam atomizer was 'going it' at a white-heat, its alcohol under a consuming fire, and the inevitable and everlasting carbolic acid going to waste, hissing, sighing and singing, and calling to mind the oft-repeated order of poor Barnaby Rudge's raven of 'Jenny put the kettle on, we'll all drink tea,' and all as if the unconscious machine was rejoicing in anticipation of a victim.

"'Charge?' we echoed interrogatively. 'No, sir, oh, no!' And we said it in a voice softened and modulated to the very sweetness of melody. (We had acquired the trick at an old-field la, me, fa, sol singing-school when a boy.) 'Charge?' we repeated with an intonation as dulcet as the musical fall of a dewdrop from the willow into a silver basin, in the atmosphere of a Hannah Morean moon whose light could be sliced by a golden knife. 'No, sir. We formerly did so; but the expense of book-keeping, and the added per cent upon those who paid to secure us against losses from those who didn't, made the charging system (excuse us a moment till we extinguish this lamp),—made the charging system a punishment to the honorable and a blessing to rogues, thus reversing a law of Heaven. No good man could be guilty of so revolting a sin after it was pointed out to him, and of course we quit charging. For our expenditure of skill upon your case this morning, you only have to pay me ten dollars, which, under the abrogated and consequently obsolete rule of charging, would have been twenty. So you see, my dear sir, that you save ten dollars by this new system of charging nothing, and taking pay as we go. As he handed us the X, he said he had no doubt that the new rule was the best for all parties. 'Except the rogues,' said we. 'In course,' he assented, 'except the rogues.'"

A NEW SOURCE OF LEAD-POISONING. — Our attention has been called by Mr. Corner, of Poplar, to some cases of lead-poisoning that have recently occurred at newly-fitted public houses in this district, and that have been traced to morning draughts of the beer that had been standing all night in the leaden pipes of the beer-engines. It is also said that experienced publicans, instead of serving this poisoned beer to their customers, draw it off and return it the brewers, who make them an allowance for it. What becomes of it then? — *Lancet.*

A CURE FOR HEADACHE.

BY GEORGE KENNION, M. D., F. R. C. P., HARROGATE.

The remedy, as I have already observed, is simple; it is the bisulphide of carbon in solution. Its mode of application is no less simple. A small quantity of the solution (about two drachms) is poured upon cotton wool, with which a small, wide-mouthed, glass-stoppered bottle is half filled. This, of course, absorbs the fluid; and, when the remedy has to be used, the mouth of the bottle is to be applied closely (so that none of the volatile vapor may escape) to the temple, or behind the ear, or as near as possible to the seat of pain; and so held for from three to five or six minutes. After it has been applied for a minute or two, a sensation is felt as if several leeches were biting the part; and, after the lapse of two, three, or four minutes more, the smarting and pain become rather severe, but subside almost immediately after the removal of the bottle. It is very seldom that any redness of the skin is produced. The effect of this application, as I have said, is generally immediate. It may be applied, if necessary, three or four times in the day.

The class of headaches in which this remedy is chiefly useful is that which may be grouped under the wide term of "nervous." Thus neuralgic headache, periodic headache, hysterical headache, and even many kinds of dyspeptic headache, are almost invariably relieved by it; and, although the relief of a symptom is a very different affair, of course, from the removal of its cause, yet no one who has witnessed (and who of us has not seen?) the agony and distress occasioned by severe and repeated headache but must rejoice in having the power of affording relief in so prompt and simple a manner. — *British Med. Journal.*

CARBOLIC ACID. — Crystallized carbolic acid becomes *liquid* in warm weather, and solidifies again as winter approaches. The best acid assumes a pinkish hue (which is due to the action of light) by long keeping, but this in no respects renders its use inadmissible for the nicest purpose. We have had thousands of pounds, which as it flowed from the retorts and crystallized was white and beautiful as the freshest snow, change in the course of twenty-four hours so as to have some color. No specimen from the best European makers, that we have seen, is free from this liability. Redistillation, a dozen times repeated, does not always suffice to maintain it in a colorless condition for many months.

SUNSTROKE. — Sunstroke, like hydrophobia, is always a doubtful subject as to what it really is, and how caused. The forms of medical treatment in the case of sunstroke are as varied as the theories advanced of the character of the malady.

In England, such cases are considered as arising from direct over-heating of the blood, and treated accordingly. At home some doctors consider it a poisoning of the blood, and follow a treatment analogous to that in snake-poisoning. Indian doctors believe that sunstroke is occasioned by the direct action of the sun's rays upon the hair, or perhaps upon the *medulla oblongata.* But how is this effect caused? What rays of the sun thus affect? It cannot be the illuminating rays, nor can it be the heat; for firemen, puddlers, glass-blowers, etc., endure much greater heat, and at still greater disadvantage. But in the solar rays we have the "actinic" or chemical rays, and it is the actinic which acts most powerfully on organic nature; and the actinic rays are surpassingly energetic in the tropics. — *Engineering and Mining Journal.*

Dr. A. P. Dutcher recommends, in the *Cincinnati Medical Repository*, for spinal irritation, the application of a succession of small blisters to the spine, and the following prescription:

℞ Ext. cannabis indicæ . . . . ʒ ss
Quiniæ valerian. }
Ext. scutellariæ } . . . . aa ʒ j

M. — Thirty pills. *S.* — One pill every five minutes.

SULPHITE OF SODA IN CHRONIC CYSTITIS. — Mr. L. Willcox, late house-surgeon of King's College Hospital, recommends the use of sulphite in those cases of chronic cystitis where the urine decomposes before it is eliminated. He finds that by the employment of sulphite of soda all the putridity disappears, and the urine becomes clear and colorless. — *The Practitioner, and Canada Med. Jour.*

Dr. Taylor, in the *British Medical Journal*, urges the employment of iron in the form of ammonio-chloride, and not in the form of the muriated tincture, in *dropsy.* The ordinary dose of the perchloride is to be added to a drachm of the liquor ammonia acetatis, this being previously acidulated by a few drops of acetic acid.

A citizen in Brunswick, Me., who earns his living working by the day, has paid for morphia, for the use of his wife, nearly thirteen hundred dollars during the past fourteen years. The woman declares that she cannot live without this stimulus, and her husband once walked twenty-four miles to get her usual supply.

CINCHO-QUININE.

Cincho-quinine results from a series of experiments upon the cinchona barks, undertaken in our laboratory with the view of presenting the medicinal alkaloidal principles in an equally efficient but pleasanter and cheaper form than sulphate of quinine. This desirable end has been accomplished. It is manufactured from a mixture of the finest varieties of the Loxa and Calisaya, or the pale and yellow Peruvian barks, and no substance or ingredient but what exists naturally in these barks enters into its composition. The crystallizable, alkaloidal principles of these barks, upon which their therapeutic influence depends, disassociated from mineral acids, constitute cincho-quinine.

It presents the tonic and febrifuge properties of bark in their most pleasant, direct and natural form, and is adapted to replace sulphate of quinine, and is preferable to that salt from the following considerations:

1st. It exerts the full therapeutic influence of sulphate of quinine, in the same doses, without oppressing the stomach or creating nausea. It does not produce cerebral distress, as sulphate of quinine is apt to do; and, in the large number of cases in which it has been tried, it has been found to produce much less constitutional disturbance.

2d. It has the great advantage of being nearly tasteless. The bitter is very slight, and not unpleasant to the most sensitive, delicate woman or child.

3d. It is less costly than sulphate of quinine. Like the sulphate of quinine, the price will fluctuate with the rise and fall of barks, but we shall supply it at all times at less than the lowest market price of that salt.

Cincho-quinine we present in the form of snow-white crystalline flakes, easily reduced to powder by rubbing, and perfectly soluble in weak acidulated water. It is placed in vials holding each one ounce, of the same size and form of those holding sulphate of quinine. No directions for its employment are needed, as it may be used in the same quantities and forms and for the same affections as sulphate of quinine, so fully understood by every physician.

Any physician in the United States, by enclosing four three-cent stamps to our address, will receive by return post a specimen of cincho-quinine sufficient for satisfactory trial.

JAS. R. NICHOLS & CO.

Sulphate of Morphia.

We are prepared to supply *Sulphate of Morphia* of our brand in its purest form, put up in ⅛ oz. vials, 8 in a box, in any quantity that may be desired. Also all the other alkaloidal and acid principles of opium.

Sulphate of Morphia.	Acetate of Morphia.
Muriate of "	Valerianate of "
Bimeconate of "	Codeia.
Pure Alkaloid.	

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PRICE-CURRENT.

JAMES R. NICHOLS & COMPANY,

Manufacturers of Standard and Special Chemicals,

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JAMES R. NICHOLS.
CHARLES E. BILLINGS.
ALBION R. CLAPP.

[LABORATORY ESTABLISHED 1857.]

JULY 1, 1869.

TERMS, NET CASH.
Bank Draft or P. O. Money-Order to accompany the order.

For the convenience of small dealers, we present below prices of our chemical products, in small quantities, such as are often wanted. For prices in packages, or in large quantities, see our regular monthly Price-List.

PRICES OF VIALS AND BOTTLES.—g.s.v., means glass-stoppered vial, the price of which is 10 cents, more or less; c.v., corked vial, 6 cents, more or less; c.b., corked bottle, 12 cents, more or less; g.s.b., glass-stoppered bottle, 18 cents, more or less. The cost of the bottles and vials as given is to be added to the price of the articles in all cases. In remitting cash for goods, remember to include price of package as per list below.

Acid, Acetic . . . . 5lb. bot. 25 lb.	$0.30
" " glacial, . . . g.s.v.7 oz.	.13
" Benzoic . . . . . (lb.5.25) oz.	.42
" Carbolic, Crystals, C.P. v.8 oz.	.20
" " " C.P. bot. 20 lb.	1.80
" " Sol. extra c.b.8 lb.	.67
" " Com. demi., extra, gal.	3.00
" *Chromic*, 1 oz. vials, g.s.b.7 oz.	.58
" Citric c.b.12,	1.33
" Gallic	
" " . . . . c.v. 5 oz.	.35
" Hydrosulphuric . . c.b.11 lb.	1.00
" Hypophosphorus . . c.v.4 oz.	.29
" Lactic, dilut. . . . g.s.v.8 oz.	.27
" " concent. . . g.s.v.8 oz.	1.02
" Nitrate Mercury . g.s.v.10 oz.	.25
" Phenic, Crystals . . . v.8 oz.	.20
" Phosphoric, 50 p.c. c.s.b. 9 lb.	1.41
" " 25 p.c. anhyd. c.b.9 lb.	.71
" Prussic . . U. S. P. g s.v.7 oz.	.13
" Pyrogallic . . . . . c.v.5 oz.	1.10
" Sulphurous, solu . . c.b.11 lb.	.39
Acid, Valerianic, ... g.s.v.7 oz.	1.33
Ammonia, Spirits, . . 5 lb. c.b.25 lb.	.47
" " Aromatic, 5 lb. 25 lb.	.52
" Borate, ... c.v.4 oz.	.56
" Hydrosulphide (Hydrosulphuret) g.s.b.20 lb.	.80
" Hypophos. . . . c.b.12 lb.	3.63
" " 1 oz. vials, c.s.v.4 oz.	.26
" Iron Alum . . . c.v.4 oz.	.20
Ammonia, Nit. pure, C. P. bulk, lb.	.85
" Valerianate, crys. g.s.v. 7 oz.	1.23
Ammonium, Bromide (c.b.8 lb. 2.92) v.4 oz.	.21
" Iodide, ... v.7 oz.	.70
Amyl, Acetate of Oxide, . g.s.b.20 lb.	6.80
Antimony, Sol. Chloride, c.s.b.11 lb.	.39
Arsenic, Donovan's Sol. c.s.b.10 lb.	.40
" Fowler's Sol. . c.s.b. 10 lb.	.25
" Iodide . 1 oz. vials, g.s.v.7 oz.	.73
Atropia, in ⅛ oz. vials, . . ⅛ oz. ea.	3.75
" Solution, Fleming's, 4 oz. v.	.50
Bismuth, Citrate (Salt), . c.s.v.4 oz.	.66
" Elix. Cal. & Iron (doz. 10) lb.	.90
" Liquid (Ammon.), c.s.b.11 lb.	1.24
" Tannate, ... c.s.v.4 oz.	1.46
Black Drop, ... c b.10 lb.	6.70
Caffeine, ⅛ oz. vials, . . . ⅛ oz. each	1.37
Calcium, Chloride, sol., c.s.b. 10 lb.	.90
Cantharidal Rubefacient, ... oz.	.45
" Vesicant, ... oz.	.50
" Collodion, ... oz.	.42
Cerium, Oxalate, 1 oz. vials, c.v. 4 oz.	1.36
Chlorine Water . . . . . . c.b.11 lb.	.64
Chloroform, C. P. . . . . g.s.b.13 lb.	1.87
Cinchona, Sulph., in oz. vials. v.5 oz.	.55
Codeine, ⅛ oz. vials . . . . . . ⅛ oz.	2.50
Cod-Liver Oil . . . . doz.	8.00
Cod-Liver Oil with Hypophosphites of Lime and Soda combined, doz.	8.00
Collodion, Surg. . . . . doz.	3.50
" " . . . . b.10 lb.	1.90
Collodion, Surgical . . . . . . doz.	2.75
" " . . . . c.b.10 lb.	1 65
Creosote . . . . g.s.v.14 lb.	1.21
Dover's Powder . . . . . . c.b.9 lb.	3.66
Egg Preservative (Judd's) . . . doz.	8.00
Elixir Calisaya . . . . doz.	10.00
" " . . 3 Gal. Demi. free	5.50
Elixir Cinch. Iron & Strych. . . . lb.	.90
" Phosph. Iron & Quin. . . . lb.	.90
" " " & Soda, . . . lb.	.90
" Rhei & Magnesia	1.00
" Pep. Strych. & Bismuth, . . lb.	.90
Ether, Acetic . . . . c.b.10 lb.	.90
" Butyric, conct. . . . c.b.10 lb.	4.40
" Chloric . . . . c.b.10 lb.	.90
" " conct. C. P. . c.b.10 lb.	1.50
" Spirits Nitros, C. P. . c.b.10 lb.	1.15
Ether, Spirits Nitros, FFFF, c b.10 lb.	50
Ether, Sulphuric, fort., ext., c.b.10 lb.	1.15
Extract Cannabis Indica . *true*, 7 oz.	1.68
" Nux Vomica . . in jars, 7 oz.	.58
Extract of Flesh . . . . oz.	1.10
Ferrated Tincture Bark . . . b.12 lb.	.88
Fusel Oil, purified . . . . . c.b.11 lb.	1.39
Glycerine, chem. pure, *extra*, including white gl. bottle and carton, lb.	1.25
Glycerine, condensed . . g.s.b.15 lb.	.70
" " . . c.s.b.10 lb.	.70
Glycerole Hypophosphites, c.s.b.9 lb.	1.11
Glonoine, Tincture . . . . oz.	$0.55
Gold, Chloride, 15 grain bots. 24 doz.	8.50
" " and Sodium, 15 gr. bot. 24 doz.	4.25
" " " ⅛ oz v. 30 oz.	11.00
Granville's Lotion, ... c.b.10 lb.	.50
Hoff. Anodyne, ... c.b.10 lb.	50.
" " c.b.10 lb.	.45
Hoffman's Anodyne, officinal U.S.P. c.b.15 lb.	2.85
Hypophosphite of Iron, in 1 oz. vials c.v.4	.56
" Lime, " c.v.4	.26
" Manganese, " c.v.4	.86
" Potassa, " c.v.4	.26
" Soda, " c.v.4	.26
Infusum Opii Deod. . . . c.s.b.15 lb.	4 50
" " per doz.	4.00
Iodide of Lime . . . . v. 7 oz.	.58
" " g.s.v.7 oz.	.53
Iodide of Sodium, 1 oz. vls. c.v. 3 oz.	.52
Iodide of Sulphur . . . . g.s.v.7 oz.	.53
Iodine, resublimed . . . . . b.20 lb.	7.80
Iodine, Carbolate . . sol. c.s.b.11 lb.	1.24
Iodoform . . . . ⅛ oz. plain vials	5.75
Iron Ammoniated Citrate, very superior, w.b.15 lb.	1.50
" " Citrate, c.v.4 oz.	.11
Iron Citrate, readily sol. w.b.15 lb.	1.50
" " " v.4 oz.	.16
Iron Citrate and Quinine, w.b. 15 lb.	11.10
" " . . . . c.v.4 oz.	.71
Iron Citrate & Strychnia, c.v. 4 oz.	.71
" Citrate Quinine and Strychine, v. 4 oz.	.81
" " and Manganese, v. 4 oz.	.66
" By Hydrogen . . . . c.b. 11 lb.	2.64
" Hydrated Sesquiox. c.b. 10 lb.	.80
" Hydrocyanate, ... c.v.4 oz.	.83
" Iodide, 1 oz. vials, g.s.v. 7 oz.	.53
" Muriate, Tinct. . . c.s.b. 10 lb.	.50
" Nitrate . . . . c.b. 14 lb.	.21
" Perchloride, dry, g.s.v. 7 oz.	.13
" Perchloride, sol. c.s.b. 10 lb.	.42
" Perchloride, sol. 36° B.c.s.10 lb.	.65
" Pernitrate . . . . . c.b. 10 lb.	.45
" Persulphate, Mon's Styp., sol. c.s.b. 10 lb.	.65
" " Mon's Styp., 1 oz. vls. doz.	2.00
" " Mon's pow. 1 oz. vls. doz.	2.25
" " Mon's powder, c.b. 16 lb.	1.64
" Phosphate . . . . . c.b. 12 lb.	.75
" Carb. Proto., pure precip., c.b. 14 lb.	.41
" Carb. Proto. (Vallet's mass.) pots 10 lb.	.50
" " " Saccharine, 1 lb. c.b 14	.76
" Pyrophosphate, ... 4 oz.	.16
" " in scales, w.b. 15 lb.	1.50
" " Elixir . . doz.	10.00
" " " and bark,	10.00
" " and Mang. 14 lb.	2.00
" Sulphuret . . . . . . c.b. 8 lb.	.42
" Syrup Iod. . . . . g.s.b. 14 lb.	.75
" " " in 1 lb. c.b. 10 lb.	.75
" Tart. et Potas., plates, 1 lb. bts. w.b. 15 lb.	1.50
" " plates, c.v. 4 oz.	.15
" Elixir Bark and Solution Protoxide, (per doz. 9.00) per bot.	1.00
" Protoxide, Solu. " "	1.00
Lactucarium, C. P. . . . . oz.	1.10
Lead, Acetate, chem. pure, c.b.11 lb.	1.14
Lead, Iodide, 1 oz. vials, c.v. 3 oz.	.57
" Sub. Acetate Sol. c.b. 10 lb.	.64
Liebig's Nutritive Food . . . . doz.	2.50
Lime, Carbolate, boxes 10 lbs. ea.	1.50
" " boxes 25 lbs. ea.	2.50
" " in bulk, by cask or ton,	
" " C. P. for sick-room, 2 oz. v. doz.	2.25
Lime, Horsford's Sulphite, in cartons, doz.	2.00
Magnesia, Cal. . . . . doz.	4.00
" Sulphite . . . . bot. 11 lb.	1.14
" Soluble Citrate w.g.b.20 lb.	1.80
" " " per doz.	3.00
Manganese, Black Oxide, purified, c.v.4 oz.	.31
Mercury, Bin Iodide, 1oz. vls. c.v.3 oz.	.47
" Proto-Iodide, 1 oz. vls. c.v.3 oz.	.47
Morphia, Sulphate, ⅛ths, 8 v. & box, 30 c. oz.	
" Acetate, " 8 v. & box, 30c. oz.	
Morphia, Muriate, ⅛ths, 8 v. & box, 30 c. oz.	
" Valerianate, " 8 v. & box, 24 c. oz.	
" Pure (Alkaloid), ⅛ths, 8 v. & box, 24 oz.	
" Bi-Meconate Sol. bo. 10c. lb.	
Narceine . . . . 10-grain vials, ea.	$3.75
Oil of Cubebs, C. P. . . . c. b. 10 lb.	4.15
Paper, Litmus . . . . . sheets, doz.	.85
" Tumeric . . . " "	.85
Pepsine, pure . . . . oz.	6.50
" Wine . . in wine bots. doz.	33.00
Piperine . . . . c.v.4 oz.	1.56
Platinum, Chloride . . . g.s.v.10 oz.	1.40
Potassa, Acetate . . . . . c.b.15 lb.	.85
" Carbolate . . . g.s.v.10 oz.	.50
" Chlorate, . . C. P. c.b.20 lb.	1.10
" Liquor . . . . . . c.b.11 lb.	.19
" Permanganate, crys. c.v.4 oz.	.41
" " solution, ... doz.	6.50
" " " demi. 55 gal.	4.00
" Sulphuret, ... c.b.11 lb.	.39
" Yellow Chromate . c.b. 15 lb.	.85
Potassium, Bromide, . . . c.b.4 oz.	.13
" " . . . . c.b.8 lb.	1.92
" Chloride . . . . c.b.20 lb.	1.10
" Iodide . . . . . c.b.9 lb.	5.66
Propylamin, 1 oz. and ½ oz. vials, oz.	2.50
Proteine . . . . . . ½ oz. vials, oz.	2.75
Quinine, Cincho. . . . . oz. (Discount 15 per cent.)	2.35
Santonine . . . . c.v.4 oz.	1.31
Soda, Bi-Sulphite Liquor . . c.b.9 lb.	.66
Soda, Chloride, Liquid . . . . gall.	.50
" " " . . c. b. 11 pt.	.29
" Silicate, (soluble glass) . . lb.	.25
" " Solution, demi. 55 gal.	1.50
Silver, Bromide . . . . . . c.v.4 oz.	2.76
" Chloride, ... c. v. 4 oz.	1.63
" Cyanide . . . . . . c. v. 4 oz.	2.66
" Iodide . . . . c. v. 4 oz.	2.66
" Oxide . . . . c. v. 4 oz.	2.11
Spirits Lavender, Comp. c. b. 10 lb.	.50
" Chloroform, U. S. P. c. b. 10 lb.	.90
" Rosemary . . . . c. b. 10 lb.	.45
Strychnine, Sol. Fleming's, 4 oz. v.	.45
" Valerianate, g. s. v. 8 oz.	5.92
" " Elixir . doz.	5.00
Styptic Colloid . . 1 oz. g. s. v. doz.	5.50
Sugar of Milk, C. P. . . . c. b. 12 lb.	.75
Syrup of Hypophos. Comp. . doz. (Lime, Soda, Potassa, Iron.)	10.00
Syrup of Citrate Iron . . c. b. 15 lb.	.95
" Hypophosp. of Lime and Soda, (Churchill's) doz.	10.00
" Hypophosphite Mang. . lb.	1.20
" Hypophosphite of Iron, . lb.	.90
" Hypophos. of Iron & Quin. lb.	1.20
" Hypophosphite of Iron and Mang. lb.	1.20
" Iodide of Iron and Manganese, lb.	1.20
Syrup of Iodide Manganese . . . lb.	1.20
" " Lime . . . . . lb.	.85
Syrup of Lime . . . . . . c. b. 11 lb.	1.14
" Phosphates . . . . . doz.	8.50
" Phosphate Iron, Quinine and Strychnine, (doz. 6.50, small bots.) . . lb.	1.75
" Protox. Iron with Iodide of Lime . . . . . . lb.	.85
" Protox. Iron with Iodide of Potassa, lb.	.90
" Protox. of Iron with Quinine, lb.	1.00
" Protox. of Iron with Rhei and Col. lb.	.90
" Pyrophos. of Iron, 1 lb. bots. lb.	.85
" Super Phosp. of Iron 1 lb. bots. lb.	.85
Tin, Solution, Muriate, c.s.b. 10 lb.	.30
" " Ox. Muriate, c.s.b. 10 lb.	.30
Valerianate Ammonia Elix. c.b.15 lb.	1.65
per doz.	3.50
" " and Quin. 4 oz. v. doz.	6.50
Zinc, Chloride, dry, . . . g.s.b.7 oz.	.18
" " Sol. medic. bot. 14 lb.	.26
" Tannate . . . . . c.s.v.4 oz.	.71
" Valerianate . . . ⅛ oz. vials	1.25

Also, an assortment of Officinal Standard Fluid Extracts.

BOSTON JOURNAL
OF
CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. IV.—No. 3. BOSTON, SEPTEMBER 1, 1869. [FIFTY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE
Boston Journal of Chemistry
IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY
JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.
RECEIPTS.—A recipted bill will be sent by return mail to any subscriber who will enclose with his subscription a three-cent postage stamp, for return postage.
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Contents.

Familiar Science.

ADULTERATIONS OF FOOD AND MEDICINES.

As often as once in five or six years there is a general "awakening" upon the subject of the gross frauds practised in food, medicines, etc., and the newspapers and medical journals are filled with "exposures" and denunciations which frighten everybody but those engaged in the business of sophisticating and vending these substances. We are just now recovering from a popular spasm of this character, and hence may expect a season of "quiet" for the next few years. Unless consumers awake to a sense of their duty, the lard manufacturers will go on mixing water and alkalies with our lard; the grocers will sand our sugar; the spice-grinders will mix turmeric, logwood, and "fine feed" with our ginger, pepper, and allspice; our vinegar will be manufactured from oil of vitriol; and our "cream of tartar" will be found innocent of a single trace of true bi-tartrate of potassa. In medicine, the same mixing, extending, coloring, or exhausting processes will go on as heretofore, only, as new methods of fraud are developed, the sophistications will be more general and more cunning in their nature. Rhubarb, opium, and many of the valuable gums will be exhausted of their active medicinal principles before being offered for sale, or made up wholly from extraneous bodies. The "solid extracts" will continue to be manufactured from "soot and molasses"; and "salts" from sulphate of soda, chloride of sodium and gypsum.

It is difficult to decide which is the most reprehensible, the falsification and poisoning of foods, or the rendering inert and dangerous medicinal substances. If illness results from the bad character of foods and drinks, the remedies are rendered powerless to restore or eliminate poisons, and thus our condition is helpless indeed. At a future time we shall have some remarks to make regarding adulteration in medicinal substances. As regards foods, or condiments used in connection with them, we have to say, that adulterations will in a large measure cease when consumers *earnestly and determinedly demand pure articles.* A large proportion of the purchasers of groceries for family use never inquire of the dealer regarding the *purity* of the articles supplied. In cities, most families consume what dealers are pleased to furnish, asking no questions, or manifesting no anxiety as to quality. In the country, the matter of *cheapness* exerts a preponderating influence with the purchaser. If an article is only *cheap*, it meets with a ready sale, and thus the dealer finds his account in vending miserable, adulterated, cheap merchandise. If every housekeeper would *demand* of his grocer pure spices, sugars, cream of tartar, flour, lard, butter, etc., etc., he would fare much better than he now does, especially if the demand were intelligently and *persistently* made. Large dealers and small ones, almost always *know* regarding the purity of their articles. The impure are usually purchased with the understanding that they are impure. Wholesale grocers often carry on the business of mixing and adulterating in connection with vending, and they make no secret of it with their customers. There are, however, adulterators by profession, who do a large business with dealers, supplying them with the grossest and most attenuated mixtures at low prices. It is *competition* in trade which primarily causes much of the wretched adulterating business carried on; and the fires of this competition are fed by *consumers*, who bestow their patronage upon those dealers who sell the cheapest, apparently not caring for the matter of quality. Let every consumer say to his grocer, "Sir, I wish to be supplied with pure articles. I shall watch you closely, and, if you deceive me, I shall not only withdraw my patronage, but advertise you among my friends. I am willing to pay a fair price for everything I need, but never bring to my house a factitious article." This would be an emphatic admonition quite likely to be heeded by the small dealers, and it would immediately react upon wholesale dealers, and then again upon the professional adulterators. *Demand* pure articles, *insist* upon having them, and the effect will be most salutary. We do not submit these observations as indicating a perfect cure for the evil complained of, but the course recommended will aid greatly in mitigating it. Legislative enactments can never bring about a reform; at least, it is safe to say that, thus far, they have utterly failed, both in this country and in Europe. The "scoldings" and "exposures" of the scientific and popular press have proved equally futile; and hence it is clear, if the evil is ever in any degree abated, it must be by the action of consumers themselves.

HOW TO TAKE CARE OF THE SICK.

(CONTINUED.)

THE FOOD THEY REQUIRE.

Florence Nightingale says on this subject that one of the most common errors among women in charge of the sick respecting sick diet is the belief that beef-tea is the most *nutritive* of all articles. "Now, just try," she says, "and boil down a pound of beef into beef-tea, evaporate the water, and see what is left of your beef. You will find that there is barely a teaspoonful of solid nourishment to half a pint of water in beef-tea." There is, nevertheless, a certain nutritive value in it, as there is in tea; we do not know what. It may safely be given in almost any inflammatory disease, but it should never be alone depended upon, especially where much nourishment is needed. Again, it is an ever-ready saying, "that an egg is equivalent to a pound of meat," whereas it is not so at all. Much trouble has occurred from this mistaken notion. *It is a question whether, weight for weight, eggs are equal to beefsteak.* Also, it is seldom noticed with how many patients, particularly of nervous or bilious temperament, eggs disagree. Most puddings made with eggs are distasteful to them in consequence. An egg whipped up with wine is often the only form in which they can take this kind of nourishment. Again, if the patient is able to eat meat, it is supposed that to give him meat is the only thing needful for his recovery; whereas, scorbutic (scurvy) sores have been actually known to appear among sick persons living in the midst

of plenty, which could be traced to no other source than this, viz, that the nurse, depending on meat *alone*, had allowed the patient to be without vegetables for a considerable time, these latter being so badly cooked that he always left them untouched. To all intents and purposes he really had no fresh vegetables at all.

Milk and the preparations from milk are most important articles of food for the sick. Butter is the lightest kind of animal fat, and, though it wants the sugar and some of the other elements which exist in milk, yet it is most valuable both in itself as fat, and in enabling the patient to eat more bread. The reason of it is just this. Animals require in their food an albuminous constituent, a starchy one, and another of fat. The first, or albuminous (the purest form of which is the white of an egg), enters largely into the formation of the human body, the muscles being chiefly composed of it. The second, or starchy component, does not enter into the structure of the body as such, but is converted into sugar during digestion, and has much to do with the formation of the tissues and heat. The oily parts enter largely into the composition of the brain, nerves, and in fact all other portions of the body, and, when broken up and consumed, supply a good portion of the fuel for heat of the body. Besides these three mentioned, which are most conspicuous, there are other substances, as common salt, phosphates, iron, etc. These are supplied through food, but our space will not permit more than a mere reference. All food *must* contain these substances in proportionate quantities. If it does not, the appetite *craves* the one wanted, and, if not properly supplied, the part of the body suffers into which the wanting component enters.

To feel assured of this, if the reader thinks a moment, he will remember that no one likes bread alone, but wants some butter with it which supplies the oily part, and the appetite craves, too, a piece of meat, cheese or an egg, — the albuminous part. We want butter with our rice or potatoes, because rice or potato is almost pure starch, and wanting in fatty matter; so nature says we must *add* the wanting parts.

As all food which properly sustains man must contain these principles, it will be readily seen that those vegetable substances which are composed of but one of them, or even two, cannot *alone* support life. Experience confirms this view. Oils or fat are useful as oils or fat, but cannot supply the place of starch or sugar; nor can starch or sugar supply the place of albumen or flesh.

To obtain all these needful constituents, we must seek a *variety* in our food, and not depend exclusively upon any single one for continued use. There are some apparent exceptions to this rule, as in the case of milk, which we know is capable, under certain circumstances, of sustaining life for a length of time; but the exception is only apparent when we examine into the matter.

Milk has these necessary articles in suitable proportion, more than any other food perhaps in general use. It has the starchy part advanced a step into the shape of sugar, the albuminous part as the cheesy constituent, and the fatty as the creamy element. Hence, milk might be taken as a sort of representative diet, and better adapted to sustain the body in health, or to strengthen it in sickness, than any single article of food.

Flour made from wheat, meal from oats or Indian corn, grits, etc., come next in order perhaps, and stand at the head of the list of all articles of food grown for general consumption. Food of the above description is made up chiefly of starch, some albumen (under the form of gluten) and a certain amount of oil. Hence, bread made of flour, may well be called the "staff of life," because, from containing these elements, it is capable of supporting life by itself for a longer time than any other single article of food, excepting milk, as mentioned above. But, though containing these essential elements of life, yet flour, without the addition of albuminous or oily matter to a certain degree, cannot long *properly* sustain the human body.

If flour cannot nourish the body in a proper manner, it will at once be seen that corn-starch, arrow-root, tapioca and the like, which are nothing but pure forms of starch, made by washing away the oily and glutinous (albuminous) parts, cannot *possibly* be expected, when used alone, to afford more than a *limited* amount of nourishment; not of course as much as food prepared from flour which has *in* it the deficient articles. Not only is flour more nutritive than arrow-root, or any preparation of starch, but it is less liable to ferment, and as a rule it should be preferred whenever it can be used.

Do not misunderstand what is meant. None of these articles, compared with flour, are spoken of as *useless* to the body, but some preparations for the sick must be more useful than others, because they contain *more* of the elements of usefulness, in the shape of albumen, starch, oil, etc.

From what has been previously said, it will be seen that milk, when it agrees with the digestion, may be one of the most valuable articles we have to restore the sick, and, in many long chronic diseases, cream will be found superior even to milk, because of its richness in those parts the system most requires.

It seems to act in the same manner as beef-tea is generally understood to act, and to most it is much easier of digestion than milk. In fact, it seldom disagrees. Cheese is not usually digestible by the sick, but it is good nourishment for repairing waste; and physicians constantly see the sick desiring it, which craving shows how much it is needed by them.

But, if fresh milk is so valuable a food for the sick, the least change or sourness in it makes it of all articles, perhaps, the most injurious; diarrhœa is a common result of fresh milk allowed to become at all sour. The nurse therefore ought to exercise the utmost care in this. Yet, if you consider that the only drop of real nourishment in your patient's tea is the drop of milk, and how much almost all patients depend upon their tea, you will see the great importance of not depriving your patient of this drop of milk. Buttermilk, a totally different thing, is often very useful, especially in fevers.

In laying down rules of diet, by the amounts of "solid nutriment" in different kinds of food, it is constantly lost sight of what the patient requires to repair his waste, what he can take and what he cannot. You cannot diet a patient from a book; you cannot make up the human body as you would make up a prescription, and say so many parts "carboniferous," and so many parts "nitrogenous," will constitute a perfect diet for the patient. The nurse's observation here will materially assist the doctor; the patient's "fancies" will materially assist the nurse. For instance, sugar is one of the most nutritive of all articles, and is particularly recommended in some books. But the vast majority of all patients, young and old, male and female, rich and poor, hospital and private, dislike sweet things. A person may take to sweets when he is ill who dislikes them when he is well; and many fond of them when in health will in sickness leave off everything sweet, even to sugar in tea. Sweet puddings, sweet drinks, are their aversion. The furred tongue almost always likes what is sharp or pungent. Scorbutic (scurvy) patients are an exception; they often crave for sweetmeats and jams.

The desire shown by the sick, and especially by those who are getting well, for acid fruits, as baked apples, cranberries, lemons, etc., should never be disregarded. The important use the acids of fruits play in the body is a long story: so we can only insist upon the importance of regarding these "cravings" wherever found. Sometimes the physician has good reasons for not wishing them given, but as a rule these fruits, properly prepared, may not only be given without injury, but with decided benefit. So, whenever a sick person "craves" such things, be sure to call the physician's attention to it, and ask if you can give them.

Calves-foot jelly is another article of diet in great favor with nurses and friends of the sick. Even if it could be eaten solid, it would not nourish. It is simply the height of folly to take ¼ oz. of gelatine, make it into a certain bulk by dissolving it in water and then to give it to the sick, as if the mere *bulk* represented *nourishment*. It is now known that jelly does not nourish, that it has a tendency to produce diarrhœa, and to trust to it to repair the waste of a diseased constitution is simply to starve the sick under the guise of feeding them. If 100 spoonfuls of jelly were given in the course of the day, you would have given one spoonful of gelatine, which spoonful has scarcely any nutritive power whatever.

And, nevertheless, gelatine contains a large quantity of nitrogen, which is one of the most important elements in nutrition. On the other hand, beef-tea may be chosen as an illustration of great nutritive power, co-existing with a very small amount of solid nitrogenous matter.

Dr. Christison says that "every one will be struck with the readiness with which certain classes of patients will often take diluted meat-juice or beef-tea repeatedly when they refuse all other kinds of food." This is particularly remarkable in "cases of gastric fever in which," he says, "little or nothing else besides beef-tea or diluted meat-juice" has been taken for weeks or even months, "and yet a pint of beef-tea contains scarcely ¼ oz. of anything but water." The result is so striking that he asks what is its mode of action. "Not simply nutrient — ¼ oz. of the most nutritive material cannot nearly replace the daily wear and tear of the tissues in any circumstances. Possibly," he says, "it belongs to a new denomination of remedies."

It has been observed that a small quantity of beef-tea, *added* to other articles of nutrition, *augments* their power out of all proportion to the additional amount of solid matter.

The reason why jelly should be innutritious and beef-tea nutritious to the sick, is a secret yet undiscovered, but it clearly shows that careful *observation* of the sick is the only clew to the best dietary.

Chemistry has as yet afforded little insight into the dieting of the sick. All that chemistry can tell us is the amount of "carboniferous" or "nitrogenous" elements discoverable in different dietetic articles. In the great majority of cases, the stomach of the patient is guided by other principles of selection than merely the amount of carbon or nitrogen in the diet. No doubt in this, as in other things, Nature has very definite rules for her guidance, but these rules can only be ascertained by the most careful observation at the bedside.

Again, the nutritive power of milk and of the preparations from milk is very much undervalued; since there is nearly as much nourishment in half a pint of milk as there is in a quarter of a pound of meat. But this is not the whole question, nor nearly the whole. The main question is what the patient's stomach can assimilate or *derive* nourishment from, and of this the patient's stomach is the sole judge. Chemistry cannot tell this. The patient's stomach must be its own chemist. The diet which will keep the well man healthy may kill the sick one. The same beef which is the most nutritive of all meats, and which nourishes the healthy man, is the least nourishing of all food to the sick man, whose half dead stomach can *assimilate* no part of it, — that is, make no food out of it. On a diet of beef-tea healthy men, on the other hand, speedily lose their strength.

Patients have been known to live for many months without touching bread, because the *kind* they wanted could not be had, and they could not eat baker's bread. These were mostly country patients, but not all. Home-made bread or brown bread is a most important article of diet for many patients. The use of aperients may be entirely superseded by it. Oat cake and bread made of Indian meal are others.

To watch for the opinions, then, which the patient's *stomach* gives, rather than to read "analyses of foods," is the business of all those who have to settle what the patient is to eat, — perhaps the most important thing to be provided for him after the air he is to breathe.

Now the medical man who sees the patient only once a day, or even only once or twice a week, cannot possibly tell this without the assistance of the patient himself, or of those who are in constant observation of the patient. The utmost the medical man can tell is whether the patient is weaker or stronger at this visit than he was at the last visit. The most important office of the nurse, after she has taken care of the patient's air, is to take care to observe the *effect* of his food, and report it to the medical attendant.

(*To be continued.*)

THE GARDEN OF PLANTS.

One of the most wonderful and interesting places to visit in Europe is the celebrated "Garden of Plants," near or within the French capital. It is not only a garden of "plants," but a "garden" where all the sciences are cultivated, and where the student may study the different departments of science under the most favorable

rcumstances. A correspondent of the Boston *Herald* ıs presented some facts concerning the garden which ·e interesting:

"The cultivation of the plants has naturally occupied ıe most minute attention of its professors here. The ctures on cultivation and botany, free to all, are well ttended by foreign and French agriculturists, and the ırden, in return, receives daily from every portion of ıe world some returns in bread from the seed sown so berally from its pulpits. Vespasian Robin and the rothers Thouin brought the first contributions to its ower-beds, and Professor Decaisne to-day succeeds and olds up worthily the mantle of his great predecessor, I. de Mirbel.

"In chemistry and physics, ever since the foundation, he garden has been celebrated for the works of Lemery, Rouelle, Vauquelin, and Dumas, of former times, succeeded by two whose names are known throughout the world—Professors Chevreul and Fremy. In the earlier ays, when the garden was established for the pharmaceutical wants of the age, Lemery discoursed most wisely and eloquently upon the medical plants. He was most reserved and retiring in his manners. Rouelle, however, was of a peculiar nature; his arrival in the lecture-room was a signal for the profoundest stillness; as Professor, he was dressed in the perfection of the day, with wig and ruffles. On his arrival, his three-cornered hat alone was placed on a cushion, and his lecture began. As he warmed up with the subject-matter before him, he took off his great curled wig, unbuttoned and took off his embroidered jacket, then his waistcoat and his white cravat, and then in this attitude of being ready for the arena of intellectual combats, he, warming up still more with his great work, delivered some of his most thrilling scientific orations, and enchanted his hearers with every word he uttered.

"The collection of fruit-trees is most remarkable, and a monumental work is now in course of publication, entitled *Le Jardin Fruitier du Museum*, in which all the species of this precious collection, so useful for horticultural history, are noted and described. There are nine hundred varieties of pears alone. Sweet-water plants, in contradistinction to sea-water plants, here find a special attention.

"In the central flower-beds (of perennial plants) it will be noticed, above all if we visit it in the present month, that the colors of the flowers have a most unwonted brilliancy. This is not real, but only the effect of the disposition of the plants, by design, after the laws of contrast in colors, discovered by M. Chevreul. Every flower is as much indebted to its neighbor, perhaps more so, than to its own petals for its brilliancy of color. Separated, they lose that marvellous coloring which they give back to us when we look upon them together. Near these beautiful beds is the first acacia planted in France, in 1787, by Vespasian Robin. Buffon died in the building now used as the *intendance*. The portion reserved to the botanical students, to which any can enter with a ticket which they have to seek for at the direction of the administration, is very vast (some six acres) and divided up into little squares of about a yard. In each you will see the iron label which gives you the name of the plant, and when they ripen, the seeds are carefully gathered and distributed throughout the country, as the quality is supposed to be the best and the species most desirable to propagate. All the poisonous plants, like belladonna, are in the same little squares, but covered over with an iron cage so they cannot be reached.

"Near to these little plots is the collection of animals. The birds are very beautiful, and the parrots and cockatoos, of the largest specimens, are in summer taken out from their warm rooms and in the open air on the lawns. The birds of prey, *carnassiers*, are very large and fine—eagles, condors, vultures and hawks—some with a spread of six feet wings, are fed by the public, who gape at them in wonder.

"The babies and the nurses are most pleased with the monkeys. The collection is large and fine. They have their palace, which will easily hold a couple of hundred, and, although not nearly so costly or so extensive as the more modern one of the Zoological Gardens in London, yet it caused many reproaches to be made to M. Thiers when, as minister, he committed the audacious extravagance of building this monkeys' cage.

"The elephants, dromedaries, giraffes, rhinoceroses and hippopotami are by themselves. All of them have reproduced here except the rhinoceros; the hippopotamus no less than four times, and each time the mother has killed her young shortly after being born. Philosophers have thought it was a moral reflection of the *maternal* that she would prefer to see her children dead rather than be turned out into the temptations of this gay capital. No other reason has ever yet been assigned for the dislike of the hippopotamus to the Parisians. Of one thing it is certain, the dislike is quite mutual. The cages of the wild animals have served as the model for most of the gardens in Europe, but are now too small. The lions have a small park in which they can go out and be in the rain and cold which they sometimes find with the snows in Asia and Africa on the mountains. The bear gardens are very deep fosses, lined with stone walls, and so built as to prevent Bruin from climbing anything but the old stump in the middle. They look the mildest of creatures, but it would not be safe to fall into their clutches.

"The reptiles have a small and the very oldest of the buildings to live in. Here are alligators, crocodiles, boas, chameleons, lizards, rattle-snakes and many others, which flourish very well. The salamander, from Japan, has been for years in the tub where he is kept. He grows and fattens, and evidently enjoys himself. One of the pythons swallowed, some years since, her woolen blanket entirely; but finding the food set heavily on her stomach, rendered it up again, and the blanket is kept as a curiosity to show to the visitors.

"It was here that Prof. Dumeril first noticed the reproduction of the *axolotl* before they had arrived at maturity, a thing quite unknown in any other animal with vertebræ. They flourish here remarkably well and are raised by hundreds.

"One of the greenhouses is appropriated to the plants of New Zealand, New Holland and the highlands of Mexico. In the one farthest westward, which is always kept heated, the tropical plants are in the greatest luxuriance. Here is the bamboo, the elephants' grass, and the canepole. One of the plants here, the leaves of which are no less than thirty feet long, has several times pierced the outside glass. To avoid the annual repairing of the greenhouses, the top leaves of this plant, the *Arengha*, are always cut.

"In the Round and the Holland hot-houses are to be found the palms, the cocoa, and the *cycas*, which is a great rarity; plants from Central America and the West Indies, from Africa and the Cape, such as the *cycadees*—those plants whose leaves appear cut off from metal; *orchidees*, *pandances* and the *tornelia fragrans*, which is supported from a plateau, and winds its leaves in with its falling roots. Here is also a remarkable specimen of the *Victoria Regia*. But to mention all, or even the principal plants in these vast greenhouses, would require more than a volume. To give an idea of the importance of a plant properly bestowed, one fact connected with the Garden of Plants will suffice. In 1720, Antoine de Jussieu, Professor at the Garden, gave a coffee-plant to an ensign of a sloop of war going to the westward (M. Declieux), who carried it to Martinique. That single plant has produced all the coffee plants now known in the West Indies; just as from the single acacia, planted in this garden in 1637 by Vespasian Robin, were produced and grown all the plants of that species now so common throughout France and her colonies."

Arts.

PROFESSOR HENDRICKS ON FORCE.

Editor Boston Journal of Chemistry:

In response to Mr. O. P. Barton's remarks, in the current number of the *Journal*, upon my article on Force, I answer:

The difficulty Mr. B. points out is, to a certain extent, real, and presents itself in every case when an attempt is made to sound, to the extremest depths, any subject whatever. No question can be answered wherein the answer does not ultimately lead to a question that cannot be satisfactorily answered. This fact must necessarily be admitted, as a consequence of the essential *relation* of phenomena, when we consider that the extent of the horizon of the human intellect is as nothing when compared with the boundless expanse beyond.

In the article alluded to I have taken the liberty to extend my argument, by inference, outside the boundary of actual knowledge, and therefore do not pretend that I shall be able to answer questions that immediately suggest themselves.

Many of the phenomena and laws of light and heat may fairly be regarded as at present lying *within* the boundary of human knowledge. But their discussion and comprehension are greatly facilitated by the assumption that a luminiferous ether, such as is indicated in the article alluded to, is everywhere present throughout unlimited space. In my article I have assumed this as an admitted fact, and have attempted to show the connection between this and some other universally recognized facts.

The *nebular hypothesis*, which in its main features receives additional support from every new discovery in astronomical science, assumes that the solar system, and by analogy every other system of the universe, once existed in an ethereal or *nebulous* condition, occupying at least all the space included within the orbit of the remotest planet, and that, from *some* cause, which is called *gravity*, its parts have been isolated and consolidated into their present condition. Now this hypothesis, of which I do not hesitate to count myself a believer, has failed to explain the *operation* of gravity, to account for the *commencement* of the consolidation of nebulæ.

In the article criticised by Mr. B., in addition to the assumptions of the nebular hypothesis, I have suggested that *possibly* the ultimate state of a nebula, before its condensation commences, is that of the ether itself. And, as in that case we have no gravity to effect the condensation, I have tried to show that condensation, when once initiated, would result from the vibrations of the ether itself. I confess I have not obviated the difficulty of accounting for the initiation of the phenomena, but I claim that my view of the case presents a *conceivable* method of dispensing with gravity as a *property* of matter, which, to my mind, *improves* the nebular hypothesis.

We have no knowledge of, nor can we conceive as possible, matter in a state of absolute rest. I assume then, not only that matter always *was*, but that it always was in *motion*, and that every form of force is simply the manifestation of a transfer of motion from one portion of matter to another.

If all the motions of the universe were consonant, as would be the case if the universe were homogeneous, the motion could by no means be recognized. Heterogeneity is therefore essential to a recognizable world. The simplest conception that I can form of a recognizable world is, therefore, an infinitely extended ether, in motion, having nucleated centres.

The foregoing is submitted as an apology for, and an elucidation of, my article on Force. I will now endeavor to answer more directly the inquiry of Mr. Barton.

Mr. B. asks, "How is it possible for a constant force, applied to an inert mass, to impart more power than itself possesses, so that it shall react upon itself."

I answer, that the absorption of force or motion from, or its radiation to, an unlimited medium, as the ether is supposed to be, by a limited mass, as a nebula, would not sensibly increase or diminish the amount of motion in the medium, although the change in the nebula might be very great.

It is demonstrable from the laws of light that the ethereal wave is retarded while passing through a refracting

medium, such as a nebula may be supposed to be; the matter of the nebula must therefore receive a corresponding impulse in the direction of the wave. As the ethereal waves will act similarly upon all parts of the surface of a nebula, it is easy to see that they must effect its condensation to a certain extent. Let it be granted that gravitation is the result of such an absorption of ethereal waves, by a nebula, it follows then, from the nebular hypothesis, that condensation and axial rotation result from ethereal vibration. But a stage of condensation must ultimately be reached — as has been by the planets at least of our solar system — when the same amount of force would fail to produce further condensation, and the augmentation of heat, or molecular motion, resulting from condensation, will then also cease. Now, granting that, in the changed condition of the system which has resulted from its condensation, it continues to absorb the same amount of motion from the ether that it did in a less condensed state, yet, as its molecular motion, or heat, has been greatly augmented during its condensation, it will now radiate to the ether much more motion than formerly, so that the sum of its forces will be diminished by radiation.

That this stage of development, or rather of decay, of every part of the system, including the central mass, or sun, must ultimately be reached, is sufficiently obvious: for of the two conditions, both of which are *essential* to the stability of the system, we have probably neither, and *certainly* not both; that is, though we are not *sure* that the worlds move in resisting media, we *are* sure that they are not solid bodies. The doom of the system, as such, is therefore written upon it, and may be read even now, though the *period* of its growth and decay may surpass even the imagination. The whole process, however, constituting the growth and decay of a system, is but a cycle in the changes of matter, and will forever be repeated under an *infinite* variety of forms.

J. E. Hendricks.

Des Moines, Iowa, July 14, 1869.

POWER OF THE OCEAN TIDES.

"It is said there is power enough in the rise and fall of the tides to drive all the machinery that man would ever have occasion to use." This paragraph, from one of the April numbers of the *Journal of Mining*, is a most suggestive one, considered from a mechanical and utilitarian point of view. That the statement is correct, we propose to show by a rough estimate.

In many parts of the sea-shore the rise and fall of the tides is considerable. In the Bay of Fundy, 70 feet; at the mouth of the Severn and at St. Malo, France, 46 feet; at Guernsey and Jersey, 32 to 38 feet; at the mouth of the Scheld, 20 feet, and along the coast of Holland, from 10 to 16 feet; in the Adriatic only 2½ feet; while in the rest of the Mediterranean the tides are scarcely perceptible; along the east coast of the United States the tides vary from 4 feet to 10 and 20.

As the original tide-wave is generated in the Pacific Ocean, and moves westward with the apparent motion of sun and moon, it is clear that gulfs having their mouths funnel-shaped, and opposed to the direction of the tide-wave, like the Red Sea, will have a strong tide. As the tide-wave moves from the Pacific Ocean around the Cape of Good Hope, and then northward in the Atlantic Ocean, the same peculiarities are observed — any gulf having its mouth toward the south, and funnel-shaped, like the Bay of Fundy, will have a strong tide, and where the mouth is narrow, like that of Chesapeake Bay, the tide-wave will be less high than in the free ocean. When the tide-wave reaches any place on the coast from two sides, as is often the case behind large islands, the effect will be to increase or diminish its height, according as the high tides coincide, or the high and low tides neutralize one another.

We have no space to apply these rules to the numerous special localities, from observations of which they have been deduced; but they serve to show that the subject has been thoroughly investigated, and is as well understood as any other in physical geography. The power exerted by the tides every day, along thousands of miles of sea-coast, is especially remarkable, as it is the only natural force directly dependent on gravitation, which owes nothing to the heat of the sun, itself a result of gravitation, and in its turn the cause of all other forces on the surface of our planet, either wind or water-power, steam-power, or the power of animals.

To estimate the force of the tides, all that is necessary is the consideration that the attraction of the sun and moon (principally of the latter), acting in opposition to terrestrial gravitation, elevates the surface of a large portion of the ocean, nearly twice in twenty-four hours, to the mean height of about two feet. The extent of surface thus raised may be set down at 100,000,000 square miles, or one half of the surface of the earth, taking this at 200,000,000 of square miles, of which the ocean occupies about three-fourths, or 150,000,000. Every square mile of water two feet thick contains nearly 60,000.000 cubic feet, or 3,840,000,000 pounds of water, and this, multiplied by 100,000,000, the number of square miles affected by the tide, gives the enormous number of 768,000,000,000,000,000 foot pounds exerted every 12½ hours, or 750 minutes, which gives, per minute, a power of 100,000,000,000,000,000 foot pounds. Dividing this by 33,000, to reduce it to horse-power, we obtain nearly 3,000,000,000,000 horse-power as the total power of the tide-wave over the whole surface of the earth.

Only a small portion of this power, however, can be made available — namely, that which is spent on the sea-coasts of continents and islands. The method of utilizing this we will discuss in a future article. — *Engineering and Mining Journal.*

OXYHYDROGEN ILLUMINATION.

L'Abbe Moigno. — This paper is written with the express view of meeting the objections made in public prints against this mode of procuring artificial light, and answers each objection, completely. The first objection, made and refuted, concerns the alleged difficulty which oxygen is supposed to have of passing readily through pipes, and travelling therein with ease, on account of its high specific gravity; the author states that experience has proved that, under the same, and, in all respects, identical conditions, oxygen gas travels more rapidly than hydrogen. Another point is an objection concerning the comparatively rare occurrence of peroxide of manganese, and the difficulty of obtaining it; to this the reply is, there is plenty of manganese, of excellent quality, readily accessible, and more than fifty times as much as any greatly-increased demand will ever absorb; moreover, the oxygen is made from permanganate of soda, which, it appears, is revived again after having yielded its oxygen. One ton of this permanganate yields in twenty-four hours 100 cubic metres of oxygen; and, from reliable data obtained, 300 tons of the salt will suffice to produce yearly about 10,000,000 cubic metres of oxygen gas (a cubic metre is equal to 35.316 cubic feet). These 300 tons of permanganate are composed of 150 tons of soda, and 150 tons of peroxide of manganese, an insignificantly small quantity, compared with the 60,000 tons which are consumed of this material annually. As to the too slow production of oxygen, the author says, at the oxygen gas-works, when in regular course of working, they have obtained, from each retort, 38 cubic metres of pure gas per day; as to the cost, he states that the gas-work intended to be established will cost, everything included (retorts, &c., gas-holders to hold 24,000 cubic metres of gas for twenty-four hours supply, 32 kilometres' length of mains), 3,700,000 francs; as to the objection concerning the zirconia, or magnesia cones, these last for several days, and only cost one centime; at the same time, the glass chimneys and globes are dispensed with. As to the expense of this gas, it appears, from the statements of the author, that, taking into consideration the great quantity of light obtained, it is decidedly less expensive. The manufacture of hydrogen, by means of the patented process, from hydrate of lime, is, according to the author, very simple, and the pure hydrogen thus obtained costs less than two centimes per cubic metre, leaving even out of the question the sale of the by-products, which would not be trifling. Lastly, the author tells us that MM. J. Dumas (Senateur, etc.), Jamin, Balard, and H. Sainte-Claire Deville, all Members of the Institut; M. Debray, of the French Imperial Mint; and M. Alphand, Director of Public Roads and Promenades, have been appointed a committee, by M. Haussmann, Préfet du Département de la Seine, to inquire into, and minutely report upon, this subject in all its aspects and details. — *Chem. News.*

Keeping Volatile Liquids. — Chemists and others know well the difficulty of keeping very volatile liquids. Bottles of ether, for example, are shipped for India, and when they arrive are found to be more than half empty. The chemist sometimes puts a bottle of benzole or bisulphide of carbon on his shelves, and when he next requires it, he finds the bottle empty and dry. The remedy with exporters is a luting of melted sulphur, which is difficult to apply and hard to remove. A new cement, therefore, which is easily prepared and applied, and which is said to prevent the escape of the most volatile liquids, will be useful information to many. It is composed simply of very finely ground litharge and concentrated glycerin, and is merely painted around the cork or stopper. It quickly dries, and becomes extremely hard, but can be easily scraped off with a knife when it is necessary to open the bottle. — *Medical and Surgical Reporter.*

A new and elegant method of preparing nitrogen gas has been made known by a distinguished Italian chemist, Signor Massimo Levi. It consists in heating bichromote of ammonia in a retort; the salt is thus resolved into green oxide of chromium, water, and nitrogen gas.

STATISTICS OF PHOTOGRAPHY.

The rapid growth of new and special industries, says the *British Quarterly Review*, is a fact so characteristic of the present day, that the statistics of photography can scarcely be regarded as wonderful, viewed merely as a question of economics. Nevertheless, some of the facts are sufficiently startling. Twenty years ago, one person claimed the sole right to practise photography professionally in England. According to the census of 1861, the number of persons who entered their names as photographers was 2,534. There is reason, however, to believe that these figures fall short of the real number; since then it is probable the number has been doubled or trebled, and that including those collaterally associated with the art, it is even four or five times that number. But these figures fall far short of the number interested in photography as amateurs. We are informed that eight years ago, in establishing a periodical which has since become the leading photographic journal, a large publishing firm sent out twenty-five thousand circulars — not sown broadcast, but specially addressed to persons known to be interested in the new art-science. The number of professional photographers in the United States is said to be over twenty thousand, and a proportionate number may with propriety be estimated as spread over continental Europe and other parts of the civilized globe.

But a more curious estimate of the ramifications of this industry may be formed by a glance at the consumption of some of the materials employed. A single firm in London consumes, on an average, the whites of two thousand eggs daily in the manufacture of albumenized paper for photographic printing, amounting to six hundred thousand annually. As it may be fairly assumed that this is but a tenth of the total amount consumed in this country, we obtain an average of six millions of inchoate fowls sacrificed annually in this new workshop of the sun in the United Kingdom alone. When to this is added the far larger consumption of Europe and America, which we do not attempt to put in figures, the imagination is startled by the enormous total inevitably presented for its realization.

The French Atlantic Cable. — This cable, now successfully laid, has some modifications of construction. The gutta-percha employed for insulation is brought direct from Singapore, as it left the hands of the natives, in the shape of unsightly idols, deformed quadrupeds, caricatures of patriarchs, dogs, ships, birds; and is made into a paste for protecting the electric core. The copper wire is received from the wire-mills in hanks of fifteen or twenty pounds each; each hank being tested on its arrival to ascertain its conductivity, none below a certain standard being allowed to be used. The conductor consists of a strand of seven wires, 0.56 inch in diameter, or a little less than one-sixteenth of an inch, six being twisted round the central wire. The seven wires are rendered perfectly compact by the coating of the central wire with an adhesive matter known as "Chatterton's Compound." The weight of the complete strand is four hundred pounds per nautical mile. It is made in lengths of about one mile, and wound on reels ready to be covered with gutta-percha. The strand is passed through a vessel of Chatterton's Compound, and through a die corresponding to the size of the first coating of gutta-percha, which is forced round the strand as it passes through the die. Four successive coats are thus applied, and between each coating the wire receives a film of the compound, which improves the insulation and binds the coats together. The total weight of the core is 800 lbs. per nautical mile, equally divided between the copper and the gutta-percha. The total length of cable for the section between Brest and St. Pierre is 2,788 nautical miles, the second section thence to New York 776 nautical miles long, with smaller wire consisting of a conductor of 107 lbs. per nautical mile, and a covering 150 lbs. per mile. The cable thus prepared is finished with a serving of jute yarn and ten wires of homogeneous iron, each of which is covered with manilla yarn steeped in tar. — *Engineering Journal.*

Improved Mode of Manufacturing Glucose from Starch. — M. Maubré. — The author states that, by the usual mode of proceeding, a portion of the starch is always left in the state of dextrine; he therefore operates under pressure and a higher temperature. For this purpose, he applies a strong cylindrically-shaped iron vessel, internally lined with lead; this boiler is charged with 28 kilos. of sulphuric acid, at 60° Beaumé, and 2800 litres of water, and this liquid is brought to the boiling point by means of high pressure steam. When boiling, there is gradually run into this fluid a mixture of 1180 kilos. of starch and 2500 litres of water, acidulated with 28 kilos. of sulphuric acid. When the whole of this quantity has been introduced into the aforesaid boiler, it is closed, and the temperature within it raised to 160°, by means of high pressure steam introduced into the boiler by leaden and perforated pipes. After about four hours, the action is complete, the fluid run off into tubs, and the acid saturated by means of 84 kilos. of finely-powdered good limestone. After separation of the sulphate of lime, the fluid is evaporated to 20° B., clarified with animal charcoal, and next evaporated in vacuum pans, yielding an excellent and beautiful glucose. — *Les Mondes.*

Acid Proof Cement.—The best preservative for corks exposed to acids consists of a coating of silicate of soda and powdered glass. The cork, having been bored to suit the size of the tube, is soaked for two or three hours in a solution of silicate of soda, consisting of one part of commercial concentrated solution to three parts of water. The tube is next inserted, and, when dry, the cork is covered with a paste made by mixing the condensed solution of the silicate with powdered glass in such proportion as to form a mass of about the same consistence as that of putty. This is spread on the undersurface, and then washed with a solution of chloride of calcium. It soon hardens, but it is advisable to make the connection with the flask while the paste is in a plastic state, and to allow it to become solid before applying heat to the vessel containing the acid.

Corks protected in this manner are but slightly acted upon, though remaining over the boiling nitric acid more than four hours, and over hot acid for ten. In some instances, when not entirely covered, the vapor softens the cork beneath the silicate to the depth of about a quarter of an inch, but the cement has proved sufficiently strong to form a compact diaphragm, enabling the tube to be removed from the flask without danger of the fluid contained being contaminated. The application of this cement as a luting for chemical apparatus for general use is suggested, as it is found that it remains unaffected even when immersed in strong nitric, sulphuric, or muriatic acid. The immersion in these liquids, made while the plaster is still soft, has the only perceptible effect of hardening the same immediately.—*Journal F. Institute.*

Mineral Lemonade.—When equal parts by weight of strong pure sulphuric acid and strong pure alcohol (85 to 90 per cent) are carefully mixed (the acid being poured into the alcohol and thoroughly mixed therewith), a liquid is obtained which has long been known and used by medical men under the older name of *Elixir acidum halleri*, more recently named *Mixtura sulphurica acida.* This fluid, which, if well prepared, contains essentially sulphovinic acid, is an excellent summer beverage when mixed with water in the proportion of one small teaspoonful to a tumbler of cold water, and sweetened with sugar, or, preferably, with some fruit syrup. Above the lemonades made with vegetable acids this acid mixture has the advantage of not increasing the perspiration, as citric and other vegetable acids do, while it is better borne by the stomach, and has a tonic action upon the vascular system. It is, indeed, a very pleasant drink, often given, at the *cafés* of Paris, Berlin, Vienna, and other places, along with some *syrop de groiselles* or *framboises*, and rather exorbitantly charged for. The proportions by bulk are—one of strong sulphuric acid and three of alcohol.—*Hamm's Agronomische Zeitung.*

Cellulose in Old Wood.—M. Payen has taken the trouble to analyze a piece of old woodwork, once belonging to the well-known Chaillot pumps, in order to ascertain what state the cellulose was in, after fully a century's exposure to wind and weather; he therefore treated the wood—first, for eight consecutive days, with a weak solution of caustic potassa (1 part in 10 of water), at a temperature of between 20° and 75° C.; secondly, he treated the residue with nitric acid, sp. gr. 1.2, without applying heat, and also for eight days; next with nitric acid, sp. gr. 1.05, taking care to wash out carefully all substances which, by each of these operations, could have become soluble, previous to proceeding with another operation; M. Payen obtained pure cellulose, as might have been expected, and was evidently also expected by Field-Marshal Vaillant, who happened to be present when the *savant* deposited, at a meeting of the Agricultural Society, a piece of pure cellulose, obtained from the wood of the old pump, since the marshal asked Payen, jocosely, whether he had not some old wood from the ruins of Carthage to operate upon; and M. Robinet, improving upon the occasion, offered to send Payen a piece of the wood of Noah's Ark, to continue his researches.—*Chem. News.*

New Test for Blood-Stains.—Upon the authority of the London *Lancet*, an important test for blood had been discovered in Australia; consisting of the application of tincture of guaiacum and ozonized ether, which produces a beautiful blue tint with blood or blood-stains. The test is excessively delicate; and we happened to be present at a lecture given by Mr. Bloxam, in which he showed some experiments with it, and added that, in the case of a blood-stain twenty years old, he had extracted a single linen fibre with an almost inappreciable amount of stain on it. The characteristic blue color was immediately induced by the test, and readily detected by microscopical examination. The testimony of so able a chemist leaves no doubt as to the value of the discovery. Ozonized ether, we may remark, is merely a solution of peroxide of hydrogen in ether.

On Electricity.—"I believe that the true theory of electricity will result from the principle that electricity is not a motion (*mouvement*), but a change of the quantitative and dynamic equilibrium of the ether which constitutes the atoms of the substances, and that the propagation of such a change is brought about by the moving of the ether from one atom to another; this motion shakes, disturbs the ether of the atoms, and thus produces heat."—*Father Secchi.*

Agriculture.

LAKESIDE IN AUGUST.

The season at Lakeside Farm has so far advanced that we are able to know positively regarding the character of some crops, and the results of some experiments; and also we may reasonably prognosticate in respect to the results of nearly all the cereal grain and root crops which are as yet immature.

The wheat has been safely housed, and never was the grain more plump, or the straw more magnificent. This is the fourth consecutive season in which we have successfully grown this noble cereal, and we predict a larger yield per acre in the present crop than ever before. At the present time of writing, it has not been threshed and measured, but an estimate of thirty bushels to the acre is apparently a safe one. Neighbors and friends, acting under the stimulus of the example afforded them, ventured to adopt our method of fertilizing wheat grounds, and, last spring, sowed generous fields to wheat. We are happy to know that their success corresponds in a measure with our own. It is high time the erroneous idea was dissipated from the minds of Massachusetts farmers that they cannot grow this grain. We *can* and we *must* cultivate it. It is a most profitable and satisfactory crop. Nothing is more gratifying, nothing conveys stronger assurances of *independence*, than broad fields of this golden grain waving in the wind. Let us see more of them upon our New England farms.

The corn fields never looked better. Under the stimulus of our favorite fertilizer, made from a mixture of bone flour and ashes, the corn is growing in rank luxuriance, and the yield promises to be a heavy one. Doubtless there are more promising corn patches in the State, but we have thus far in our travels failed to find them. We have noticed, in one or more of our exchanges, statements that the bone and ash mixture recommended in the *Journal* has disappointed farmers, in some instances. We suppose there never was, and we venture to say there never will be, a fertilizer suggested that will not work badly with *some* cultivators. We shall have some observations to make upon this special topic before long.

Of apples, there are none. From an orchard of five hundred trees of bearing size, not a single barrel will be gathered. This is the sixth year since a full apple crop has been secured in New England. It is enough to discourage fruit-growers.

The vineyard is looking finely. The fruit is fully a fortnight in advance of the last season, and, if nothing untoward happens, as mildew or early frosts, the rich clusters will present a fine aspect in September.

The tubers as yet have escaped the disease which proved so disastrous the last season. Our crop, grown upon "virgin soil," a tract covered with a thick growth of oak and hickory last year, is not only a fine one in quantity, but of unusual excellence in quality. The Early Rose grew rapidly, and in the first week in July they had attained to nearly their full size, but they were not fit for the table. When boiled, the watery sodden lumps of starch were found wholly unpalatable, and were thrown to the pigs. As they ripen they grow better, but, as an early variety suited to early use, they have not met our expectations. We have raised them on different fields widely apart, and the results are the same.

The hay crop at Lakeside has proved, upon the whole, a fair one. The severe, open, icy winter destroyed many of the grass roots, and caused some unsightly bare patches to appear in the fields. The heaviest swarth was mowed upon the reclaimed meadow, upon a portion subdued and seeded down a year ago. The yield was quite three tons to the acre. Upon the experimental grass-plat of one acre, forty-two hundred and fifty pounds of excellent hay was secured. This is the *sixth crop* taken from the field, and no animal excrement or stable manure has been employed. It was brought into good tilth, and has been maintained solely by the use of chemical fertilizers. We shall publish a full statement of results on this and other fields at a future time. At present the men are busy at work upon the low lands, draining, removing the hassocks and bogs; and another year we hope to see excellent timothy growing in places where hitherto has been found nothing but wire grass and bulrushes.

AN ENGLISH FARM.

We have recently received a pleasant visit from William Lawson, Esq., proprietor of the celebrated Blennerhasset Farm, Cumberland, England. Mr. Lawson has been travelling through the United States for puposes of observation and pleasure since November, and, before leaving, will make the trip to California over the great Pacific Rail Road. He is much pleased with our country, and surprised at its extent and the vastness of our agricultural resources.

His farm in England consists of about four hundred acres, all of which is in the highest state of cultivation. He has sixty acres to potatoes, forty-five to wheat, thirty-three to Swede turnips, sixty-eight to oats, six to carrots, ten to barley, sixty to hay, five to Italian grass, four to cabbage, four to flax, twenty to garden, etc. He devotes, this year, *nine acres to experiments*, and has in his employ an experienced chemist, who has charge of all experimental labor. Fertilizers are manufactured in large quantities upon the premises, and Mr. L. is ready to supply his neighbors with what they may need at a small advance from cost. Formerly, a large number of animals were maintained upon the farm, but, regarding the production of grain and roots as more profitable, and wishing to try the experiment of maintaining the lands in good condition by chemical or special fertilizers, the stock was removed and a new system adopted. It has thus far proved successful, and we shall look with much interest to future reports of experimental results. The plowing, threshing, and nearly all other labor in which machinery can be employed, is done by steam power, and he finds it to greatly reduce the expense of cultivating the farm. The land is thoroughly underdrained, and the soil kept in the best possible condition by turning up, pulverizing, and weeding. Owing to the extreme drought in England the past season, many of his crops were greatly injured, and his experiments interfered with; but this year, his superintendent informs him, the crops are in a highly satisfactory condition.

The experiment which Mr. Lawson is trying upon a large scale at Blennerhasset farm, in dispensing with excrementitious manures, is almost precisely like the one which has engaged our attention during the past six years in a comparatively small way, at Lakeside farm, in Essex county. The difference, if there is any, may be presumed to consist in the dissimilar condition of the soil when the experiments began. In our case, the land was run down, or exhausted. Mr. Lawson's farm must have been left in good condition at the time of the sale of his stock. Our object has been to put exhausted lands into good tilth without manure; his aim is, to keep up the fertility of rich fields through similar agencies.

We claim that a successful end has been reached in our experiments, and, that fact being established, it certainly insures the success of Mr. L. in that in which he is engaged.

Our experiment has in a measure come to an end through its entire success, the farm, by the use of chemical fertilizers alone, having been brought into a state capable of sustaining a herd of animals: they have been supplied, and therefore the excrementitious manures furnished, in part meet our wants in maintaining a high degree of fertility.

Mr. Lawson employs bones, ashes, salts of ammonia, nitrate of soda, and potassa, chloride of sodium, lime, etc., and is pursuing a course, in compounding and chemically manipulating these substances, which shows much discrimination and scientific knowledge on the part of the chemist who has the work in charge.

Mr. L. is also trying another experiment this year, of a character unlike the one alluded to. He is working his farm upon the co-operative plan; that is, giving his employés an interest in the productive results of their labors. Two and a half per cent upon the capital employed, reckoning the farm at its market value, is reserved from the net profits for himself, and the remainder is divided upon an equitable plan among his laborers. The laborers are paid regular wages, which goes into expense account. The plan is working well, and satisfactory results are anticipated by employer and employés.

We regret that want of space compels us to refrain from giving a more extended account of the Blennerhasset Farm, and of the interesting experiments which are being carried on there. Upon Mr. L.'s return from California, he will spend a few weeks in looking over New England farms, and we hope to be able to introduce him to some of our prominent agriculturists.

THINNING OUT GRAPES.

Is the importance of thinning out the fruit of the vine duly considered by the majority of cultivators? I think not. From close observation, and even sad experience, the subject, in my opinion, calls for much more attention than is usually given. In young vines, this is particularly the case.

Such vigorous and hardy constituted varieties as the Concord may stand it, but even they will eventually suffer. This fault is not only to be found in the vineyards of the novice, but can be seen almost everywhere, in charge of those who know better. This then, being admitted, the next question is, How shall it be remedied? Shall we prune so much shorter, so as not to leave more wood than the vine can carry safely through or leave more wood, and then thin out the bunches?

The latter, in my opinion, will be the best; for, by the first plan, we get our fruit too much crowded, and throw too much force into the young canes for the following year's bearing. My impression is that when a vine is pruned to what would seem about right, the pinching out of every third bunch, at the first operation, pinching back would be the method. I would leave but two bunches on each bearing shoot, and in some instances it is better to leave but one.

We all know that the forming of the seed of any fruit is the heaviest tax on the plant. This being the case, do we not give considerable relief when we diminish this tax one-third? I think we would be safe in counting on having the same weight of fruit in the two bunches as if three are left. Some years ago, we grew Concord bunches in this way, which the committee, who were to test them, would not admit to be that variety until they tasted them. For marketing table grapes this is particularly practicable. For instance, let one man take Concords that will average three-fourths of a pound to the bunch, and another have them as usually grown, and my word for it, the large bunches will command nearly double price, not only among the wealthy, but the masses. — *Grape Culturist.*

Grape Vines about Rocks. — It is a well-established fact that grapes ripen very much earlier at the North when the vines are planted near or about rocks. Last year, while grapes were nearly a failure in the open field, there were cases where a fine crop of perfectly ripened bunches was raised from vines whose roots ran about rocks. The rocks absorb the heat by day, and keep the roots of the grapes warm day and night. Rocks in gardens and fields are generally regarded as nuisances; but if they are left, a good use can be made of them by planting vines about them. — *American Journal of Horticulture.*

How Much Manure do we Use on an Acre? — An acre of land contains 43,560 square feet, 4,840 square yards, or 160 square rods. By those who have used guano, it is said that 300 pounds is sufficient to manure an acre; 302¼ pounds would give 1¼ ounces avoirdupois to the square yard. One cubic yard would give a trifle over one cubic inch to the square foot. A cubic yard of highly concentrated manure, like night soil, would, if evenly and properly spread, manure an acre very well. A cubic yard of long manure weighs about 1,400 pounds; a cubic foot not far from 50 pounds. A cord contains 128 cubic feet; 1¼ cord would give about a cubic foot to the square rod. If liquid manure be used, it would take 180 barrels to give one gill to a square foot upon an acre, which would be equal to about 50 pipes or large hogsheads. It would be quite useful if farmers would be a little more specific as to the manure applied.

To Rejuvenate Old Grape Vines. — The editor of the *Practical Farmer* says: — "Having on our premises, planted by former owners, probably twenty years ago, half a dozen old grape-vines with large weather beaten trunks or stems, which made annually but little new wood and yielded but very few poor grapes; two seasons ago we cut off the branches, covering with about a foot of earth. Vigorous and healthy shoots sprung up in great abundance — the weak ones of which were broken off, and leading ones at proper distances trained to the arbor. The new growths are now clean, healthy, and strong — sufficient entirely to cover the large arbor the present season; we look for bushels of fruit from the new bearing wood. We see old grape vines, everywhere, doing no good, and which could be made young and thrifty by this process."

Boston Journal of Chemistry.

BOSTON, SEPTEMBER 1, 1869.

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STEEL MANUFACTURING AND THE SPECTROSCOPE.

One of the most beautiful of the practical applications of the new science of spectrum analysis to the industrial arts is connected with the manufacture of steel after the Bessemer process. In this process five tons of cast iron are in *twenty minutes* converted into cast steel. We have in a former article explained to our readers that steel differs from common cheap cast iron in containing less carbon. By the Bessemer process the excess of carbon in cast iron is actually *burnt out*, while in a molten, white-hot condition, by a blast of atmospheric air, and thus converted into steel. The oxygen of the air burns out the carbon and silicon, and the heated gases issue in the form of flame from the furnace during the time that the molten iron is being burned. If cast iron contains five or six per cent of carbon, and good steel but two and a half, it will only be necessary to burn out of cast iron three and a half per cent of carbon to convert it into steel. The operation has always been a very nice and difficult one, and none but the most experienced and competent workmen could know just when to stop burning the carbon and arrest the process. If the blast were continued *ten seconds* after the proper point had been attained, or if discontinued *ten seconds* before that point was reached, the charge became either so viscid that it could not be worked, or so hard as to crumble up like cast-iron under the hammer. In short, the resultant mass would not be steel. Now, spectrum analysis steps in, and removes the difficulty in the most perfect manner. The flames issuing from the furnace contain the volatilized constituents contained in the impure iron and fuel, and by the use of the spectroscope the nature of these substances is at once detected. The complicated masses of dark absorption bands and bright lines show that a variety of substances are present in the flames in the state of a glowing gas. Among them are carbon, sodium, potassium, lithium, iron, hydrogen, and nitrogen. At a certain stage of the operation, all at once, the *carbon lines disappear*, and a continuous spectrum is observed. This is the *moment* when the air must be shut off; and, at a signal from the observer, the draft is instantly closed, and the process suspended. The spectroscope alone can thus unerringly guide in conducting this important manufacture. We naturally desire that the spectroscope should do even more in the process than has been described, and the manufacturer would like to be told whether there is any sulphur, phosphorus, or silicon in his steel, but these points it is as yet unable to determine. As these substances do not appear at all as gases in the flame, but remain unvolatilized in the molten metal, or swim on its surface in the slag of the ore, the lines peculiar to them are not seen in the flame, and consequently no aid in this direction can be expected from the spectroscope.

OUR COAL SUPPLY.

The scientific commission appointed by the British Government to thoroughly investigate the important matter of the "coal supply" in the islands have made their report, and it is pronounced "entirely satisfactory." They have succeeded in convincing the anxious subjects of the Queen that coal enough remains in the subterranean depositories to last for more than one thousand years, and so John Bull sleeps soundly again.

In this country we have never had any anxiety upon the question of supply; our concern at present is confined to another point, — how to obtain it at reasonable prices. Perhaps some of our readers may not be fully informed regarding the enormous extent of our coal-fields.

The great coal formation of this country consists, like those of other parts of the world, of beds of coal from a mere line to fifty feet in thickness, interstratified with sandstone, shale, and limestone, which constitute the great body of the formation. It is enormously developed in North America. We have first in the north-eastern part of Nova Scotia and New Brunswick a coal-field covering not far from ten thousand square miles. In the south-eastern part of Massachusetts and in Rhode Island is a deposit covering about five hundred square miles. This field, though not much worked as yet, we cannot doubt will be found hereafter to contain important seams of workable coal.

The great Appalachian coal-field, extending from New York to Alabama, — seven hundred and twenty miles in

length, — covers nearly one hundred thousand square miles. The Indiana coal-field, three hundred and fifty miles long, embraces about fifty-five thousand square miles. Another occurs in Michigan, one hundred and fifty miles long, covering about twelve thousand square miles. The Missouri and Iowa coal-fields may be set down at fifty thousand square miles. The grand total, to say nothing of fields yet further west, amounts to more than two hundred and twenty-five thousand square miles, equal to about twenty-eight such States as Massachusetts! If we suppose the average thickness of all the beds to be fifty feet (some single beds are twice that thickness), the whole amount in solid measure of the coal in the United States will be one thousand and sixty-six *cubic miles!* One cubic mile would furnish seven million tons of coal annually for one thousand years. At that rate, our coal would last one million and sixty-six thousand years.

SPOTS ON THE SUN, AND THE WEATHER.

There are many popular fallacies relating to the influence of the sun, moon and stars upon the weather, but we have never regarded as one of them, the notion that what are known as "spots" upon the sun influenced temperature upon our planet. It is certainly quite reasonable to suppose, that any opaque screen projected upon the blazing disk of the sun, would diminish the amount of heat-rays coming to us from that orb. Regarding the nature of these dark patches, we are wholly uninformed. They are known to be of immense area, for they have been accurately measured. Several have been observed which covered a space several times the diameter of our earth, and during certain years the whole equatorial region of the sun has been crowded with these spots. At the present time there are several large ones visible, and in June last they were uncommonly numerous. June was a cold, dreary month, and August was chilly, like September. It has been a cool summer, and we think it will be found that a low range of the thermometer is consequent upon the presence of these spots upon the sun's disk.

Father Secchi, the Italian astronomer, so distinguished for his spectroscopic researches, has been attentively studying this subject, and presents, in the *Giornale di Roma*, a communication in which some most interesting statements are made. He remarks that the variation of the solar spots appears confined to a period which is all but triennial. If this be so, it affords ground for hope that a law governing the appearance of the spots will be discovered which may furnish valuable data for the prediction of variations intemperature upon our planet, of the greatest importance. It is a most interesting subject for investigation, and we hope systematic researches will be instituted which will result in a great increase of our knowledge of the meteorological influences exerted upon the earth.

PERILS OF TRAVELLING IN ITALY AND THE EAST.

In one of Dr. Holland's recent letters from Europe, published in the *Springfield Republican*, he makes some most just and timely remarks regarding the "perils" attendant upon travelling and residing in the southern part of Italy, especially in Rome and Naples. We have watched by the bedside of a sick friend in the latter city, sick from malarial fever, and know that every word spoken by the doctor is true, and should be heeded by those who contemplate travelling abroad. Rome is one of the most gloomy and unhealthy cities in Europe, and a winter's residence there, to an American invalid, is most hazardous, and every way undesirable. Let no poor consumptive be deluded by the "tales of travellers," and leave a comfortable and cheerful home to pass weary days and nights in travelling, or in a residence in "sunny Italy," or the East. The most robust constitutions often succumb to the fatigues, exposures, excitements, and malaria incident to travel in those countries, and good sound health is broken and impaired oftener than is known. There is a growing disinclination on the part of sensible physicians to permit patients to leave comfortable homes in pursuit of health. If they must be set in motion, they certainly should not be allowed to cross the stormy Atlantic, for, from pretty careful observation, we are convinced there is no place in Europe where the sanitary advantages are greater than here.

A NEW ANÆSTHETIC.

A correspondent of the St. Louis *Medical and Surgical Journal*, residing at Berlin, presents some statements regarding a new anæsthetic agent discovered by Dr. Liebseich of that city, which are interesting. The term "chloral," the aldehyde of tri-chloretted acetic acid ($C_2\ Cl_3\ OH$), has long been familiar to chemists. This substance has been considerably employed in England in the manufacture of chloroform by simple double decomposition between it and caustic soda. This "chloral" is the new anæsthetic of Dr. Liebseich. It is a colorless fluid, of penetrating odor, but almost without taste, and is obtained by the action of chlorine gas upon alcohol. It is thought from the experiments made with it that it will, in many cases, prove superior to chloroform or ether. Its action is slow, but the sleep, stupor, or insensibility may be continued for hours without causing headache, or any unpleasant symptoms. It is thought that it will not supersede the agents in use, but it will fill a gap which they do not cover. In cases of insomnia from general suffering, or mental excitement, it may prove of great service. If so, it will indeed be a boon to suffering humanity.

POPULAR LECTURES.

The season of the year has arrived when lyceums and library associations are making arrangements for courses of popular lectures. These lectures are generally such as do not add to the stock of general information, or improve the mind or heart. Popular sensational preachers, noisy politicians, and story-writers, have been the most sought after to fill the lecturer's desk. We hope to notice an improvement in the public taste the coming winter, and that lectures upon science, the mechanic arts, history, geography, etc., will take the place of the worthless declamatory productions heretofore so popular. We find in the report of the executive committee of the Peabody Academy of Science, recently published, some most truthful and timely observations upon the subject of popular lecturers, which we copy. The Report is written by Wm. C. Endicott, Esq., of Salem, Mass., President of the Academy.

"And here it may be remarked that lectures affording solid instruction in an agreeable and interesting way are much needed in this community. The persons who for the most part supply the popular lecture platforms are either professional lecturers, given to sensational, declamatory, fine writing, — gentlemen of some general reputation obtained in other fields, — or the advocates of some particular hobby or reform. Lectures are given and attended, not for instruction and improvement, but to gratify curiosity, or to afford amusement and excitement to audiences. The result is, that the lecture now seldom instructs. Aiming at other ends, the modest rewards of the scholar and man of science are no longer the measure of payment, and prices have risen to an exorbitant rate. Lecturers swell their incomes by a winter's tour at one or two hundred dollars a night. They are paid as opera-singers are paid. The lecture platform is thus forced to pay a heavy tribute, and in the smaller towns and communities the performance is beyond the reach of the people. It would be idle, even if it were desirable, to attempt a change in this condition of things, or to enter into a crusade against the present system; but it would seem that much might be done in this county by an institution like this, co-operating with local societies, to furnish that which the lyceums no longer supply.

MAILING THE JOURNAL.

We have to apologize for the delay in mailing the two last numbers of the *Journal*. So large have been the editions, that, with all the force that could be employed in the mailing-room, the whole could not be sent away in less than *two weeks* from the day of publication. To remedy this, we have, at large expense, adopted the "Dick" system of mailing and book-keeping, and soon our subscribers will find upon each number of the *Journal* the little printed slip of yellow paper, containing the subscriber's name and the date to which subscription moneys have been paid. This will save all duns and errors, we trust, and greatly facilitate the speedy and correct delivery of every number.

THE GREAT ECLIPSE. — To thousands of our readers residing in Iowa, Illinois, Kentucky, the Carolinas, etc., the late eclipse of the sun was indeed *great*, because it was *total*. To those residing in the Eastern States, the spectacle was less sublime and wonderful; but still the amount of "smoked glass" brought into requisition was as large as that employed in more favored localities. The day was clear and favorable so far as we have learned, and the millions of eyes upturned to the great luminary were able to watch the phenomenon from the beginning to the close. The exact scientific observations of astronomers, with their delicate instruments, — the telescopes, spectroscopes, photographic apparatus, barometers, thermometers, hygrometers, etc., etc., — have not yet been presented to us in detail, but we shall soon have them. How exact and wonderful are the deductions of science! At precisely the instant of time predicted, our satellite impinged its broad disk upon that of the sun, and the whole affair was in perfect accord with mathematical results. How few of the many great facts in astronomical science would enter into the popular belief, if there were not some astounding demonstrable results, like the calculation of eclipses, the transits of stars, the movements of the great tidal wave over our earth, etc., etc.!

The statement that iron, chromium, barium, and other metals have been found in the photosphere of the sun, at a distance of 95,000,000 of miles from us, is only assented to as true, because of the proved exactness of eclipse calculations. The same may be said of the wonderful deductions of the other sciences; and fortunate indeed is it for the world that eclipses occur, and that the chemist can burn iron, steel, diamonds, and the most refractory substances with as much ease as shavings of wood, as thereby confidence is established in those sublime truths of science which do not admit of popular demonstration.

Bradford Academy.—The reader's attention is called to the advertising department of the *Journal*, where will be found the modest announcement of the school-term of Bradford Academy. This institution, as is well known, is one of the most excellent and trustworthy of our many schools for young ladies. It has a history interesting and honorable. The new and magnificent school-building, erected at a cost of *one hundred thousand dollars*, occupies a position of unsurpassed, picturesque beauty, commanding a view of the valley of the Merrimack for several miles, and of the city of Haverhill throughout its entire extent. We believe this structure to combine more comforts, conveniences, and excellences, as a school for ladies, than any other in the country. Parents can send their daughters to Bradford Academy with the fullest assurance that they are *safe;* that they will be cared for, watched over in sickness and in health, and be thoroughly instructed and trained, morally, intellectually, and physically. We make these remarks because we have long known of the high character of this institution, and because we also know that, in many households where the *Journal* is received and read, the anxious inquiry is often made, "To whom shall we intrust the education of our daughters?"

☞ The *Journal* of the *Gynæcological* Society of this city made its appearance in July under the editorial charge of Prof. Storer and Dr. Lewis. It promises to be a very able and useful medical publication, and one which every practitioner will need to have upon his table. The extensive experience and high scientific attainments of the editors and conductors is a sufficient guarantee that the *Journal* will be an important addition to American medical literature. It should be generously sustained by the profession.

Preserving Fruits.—This is the season for canning fruits and vegetables for winter use, and we advise our friends to provide a generous store of these luxuries. The jar or can which we have tried and found most convenient and perfect is what is known as "Moore's Patent," manufactured by Messrs. Moore & Co., Clayton, N. J. The jars and lids being all made of glass, there is no metallic contact with the fruits, and no part to rust or corrode. A simple turn of a screw on the top of the jars fastens the cover, and hermetically seals the package. It is a most convenient and excellent device.

☞ It is apparent from an item under the editorial head found in the issue of the *Boston Medical and Surgical Journal*, July 12, that the editor is greatly troubled with—*worms!* It is a bad case: who will prescribe?

BOOK NOTICES.

On the Detection of Red and White Corpuscles in Blood-stains. By Joseph L. Richardson, Microscopist to the Pennsylvania Hospital.

The above is the title of a very interesting medico-legal paper in the July, 1869, number of the *American Journal of Medical Science.* In murder trials the question arises as to whether certain blood-stains upon the prisoner's clothing are those of human blood. By macerating in pure water a portion of the stain under a 1-25 immersion objective, Dr. R. finds the red corpuscles distended and almost broken, and yet capable of measurement with a cobweb micrometer. The elaborate researches of Carl Schmidt and others in regard to the exact variation of size among the blood-corpuscles in different species of vertebrates, having been laid before the profession, and Dr. Richardson having shown how the corpuscles in stains may be detected and measured, we see that a valuable contribution has been made to medical jurisprudence. We welcome cordially any addition to the literature of blood morphology; but can Dr. Richardson expect credence with his three or four experiments and mensurations of *ten* red blood-corpuscles, when influential and reputable *savans*, so called, thrust Dr. Salisbury aside, with his tens of thousands of observations, extended over a long space of time, as unworthy of anything but ridicule?

Medicine and Pharmacy.

HAY-FEVER.

The month of August is the time when the disease known as "hay-fever" prevails in all its disagreeable intensity. It is certainly a most extraordinary and baffling affection, and one which is unmistakably on the increase in the Northern States. Formerly, say thirty years ago, it was rare to find a case in a wide circle of practice; now it really seems as if there were hardly a neighborhood in which less than a dozen victims are found. Thus far, the disease has resisted all methods of treatment; and physicians can only send their patients to the seashore, or to the mountains, with any hope of relief. Some forms of the affection are relieved by a seaside residence; others are not in the slightest degree mitigated. We know of a gentleman who is relieved when in a boat on the salt water; but the instant he touches land, it returns with unusual violence. The neighborhood of the White Mountains appears to be the most favorable locality for relief from suffering. A large number of persons have been cured by a residence at Gorham and Conway, N. H. Probably the most judicious advice a physician can give a hay-fever patient is, to recommend a trip to, or residence at, the mountains during the season when the attack is expected.

What is the cause of this singular affection? Who can reply? A lady informs us that it is brought on in her case by passing over a certain road in which there is a depression of a dozen rods in extent. She is well enough until this depression is reached, when she instantly begins to sneeze, the eyes become filled with water, and the nose and throat with mucus. By the time she reaches the other side, the disease is firmly established. Another states that the odor of an apple in a room, or in the hand of a person, will bring on the affection; another, that flowers or new-mown hay will cause it; and still another is positive that a certain room in a house cannot be visited in August without resulting in a violent attack. It assumes the form of violent catarrh, and is attended with exquisite suffering in many instances. The time of continuance is from four to eight weeks. Two instances have come under our observation, in which, after about four weeks' duration, typhoidal symptoms set in; and the fever clung to the patient far into October.

We have waited anxiously for the treatise upon this subject which it is understood Dr. Wyman, of Cambridge, has for several years contemplated preparing. He is a victim to the disease himself, and has taken great pains to collect facts and study cases, so that in such able hands we may expect an interesting and exhaustive treatise, which is much needed by the profession.

Recently it has been asserted that the affection is caused by the presence of *vibriones* in the atmosphere, and that great irritation results from their contact with the mucous surfaces of the upper air-passages. A distinguished *savan*, Helmholz, reports in *Virchow's Archiv* that he has succeeded in finding vibrios in his own nasal secretions, when suffering from this form of catarrh. He also states that a saturated neutral solution of quinine dropped into the nasal passages afforded immediate relief. We are ready to welcome any reliable researches which will throw light upon this subject, and through which a remedy may be pointed out.

Subcutaneous Injection of Morphia.—It is certain that one of the most important aids to the physician in his professional labors is the employment of remedies subcutaneously. If this method were confined alone to one agent, morphia, it ought to confer immortality upon the discoverer. We have ourselves experienced the immense value of this form of employment of the alkaloids of opium, and cannot too fully express our thankfulness for its benefits.

If the instruments used are perfectly clean, and the solution free from extraneous bodies, we do not believe unpleasant results will ever occur when morphia is injected under the skin. In this form, the drug acts with much greater intensity and rapidity; the duration of its effects is prolonged; it is well tolerated by the stomach; does not produce cerebral disturbance; seldom constipates the bowels; in short, morphia hypodermically used becomes, so to speak, a new remedy, or an old one with its value a thousand times enhanced.

In cases of insomnia, resulting from excited nervous action, its employment in this form affords the physician a ready and safe means of relieving his suffering patient. Acute pain, from bowel affections, rheumatism, etc., is almost instantly mitigated, and the patient put in condition to be favorably influenced by such other remedies as the case may require. In short, there is no form of disease in which morphia is better given by the mouth than placed under the skin.

The initial dose for an adult man is regarded to be from one-sixth to one-fourth grain; for a woman, it should be smaller,—from one-eighth to one-sixth. We prefer the acetate to any of the other salts of morphia; indeed, it is difficult to understand how the sulphate of morphia came to be more favorably regarded by physicians than the acetate. An organic acid, in combination with the alkaloid, certainly more exactly corresponds with its natural condition, as it exists in the dried juice of the poppy; and theoretically we ought to regard it with favor.

A NEW MYRRH MIXTURE.

Editor Boston Journal of Chemistry:

I send you a formula for a myrrh mixture which I have prepared here, and find very useful as a tonic in place of the Griffiths mixture. It will keep any length of time, and is quite agreeable to the taste. Dose, one to two teaspoonfuls half an hour after each meal.

You are at liberty to publish it, with any improvement you may think proper.

Yours truly,

H. H. Hill, M. D.

Augusta, Me., July 29, 1869.

MIXTURE OF MYRRH AND PYROPHOSPHATE OF IRON.

℞.	Gum myrrh Turkey,		
	Pyrophos. iron,	āā.	℥ij.
	Sugar,		℥v.
	Tinct. ol. gaultheria,		ʒx.
	Brandy,		℈ss.
	Aqua,		℈iij ss.
	Carb. magnesia,		℥j.

Tincture the myrrh with the brandy, then mix the tinctures with the magnesia and sugar rubbed together, add the water gradually and filter. Then add the iron, and, when fully dissolved, filter again. Alcohol may be substituted for the brandy.

TREATMENT OF BURNS.

Editor Boston Journal of Chemistry:

The frequent difficulty experienced by physicians in affording prompt relief in cases of burns induces me to offer to them, through your paper, two remedies or applications which have served me well in the cases above named: frequently affording almost *instant relief* to pain, and preventing the separation of the cuticle in cases where a blister seemed inevitable. The first is, to envelop the injured part immediately with the pulp of the *raw potato*. The second is, to apply linen cloths, dipped in a mixture of sweet cream and *subnitrate of bismuth*, in the proportion of one ounce of the latter to a pint of the former, repeated once in two or three hours. In cases which are first visited three or four days after the accident, I have found the latter application to answer the best of the two.

A. H. Lamphear, M. D.

Atchison, Kansas, Aug. 9, 1869.

VOLATILE LINIMENT.

Editor Journal of Chemistry:

I wish to call attention to a new formula for volatile liniment. I propose to substitute cod-liver for olive oil, thus:

℞. Liquor ammoniæ, f ℥ j
Oleum morrhuæ, f ʒ ij M.

Such a formula may have been used before, but if so I have never seen it. It makes an elegant preparation, and combines a tonic effect with that of the liniment. It is a valuable mode of administering the oil by inunction in chronic and wasting diseases of children, rheumatism, etc.

G. W. H. Kemper, M. D.

Munice, Ind., Aug. 10, 1869.

Cincho-Quinine. — *Messrs. J. R. Nichols & Co.:* The specimen of cincho-quinine which you sent me has been received, and I have had a patient with remittent fever who could not take the sulphate of quinine on account of an irritable stomach, and to whom I gave the cincho-quinine. It was not only retained, but did not affect the stomach or brain unpleasantly in the least degree. It was a little boy of about six years of age, and a fine specimen of the nervous temperament.

I will be much obliged if you will send me two ounces cincho-quinine by express, as I have several patients who cannot take the sulphate, and the season is at hand when a substitute must be had.

A. Donald, M. D.

Demopolis, Ala.

CHEMISTRY AND PHARMACY.

The "New Nomenclature" in chemistry is now adopted by nearly all teachers of that science, and ere long the old technical vocabulary will probably have fallen into disuse, and new generations of graduates will come into our ranks, speaking a chemical language unknown to many of us, and not comprehending the obsolete terms which older practitioners will continue to employ. The younger man may possibly guess what is meant by "sulphuretted hydrogen"; but his older companion will not know what compound is intended by the term "dihydric sulphide." Senex, who may be thoroughly conversant with the effects of "carbonic acid," will not be apt to imagine that Juventus applies to this gas the appellation of "carbonic dioxide," but will refer it to the only "carbonic oxide" of which his former reading has informed him.

Such misunderstandings, however, are of minor importance; for medical men are not as a rule prone to enter upon very profound chemical discussions in their ordinary colloquial intercourse. But there is a graver side to the question, which bears upon the practical, every-day business of our profession; and this relates to the matter (or rather to the manner) of prescribing.

Chemistry is the parent of Pharmacy, and its phrases and formulas are laws to its offspring. The new nomenclature, involving, as it does, a vast number of compounds used for medicinal purposes, and being likely to be exclusively taught to future dispensing druggists, must ultimately necessitate material changes in our pharmacopœia. In some respects the alteration would be desirable, inasmuch as many of the terms derived from older chemistry are inaccurate in the light of modern science, and their retention serves to perpetuate error: but if the change be thorough, — if things are to be "called by their right names," — "confusion worse confounded" will reign among prescribers of the old school. We shall have to learn that calomel is "*mercurous chloride*" and corrosive sublimate "*mercuric chloride*," and that, consequently, abbreviations must be renounced, since "mercur. chlorid." would apply to either; that "*spiritus etheris nitrici*" is not spirits of nitric ether at all, but an alcoholic solution of "*ethylic nitrite*"; that "*sulphuric ether*" contains no suspicion of sulphur, but should be written "*ethylic ether*"; and many other pieces of new information. To be sure, our convenient abbreviations will still answer for some substances: "*sod. chlorid.*" and "*potass. iodid.*" will apply as well to "*sodic chloride*" and "*potassic iodide*" as to the titles by which those drugs are now dispensed, and, as a good many prescribers know the remedies they use only by such abbreviated "nicknames," the alteration will not give them much concern.

It is evidently proper that the pharmacopœia should be in accordance with scientific chemistry; and it is certainly necessary that medical prescriptions should be in accordance with the pharmacopœia, even if the majority of the profession be forced to go to school again. For our own part, we should welcome any measure which would lead to greater care in writing prescriptions, and better acquaintance with some of the substances to which prescriptions relate. — *New York Medical Gazette.*

☞ Dr. C. W. Davis, of Indianola, Iowa, writes that he has treated several cases of "Sulphuretted Hydrogen Dyspepsia" successfully, by the use of the following mixture:

Nichols' solution carbolic acid, }
Pure glycerine, } ea. ʒi.
Peppermint water, } (Mix.)

Use teaspoonful as a gargle, cleansing the throat, fauces, and mouth well; after which, take from 15 to 20 drops of the same mixture internally. By using the carbolic acid mixture, as above directed, the most offensive and fœtid breath can be rendered sweet, and offensive eructations prevented.

Prophylaxis of Scarlet Fever and Measles. — Dr. J. C. Peters makes this suggestion in the *New York Medical Gazette:*

It often becomes necessary or desirable to give some remedy which is supposed or believed to be preventive, or ameliorative of these diseases. Belladonna is unreliable in small doses and dangerous in large quantities. Besides, its effects are so similar to those of scarlet fever that the physician may be plunged in doubt as to which is the effect of the remedy, and which of the disease, when it has been given antecedently, both long and frequently. I have seen many children escape after great exposure to scarlet fever without the use of any prophylactic, or precautionary treatment; and I have seen it occur in a malignant and fatal form after Belladonna had been given regularly for two or three weeks before the occurrence of the attack. I now never use Belladonna to prevent scarlet fever, but rely entirely upon the sweet Spirits of Nitre. This is a mild and safe remedy which can complicate the disease in no possible way. It lessens the fever and restlessness, and prevents the occurrence of disease of the kidneys. As a diuretic, it may eliminate the poison so rapidly and completely, that the system cannot become affected, nor the disease reach its full and fatal development. Comparative experiments prove that it is more reliable than Belladonna, and far more safe.

Employment of Glycerine of Tannin. — Dr. Sidney Ringer (*The Practitioner*) states this preparation of tannin is very useful in many diseases. It is not laid down in the United States Dispensatory, but Adolphe Wahltuch, M. D., alludes to the following formula for its preparation in the *Dictionary of Materia Medica and Therapeutics:*

℞ Gallic acid, ℥ i.
Glycerine, f ℥ iv.

Rub and heat. In ozæna, this combination is highly prized by Dr. Ringer. He also recommends it in the thin sanious or thicker purulent discharge from the nostrils which sometimes occurs after measles and scarlatina; in the obstruction of the nose frequent in syphilitic children. The purulent discharge from the ears, so often met with in unhealthy children, can be stopped at once by filling up the internal meatus with this preparation. If there be acute inflammation of the meatus, this should be relieved before using the tannin.

Tincture of Paullinia. — M. Stanislas Martin, in the *Bulletin de la Therapeutique*, says that the *Paullinia*, which in Brazil, whence it comes, bears the name of "Guarana," is prepared by the Manheem Indians. According to Riadel, he says, it is a compound of tapioca farina, of cocoa and of paullinia seeds, made into a homogeneous paste, and dried in the sun. The names of medical men in Brazil are cited as having praised the drug as a tonic, anodyne and febrifuge. Dr. Martin's analysis showed it to be composed of glycyrrhizin, albumen, gallic acid, bitter resin, fatty matter, and vegetable (including woody) extractive matter. At Rio de Janeiro this substance is given in powder, or made into pills, pastilles or tincture. Since 1846 it has had a place in French therapeutics, being employed in France in the form of powder, or dissolved in alcohol. Dr. M. proposes the following formula for the tincture:

℞ Paullinia in impalpable powder, 100 parts.
Alcohol at 80 degrees, 250 parts.
Distilled water, 250 parts.

Macerate for fifteen days in a bath heated to ten degrees (centigrade), taking care to agitate frequently. Express, and filter through paper.

Treatment of the Vomiting in Colic. — Dr. George Atwood, of Fairhaven, Mass., recommends, in the *Boston Medical and Surgical Journal* for July 23, 1868, p. 393, the treatment of common colic by the hypodermic injection of morphia, in the dose of one-third or one-half a grain of the acetate or sulphate in the smallest quantity of water, thrown into the arm. If, after waiting ten or fifteen minutes, any pain should remain, the dose may be repeated.

One or two teaspoonfuls of the tincture of lobelia, in a quart of water, thrown up the rectum, will, in the early stage of colic, afford immediate relief. It is much safer and more efficacious than Dr. Mackintosh's tobacco injection.

Treatment in Diarrhœa of Infants. — Dr. Smith (*Medical News and Library*), in his valuable papers on the "Wasting Diseases of Infants and Children," recommends the following prescription, if the bowels are rather loose, with dark, slimy, offensive stools:

℞ Tinct. opii, ♏ viii.
Ol. ricini, ʒ j.
Syrupi zingib.
Mucilag. acaciæ, āā ℥ j.

M. S. A teaspoonful three times daily. In the screaming fits, accompanied by constipation, this combination of castor-oil with laudanum is very valuable.

A Soluble Salt of Mercury for Hypodermic Injections.—M. Couilhon suggests, in a late number (15th April) of the *Bulletin de Therapeutique*, a solution of the double iodide of mercury and sodium for hypodermic injections. It is soluble in water without decomposition; it is active, yet not irritating to the tissues; it is manageable and safe. One and a half parts of this (by weight) in one hundred parts of water gives a solution, of which ten drops can be administered every other day in syphilis. After a week or two, the amount of the injection can be increased ten drops at a time. — *Medical Archives.*

Dr. Pavy, of Guy's Hospital, recommends opium or morphia as exerting a controlling (in one case curative) influence in diabetes. He begins with large doses, — half a grain of morphia three times a day, — and increases according to effects.

For chills, chronic with anæmia, —

℞. Acid arseniosi, gr. jss.
Quin sulph.
Ferri sulph. (exsiccat,) aa ʒ j.
Morph. sulph., gr. j.
Ext. nucis vomicæ, ℈ j. M.

In pil. xxx ft. S. — One three times a day.

Dr. King (*Medical and Surgical Reporter*) has used permanganate of potassa with the happiest results in rheumatism. His formula is, —

℞. Permanganate of potassa, gr. ij.
Syrup of Sarsaparilla, ℥ j.

One teaspoonful to be taken three times a day.

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. IV.—No. 4. BOSTON, OCTOBER 1, 1869. FIFTY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—A receipted bill will be sent by return mail to any subscriber who will enclose with his subscription a three-cent postage stamp, return postage.

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Contents.

Familiar Science.

THE HAIR: HAIR DYES AND WASHES.

The deep interest felt in the welfare of the natural covering to the head is evinced by the expenditure of much time and large sums of money in attempts to preserve and adorn it by all classes of people. Upon no subject have we been more frequently requested to express opinions or supply information than upon that of the hair, and the increasing demand for dyes, washes, and "preservatives" indicates how wide-spread and well nigh universal is the interest in the matter. These considerations have led us to make some observations upon the hair, and the substances used to change its tints and improve its condition.

The adornment of the hair, and the forming of it into fantastic shapes, has been practised by women in all ages, and in no direction have the caprices of fashion been more strikingly displayed than in disposing this natural covering of the head. The early Hebrew women gloried in their luxuriant tresses, plaiting them, and adorning their heads with ornaments of gold, silver, and precious stones. The Greeks allowed their hair to grow to a great length, while the Egyptians often removed it as an incumbrance. There is no "fashion" connected with the hair, in vogue at the present time, which is new. It is not a modern idea to resort to borrowed or "false" hair to satisfy the caprices of fashion, neither is it to dye the hair, or dress it with unguents and oily substances.

The Greek, Egyptian, Carthaginian, and Roman ladies, more than twenty-five centuries ago, made use of the most extravagant quantities of borrowed hair, and they wound it into large protuberances upon the back of their heads, and to keep it in place used "hair-pins" of precisely the form in use at the present time. The Roman women of the time of Augustus were especially pleased when they could outdo their rivals in piling upon their heads the highest tower of borrowed locks. They also arranged rows of curls formally around the sides of the head, and often the very fashionable damsels would have pendent curls in addition. An extensive commerce was carried on in hair, and after the conquest of Gaul, blonde hair, such as was grown upon the heads of German girls, became fashionable at Rome, and many a poor child of the forests upon the banks of the Rhine, parted with her locks to adorn the wives and daughters of the proud conquerors. The great Cæsar indeed, in a most cruel manner, cut off the hair of the vanquished Gauls and sent it to the Roman market for sale, and the cropped head was regarded in the conquered provinces as a badge of slavery.

To such a pitch of absurd extravagance did the Roman ladies at one time carry the business of adorning the hair, that upon the introduction of Christianity, in the first and second centuries, the apostles and fathers of the church launched severe invectives against the vanity and frivolity of the practice. It must be confessed the ancient ladies did outdo their modern sisters. The artistic, professional hair-dressers of old Rome were employed at exorbitant prices to form the hair into fanciful devices, such as harps, diadems, wreaths, emblems of public temples and conquered cities, or to plait it into an incredible number of tresses, which were often lengthened by ribbons so as to reach to the feet, and loaded with pearls and clasps of gold. No wonder such exhibitions of vanity excited the wrath of that stubborn old bachelor, St. Paul, and called forth his maledictions. It would be curious if, before the present fashion of arranging the hair among the ladies burns out, the extreme customs of a pagan age should come round again.

In ancient times, people grew old as they do now, and the frosts of age blanched the raven locks of youth, and also there were those with hair glowing with red, or other tints not deemed desirable. Hence it was that hair dyes came into use, and a brisk demand for substances capable of changing the color of the hair has been maintained for thirty centuries.

The substances employed before the science of chemistry was understood, were usually quite ineffective in their influence. They were, for the most part, fugitive vegetable stains, which water would easily remove. There was, however, a metallic mixture made in Egypt which possessed qualities of the highest excellence. If the statements of some writers can be relied upon, this mixture was far superior to any form of hair-dye known to modern chemists. There is at the present time a dye used by the Armenians, in the East, which may be, in many respects, like the ancient dye. It is a metallic substance, resembling dross. This is powdered, and mixed with fine nut-galls and moistened. A little of the paste is taken in the hand and rubbed into the hair or beard, and in a few days it becomes beautifully black. Those who have visited the Armenian convents in Turkey can but have admired the fine black beards of the monks, even those of advanced age. This dye is undoubtedly composed of a mixture of iron and copper, which metals, in conjunction with the gallic acid formed from the galls, produces a dye of superior excellence.

The hair dyes in use at the present time are, for the most part, objectionable in some one of their features, or they are untidy or inconvenient to apply. The dye which has been so fashionable during the past ten years is a poisonous compound, being composed largely of one of the salts of lead, (the acetate.) This mixture was brought into notice soon after the close of the Mexican war, and was known as "General Twiggs' hair dye," the General of that name having first successfully used it. Nearly all the "Restoratives," "Washes," "Embrocations," "Dressings," "Dyes," etc., found in the shops are identical in composition, being made from this formula. The number of popular mixtures of this kind, having different names, and which were made and sold by different parties, at one time exceeded *forty* in the

United States. The formula and method of preparing it is exceedingly simple. Take of

Finely powdered Acetate of Lead — 120 grains.
Lac Sulphur — 160 grains.
Rose Water — one pint.
Glycerine — one ounce.

Mix the glycerine with the water, and add the acetate of lead and sulphur. The mixture must be well shaken before using. The lead and sulphur do not all dissolve in the rose-water, but fall to the bottom of the vessel as a precipitate. This preparation will gradually dye the hair a black or dark brown color if a small quantity is rubbed into it once or twice a day. Its frequent use is however attended with great danger, as numerous instances of lead poisoning have resulted from its employment. There are many other hair dyes into which lead enters which are equally objectionable. The following is a well-known formula:

Powdered Litharge (oxide of lead) 2 oz.
Quicklime — ½ oz.
Calcined Magnesia — ½ oz.

Mix the powders, moisten with water, and apply the paste to the hair and allow it to remain four hours. This affords a dark brown color; for a deep black, it must remain eight hours.

The solution of plumbate of potash is a very convenient dye. It is slow in its action, but it does not stain the skin. It is prepared by dissolving in four ounces of liquor of potassæ as much freshly precipitated oxide of lead as it will take up, and dilute the resulting clear solution with twelve ounces of pure water. It may be applied as a wash to the hair. The permanganate of potassa forms an excellent dye, where a dark-brown color is desired. It is safe and easily applied, but it has the disadvantage of staining the skin. If care is used, this need not occur. The solution may be made by dissolving in two ounces of distilled water 120 grains of the crystals of permanganate of potassa.

One of the most common forms of hair-dye, as found in the shops, is prepared from nitrate of silver.

Nitrate of silver, 1 oz.
Rose-water, 7 oz.
Dissolve the silver in the rose-water.

This is the dye. Previous to applying it to the hair, it must be wet with the following solution:

Sulphuret of potassium, 1 oz.
Water, 6 oz.

After the hair is dry, the silver solution is applied with a brush. The odor of the mordant is very disagreeable; and this dye, although very quick and certain in action, cannot be regarded as very desirable. An inodorous silver dye is prepared as follows: Dissolve one ounce of nitrate of silver in six ounces of water, then add liquor ammonia by degrees, until the solution becomes cloudy from the formation of oxide of silver; continue to add ammonia until it becomes clear again from the re-dissolving of the oxide of silver. This is the dye. Before applying it, the hair must be washed in a solution of pyrogallic acid, made by dissolving sixty grains of the acid in eight ounces of rose-water. This is an excellent and safe dye; but its employment is attended with some trouble, and care must be used. A large number of other formulas for hair-dyes, might be given, but these are sufficient. Their nature and methods of use will be readily understood.

The frequent use of "oils," "bear's grease," "arctusine," "pomades," "lustrals," "rosemary washes," etc., etc., upon the hair, is a practice not to be commended. All of these oils and greasy pomades are manufactured from lard-oil and simple lard. No "bear's grease" is ever used. If it could be procured readily, it should not be applied to the hair, as it is the most rank and filthy of all the animal fats. There are many persons whose hair is naturally dry and crisp, and in most families there is a want of some innocent and agreeable wash or dressing which may be used moderately and judiciously. The mixture which may be regarded as the most agreeable, cleanly and safe is composed of cologne spirit and pure castor-oil. The following is a good formula:

Pure, fresh castor-oil, 2 oz.
Cologne spirit (95 per cent), 16 oz.

The oil is freely dissolved in the spirit, and the solution is clear and beautiful. It may be perfumed in any way to suit the fancy of the purchaser. The oil of the castor-bean has for many years been employed to dress the hair, both among the savage and civilized nations, and it possesses properties which admirably adapt it to this use. It does not rapidly dry, and no gummy, offensive residuum remains after taking on the chemical changes which occur in all oils upon exposure to light and air. It is best diffused by the agency of strong spirit, in which it dissolves. The alcohol or spirit rapidly evaporates, and does not in the slightest degree injure the texture of the hair. This preparation, for dressing the hair of children or ladies, will meet nearly or quite all requirements. A cheap and very good dressing is made by dissolving four ounces of perfectly pure, dense glycerine in twelve ounces of rose-water. Glycerine evaporates only at high temperatures, and therefore under its influence the hair is retained in a moist condition for a long time. As a class, the vegetable oils are better for the hair than animal oils. They do not become rancid and offensive so readily, and they are subject to different and less objectionable chemical changes. Olive-oil and that derived from the cocoanut have been largely employed, but they are inferior in every respect to that from the castor-bean.

It is doubtful if any mixture or substance has ever been devised which will restore hair to a bald head. A great many washes and embrocations are manufactured, all of which usually fail to meet the end desired. The falling of the hair is the result of diseased action in the hair follicles, or to a morbid condition of the entire scalp. When a hair is pulled out "by its roots," its base exhibits a bulbous enlargement of which the exterior is tolerably firm, whilst its interior is occupied by a softer substance which is known as the "pulp"; and it is to the continued augmentation of this pulp in the deepest part of the follicle, and to its conversion into the peculiar substance of the hair when it has been pushed upwards to its narrow neck, that the *growth* of the hair is due. A hair does not begin to grow from the true skin, but originates in the *epidermis*, and is essentially like that covering, being composed of aggregations of cells filled with horny matter, and frequently much altered in form. Hence it will be understood how difficult it is to excite action in a part possessed of such low vitality, and how poor the prospect must be of compelling hair to grow by any stimulus externally applied. Still, mixtures containing ammonia, vinegar, soap and vesicating tinctures are sometimes thought to prove beneficial. The fall of the hair will usually cease from natural causes in a short time, the germinal vessels taking on healthy action spontaneously. The frequent washing of the head in tepid or cold water, and friction with a brush or coarse towel, is to be commended.

The English artisans are making window sashes of copper, which is much better than wood.

THE MOON.

The late eclipse, so interesting and wonderful in all its aspects, has naturally awakened a new interest regarding the physical character, not only of the great solar orb, but of our beautiful satellite, the moon. A correspondent sends us some observations which, we think, will interest our juvenile readers, if they do not those of more advanced years. He remarks:

There are some *queer things* about our amiable celestial companion. In the first place, *she never shows us but one of her sides.* Is it possible that she is a dissembler, after all, and has anything to conceal? Scarcely. We had much rather attribute her conduct in this respect to *eccentricity.* Whatever may be her motives, the fact that we never see but one side of her is easily explained. It takes her a little more than twenty-seven days to revolve once around our earth — and it so happens that she requires *just as long a time* to revolve once on her own axis.

To explain this, let any one of your young readers place an apple, to represent the earth, on a table in the centre of a circle. Let another apple, to represent the moon, be moved in the circle around the central apple, care being taken to keep the *same side* of the moving apple always turned towards the apple in the centre. It will be found that when the revolving apple has completed a circle round the stationary one, it has made one revolution on its own axis. It is clear that a fly stationed on the central apple, even if he follows the moving apple all the way round, never sees but one side of it. This is a singular arrangement, and, whether or not we *know* what it means, it doubtless means *something.*

There is another sense in which our *secondary* is *one-sided.* Let us explain: Suppose we take a round ball of wood, and bore a hole from one side into the exact centre. Now, if the ball is exactly even and we insert a wire until it reaches the exact centre, the ball will be balanced upon that point. But suppose that, after we have done this, we bore another hole in the side of the ball, and fill it with lead, and try to balance the ball now on the centre, — what will be the result? Of course it will not balance, but the side on which the lead is will overbalance the other; and, if we wish to balance the ball now, we must find a point somewhere away from its centre, and on that side of the ball which contains the lead. The centre which we *first* found is the *centre of the figure*, while the *balancing* point is called the *centre of gravity.* Exactly so with the moon. The *centre of her figure is different from her centre of gravity*, and the heavier side is that which is always turned from the earth. What a singular fact have we here!

The question is often asked, if the moon is inhabited. Let us speculate a little. Of course it is meant, inhabited by beings similar to the inhabitants of the earth, for we have no knowledge of any other.

It is certain that the moon keeps whatever she has on her surface by the force of *attraction of gravitation.* Gravitation is only another name for *weight*, and everybody knows that everything that has weight seeks to get as low as possible, and will fall unless sustained by some other power; that is, all bodies on the earth would, if not prevented, fly at once to the centre of the earth. We say water seeks its level. What is this but saying that water gets as near the centre of the earth, which is her centre of gravity, as possible? and just so with the atmosphere.

It is precisely the same with the moon. If there is any atmosphere around her, it will get just as near her centre of gravity as it can; and, if it can get nearer by

going all on one side of the moon, it will be sure to go there.

But suppose it cannot *all* get on one side; then a little may extend over on the other hemisphere. *Perhaps* this accounts for the fact that philosophers, seeing only one side of our satellite, for a long time believed there was no atmosphere around the moon; while more accurate instruments and experiments seem to reveal the existence of a very slight and thick atmospheric covering. Now, unless things are very different in the moon from what they are on the earth, where there is no atmosphere, it is difficult to see how there can be any water; and besides, if the water is free to flow, that, too, would all accumulate on one side of the moon, — that is, on the side which we never see. How can beings like those on the earth live where there is neither air nor water? But it may be said, "How do we know but such beings may live on the *other* side of the moon?"

Well, perhaps they do. If so, we pity them, — if for no other reason than that they can never see a moonlight night. If the proverbial "man in the moon" lives on our side of that orb, to him our earth is a moon, and is always over him and always full. Look at the two apples again, and see if it is not so. If we cannot see the far side of the moon, our earth cannot be seen from that side; consequently that side has no moon.

And thus, again, as the moon turns on her axis only once in about twenty-eight days, *her day is equal to twenty-eight of our days*, — fourteen days of light and fourteen days of darkness. Such a state of things would be anything but agreeable to us. The sun blazing with all his power for fourteen days continually, without once setting, would, unless modified by other causes, produce a parching heat; and then fourteen days of darkness, with not a ray of sunlight or heat, and no moonlight on one of her sides, would be attended with an intense degree of cold. Such an arrangement does not seem very well adapted to the support of life in such creatures as we are.

But we might extend our speculations *ad infinitum*.

Arts.

ADULTERATION IN FOOD.

Editor Journal of Chemistry:

Your article on "Adulterations," in the last number of *Journal*, is timely and truthful; but, having had some experience in the investigation of this subject, I must differ from you in one or two points. You say, "If every housekeeper would demand of his grocer pure spices, sugars, cream of tartar, etc., he would fare much better than he now does." Perhaps he might fare a *little better*; but the main difficulty would remain, as I know by experience. I once bought some ground coffee, "warranted pure." It proved to be largely adulterated with chickory. On returning it, the dealer said he could not depend on the grinder. I then inquired his price for the same coffee roasted, but not ground, and it was two cents the pound more; thus showing at once the complicity of the seller. You further say, "Large dealers and small ones almost always *know* regarding the purity of their articles." This may be the case with some of the large dealers; but I know that it is not so with the retailers. But few if any of them are competent, or know how to detect adulterations. But this is not the worst of the matter: but few of them care anything about the quality of the article they sell; if it sells, and customers do not complain, that is all they require. I have offered to show a retailer, doing a large trade in Washington Street, how to detect adulteration of coffee. He did not care to know; customers bought his coffee, and that was enough! I have, within a few months, bought "kerosene" oil, so called, of a grocer. He did not know by whom or where it was made, or professed he did not: it proved worthless, not giving so much light as a tallow candle. Such indifference and ignorance is caused by a mistake as to the duty a retailer owes to his customers. The retailer is paid a profit on his goods by the consumer for the exercise of his skill, judgment and experience in selecting good and pure articles; and, if he is wanting in skill, judgment and experience, he is unfit for his business. Again, you say, "Legislative enactments can never bring about a reform." Here I must disagree with you. Such laws as we have had, I admit, will not; for it has been the case that laws have been made punishing the dealer only for *knowingly* selling an adulterated article. In ninety-nine cases in a hundred, it is impossible to prove the *knowledge* of the seller, though he prepared the factitious article with his own hands. But pass a law imposing a penalty for adulterating, or selling an adulterated article, thus making it the business, as it should be, of the retail and wholesale dealers both to know what they offer for sale, and the evil will be rooted out soon after a few convictions. But I fear no such law can be passed while so many of our legislators are themselves the parties liable to punishment. C. S.

BOSTON, Sept. 1, 1869.

THE AVERAGE WEIGHT AND HEIGHT OF MAN.

Editor Journal Chemistry:

Quetelet, who has devoted more attention to this subject than any other writer, gives the average weight of an adult male 136.993 pounds, and the average height 5.333 feet.

Dr. Gould, who examined a large number of students in the junior and senior classes at Harvard University and Yale College, together with some members of the professional schools, reports their average height 5.666 feet, and average weight 139.700 pounds. A. Maclaven, who has the charge of the gymnasium connected with the Oxford University, England, reports of the first one hundred names on his book, as they arrived at the University, their average height 5.825 feet, and average weight 132.970 pounds.

From the vital statistics of all the members of Amherst College from 1861 to 1869 — making over 600 different students — their average weight was found to be 139.485 pounds, and average height 5.651 feet.

DR. NATHAN ALLEN.

LOWELL, MASS.

GUM FOR LABELS, POSTAGE AND REVENUE STAMPS.— The following recipe is published in a late number of *Dingler's Polytechnic Journal:* Five parts of good glue are to be digested for one day with twenty parts of water, after which nine parts of candy or sugar and three parts of gum arabic (not cherry gum) are dissolved in it. This solution is then ready to be spread upon paper. It keeps well, does not get brittle nor wrinkled, and does not make the sheets stick together when they are piled upon each other. The following is recommended as a good paste for labels for letters, and soda-water bottles: Stir into one pound of a paste of glue and rye-meal one half an ounce of turpentine.

Labels attached with this gum do not get loose in damp cellars. Moreover if, for convenience sake, it is desired to gum these labels preparatory to using them, add one half an ounce of oil varnish and one quarter of an ounce of magnesia to one pound of the former paste, and use it then.

PHYSICAL CULTURE.

Editor Journal of Chemistry:

The first instance in the whole history of modern education where the claims of the body, its proper development and healthy training have been placed, in a large institution, upon the same platform, and the same importance attached to them as to any branch of study or mental acquirement, is found in Amherst College. In 1860, a system of gymnastics was introduced into this institution, which has had wonderful success in developing the physical organization and in improving the health of the students. These exercises were incorporated by the trustees into the regular curriculum of studies, and were made obligatory upon all students to attend upon them as much as on instruction in the mathematics or classics. All gymnasia connected with literary institutions both in Europe and America have failed to accomplish the results intended or expected, because no system of exercises was adopted in harmony with the laws of the body; nor did the character given them correspond to their importance, or to require that daily regular training which was accorded to mental acquisitions. But, at Amherst College, the trustees, instead of leaving the thing to take care of itself, — for students to exercise or not, at their convenience or option, without any guide, system or instruction,— made physical education not only a part of the regular exercises of the institution, compulsory upon all its students, but appointed a professor to this department, — a thoroughly educated physician, — who also has an oversight of the health of all the students. This is the secret of success.

DR. N. ALLEN.

LOWELL, MASS.

GIANT POWDER. — The superiority of giant powder over ordinary black gunpowder for blasting purposes, it is asserted by the California journals, has been proved by actual experiment during the past six months. In the New Almaden mine it was found that to cut a yard of one of the tunnels cost $65 with black and $45.45 with giant powder, showing a saving of 30 per cent. In the Oaks and Reese mine, a hundred feet of drifts, that would have cost $7,500 with black powder, were made under contract for $4,437.50, a saving of 40 per cent; and in the Empire mine it was found, on a long and fair trial, that the extraction of a ton of ore cost $5.39 with the black and $2.09 with giant powder, showing a saving of 61 per cent by the use of the latter.

At another mine it was ascertained that, with giant powder, derricks were no longer needed in the hydraulic claims for lifting large boulders, which can now be shattered at one blast into pieces small enough to be carried down through the sluices. This giant powder is reported to be nitro-glycerine, reduced to dryness by combining it with hydrated silica.

THE ORIGIN OF PETROLEUM. — The origin of combustible volatile and liquid mineral products, such as gas, oil, tar, asphalt, is still an open question. The presence of large beds of anthracite coal lead to the suspicion that oil was derived from the distillation of bituminous coal by volcanic action. Explosions in coal mines indicate that gases can be produced in the beds of coal without the aid of heat; and according as these gases have a vent to escape, or are under heavy pressure, can they remain volatile, or form liquids. Petroleum usually occurs in porous fossiliferous limestones, or in such sandstones as are evidently of marine origin. This has led geologists to look upon petroleum as of animal origin; and recent observations in Egypt have served to sustain this view.

There are in Egypt natural petroleum springs now in actual formation. The coast of this land consists of coral beds. The coral animal grows toward the sea, but dies out on land, leaving a porous lime-rock behind. In the cavities of this rock oil collects which is derived from the decomposition of the polyp coral, and is collected and used by the inhabitants for many purposes. Vast beds of coral would yield a proportionate supply of oil: and this is now considered by many to satisfactorily account for the oil springs and asphaltum lakes of various parts of the world. They were once coral beds of ancient seas, and the oil is of animal origin. — *Journal of Applied Chemistry.*

A Cheap and Durable Stove Polish.—Every housekeeper knows by disagreeable experience the effect of many kinds of stove-polish now in use. Some of these emit an odor when exposed to heat, which is at once very offensive and very unwholesome, while others communicate their color and a great portion of their substance to every object with which they come in contact. An inexpensive article of polish for stoves, grates, fire-places, and iron ornaments, may be easily made by grinding any black, non-combustible pigment with a sufficient quantity of silicate of potash, or "liquid glass," to make it of a proper consistency for application. When the polish has become dry, it will be found to be smooth and shining, wholly without odor, and very durable, while it will not soil the whitest cambric if applied to it. The materials are easily obtained, as easily mixed and applied, and the article should be manufactured in the domestic laboratory, or kitchen of every householder.

Colors for Artificial Flowers.—For blue, sulphate of indigo in solution; for yellow, tincture of tumeric; for red, carmine dissolved in a solution of the carbonate of potash; for lilac, a solution of litmus; for violet, the latter, mixed with blue. When the flowers are made of muslin or paper, they may be dipped in these colors; but, when made of velvet, they should be colored by the finger, dipped in the dye.

Cement for Iron and Stone.—A very durable cement has been in use by parties in Saxony for several years, which is composed of oxide of lead, litharge, and concentrated glycerine. It is said to harden rapidly, and to be unaffected by the ordinary acids, and by heat. The inventor claims that it is less easily broken than stone itself.

Cement for Filling Teeth.—Pulverized borax, one part; freshly calcined oxide of zinc, nine parts; finely powdered silex, two parts; mix them well together, and use like amalgam or any plastic filling.

A Dish of Fruit.—After the refined and complicated luxury of a *recherche* dinner, we seem to go back, when the fruit comes on the table, to the primitive simplicity of the earliest ages. We consume our entrements and our fricassees, our soups and our made dishes; and then our host, as if the repertoire of delicacies had been exhausted, steps out into his garden and his orchard, and brings in a simple dish of fruit; a bunch of golden grapes, some apples, painted red and yellow by the soft pencil of the summer sunbeam, a dusty velvet peach, or some honey-fleshed apricots. He is doing what King Alcinous may have done to Ulysses and the storm-beaten Greeks! it is patriarchal, it smacks of the golden age and the old mythological times; yet it is a custom that does not wither, and will never grow unfashionable. How things alter! The salad, once all that the hermit had to live upon, has become a relish for the gourmand; cheese, once the shepherd's only food, is now an entrement after many courses; fruit, once the only food of the early denizens of the world, is now the mere crowning pleasure of the dinner.

Fruit requires no cooking; the great stationary fire has cooked it to a turn. It has been basted with dew; the soft balmy sun has been its sauce. Its flavor has been mixed by the ministering spirits of garden and orchard; its color and shape are of a lasting fashion; it contains essences never discovered, and wines as yet undreamed of; it is older than the cutlet, and anterior to the fricandeau! its seed blew to us from Eden, or fell to us from the amaranthine gardens. Turtle soup is sublime, and there are ragouts which exercise a moral and psychological influence over the world; but they are earthy. Their component parts are known; there is not the mystery about them that appertains to fruit.

Really to enjoy fruit, one should pick one's own and eat it in appropriate scenery under the tree from which it is gathered, or beside the bush whereon it has grown. The pear reached down from the pliant bough, where it has long swung like a golden weight for Mammon's scales, tastes as much better than the same fruit coldly cut by a silver knife at a formal dessert, as a damson does than its humble, rustic cousin, the sloe; the strawberry has its finest fragrance only when discovered under its own triple leaves. When is the raspberry so delicious as when plucked from the straggling canes? The apple should be twisted from its fostering twig; the grape bunch nipped from the ragged brown branch bound to the green-house roof.—*All the Year Round.*

A New Pharaoh's Serpent.—The sulphuric acid employed to rectify petroleum and tar oil becomes very black. If it be treated with fuming nitric acid a resin separates, which, when cold, is dark brown and brittle. This resin has the property, when burning, of yielding a highly voluminous coal, which expands more remarkably than the sulpho-cyanide of mercury, so popular a few years ago. The resin appears to be the nitrogen product of some acid.—*Journal Applied Chemistry.*

A Good Varnish for Furniture.—Dissolve equal parts of gum copal and essence of rosemary in about three parts of 95 per cent alcohol, heated to 150° F. It should be applied while hot, and, when cool, dries quick and becomes hard and durable.

Agriculture.

RECLAIMING MEADOWS.

Unquestionably the most important and profitable labor in which farmers can engage, after the haying season has passed, is in draining and working over wet meadows in order to fit them for producing the rich upland grasses.

It is a kind of labor which returns the most generous profits of any done upon the farm; and a farmer who has low grounds, and permits them to remain covered with bogs and bushes, is certainly indifferent to his true interest. There is a want of knowledge regarding the subject of reclaiming meadow lands, and, although much has been said and written upon the subject, it is still imperfectly understood what *kind* of lowlands can be profitably worked, and how the labor can be most expeditiously and cheaply performed: these are points about which information is greatly needed. There are different kinds of lowlands or meadows, as well as of uplands; and, before entering upon the work of reclaiming, the nature of the soil or deposits should be investigated, and the facilities of drainage carefully considered. Some meadows are clean *peat-bogs*, others are filled with a silicious deposit intermixed with enough humus to give an intense black hue to the whole. One is made up of light, spongy, and (when dry) combustible organic matter; the other is silicious matter washed from hills. Now, the two varieties of meadow lands require very different treatment, in order to obtain from them the most satisfactory results. The first requires to be worked over with the spade, if too soft to plow, and then the surface must be covered with a heavy coating of pure sand. This, with a slight compost dressing, brings in the timothy and red-top. The second needs turning up to the warm sun and air, and the heavy, cold deposits must be thoroughly pulverized and richly manured with stable manure, or some one of the concentrated fertilizers. This form of lowland is often not profitable to reclaim, and much time and expense has been wasted upon such meadows. The outlet or drainage point in meadows must not be placed too low, as lowland suffers more severely from drought than upland when the natural moisture is wholly withdrawn. Peat, for the first three or four years after it is drained, requires considerable moisture, to enable the chemical decompositions to go forward which fit it for the sustentation of plants.

It has been considered impossible to fit a bog to grow upland grasses if the drainage cannot be carried to a point two feet below its surface. This we have proved to be an error. A bog at Lakeside, bordering upon Lake Kenoza, is so low that we have but *eight inches* above the water level during the spring months. This we reclaimed in part three years ago, and from the portion reclaimed have had most abundant crops of the richest grasses. We are now working over the whole surface of the basin. In some places there is a deposit of peat twelve feet in thickness. Silicious coverings and the application of fertilizers will operate to keep out meadow grasses. On this meadow we have never used an ounce of stable manure, and yet we have cut three tons of hay to the acre. It received, the first year, one ton of fish pomace to the acre, after a thin spread of spent ashes. Lime, ashes, fish pomace, and fine-ground bones are excellent fertilizing agents for reclaimed peat-bogs.

Giving Trees a Dose of Calomel.—A paragraph in a scientific journal came under our notice recently, in which the statement was made, that insects upon trees could be destroyed by boring holes in the trunks, and inserting calomel, or some other salt of mercury. This idea of endeavoring to force into the circulation of a tree powerful mineral poisons, to destroy injurious insects upon the leaves or branches, seems to us very vulgar and absurd. We hope no one of our farmer or horticultural friends will engage in experiments of this nature; for, by so doing, we fear they will greatly injure their fruit-trees. The sap in vegetable structures corresponds, in many of its functions and characteristics, with the blood in animal organizations; and it is well understood among physiologists and surgeons that that fluid is exceedingly sensitive to the presence of foreign agents. No more sudden or effective way can be devised to destroy life than to inject into the circulation any extraneous agent, solid or fluid. Blood will abstract from food or medicine what it requires to healthfully perform its appropriate work, and it can obtain it from no other source; and so with sap: it will draw from the soil the constituent particles it needs, and any attempts to force in abnormal substances, in an abnormal way, can but result in irreparable injury to the structure.

Oats Changing to Rye.—We are often asked if there is any truth in the statements of farmers and others, that oats sown in pastures, and which are fed down by animals during the summer, will spring up the subsequent season in the form of rye. We have never made the experiment, and therefore cannot make any statement based upon personal observation; but we are inclined to think the evidence that the singular change occurs is too strong to be gainsayed. The subject has received the attention of careful observers in this country, in England, and in Germany. Dr. Weissenborn, of the latter country, states positively that this change of species occurs under the conditions named; and many other reliable gentlemen corroborate his statements. It is comparatively but a few years since the various coniferæ have been classified and described; and yet, within that time, some species have entirely disappeared, and their places been taken by others not before known. Our knowledge of the metamorphosis which vegetable structures are capable of undergoing is quite imperfect and unsatisfactory. Upon one of our hill-pastures, which three years ago was covered with white clover, and other sweet grasses peculiar to dry or upland soils, there is now a thick growth of rushes, ferns, and grasses which we have heretofore found only in bogs and lowlands. That which is very singular in regard to this change is the fact that it occurred during one of the *dryest* summers we have experienced for many years. The conditions for a change of species in vegetable growths seemed unfavorable; and yet they occurred.

FERTILITY OF THE SALT LAKE BASIN.

Dr. Prime, Editor of the *N. Y. Observer*, is now in California, having gone thus far, in a journey around the world. His letters to the *Observer* are exceedingly interesting. The following description of the fertility of the Salt Lake Basin, Utah, will be read with interest, and we presume with some degree of astonishment, by our readers. Ninety-three bushels of wheat to the acre is certainly a *very* large yield.

"The vast mountain barrier stretching along the eastern portion of the valley is an immense fountain, streams of the purest water issuing from its sides at every point, and furnishing the means by which this once arid desert has been converted into one of the most fertile plains to be found on the face of the continent. When the Mormons entered this valley, it was like the desolate mountains over which we had passed for hundreds of miles, — a perfect waste of sand and sage bush. Where they got their idea of making it a garden, simply by turning the water upon it, I do not know; but within a little more than twenty years from their first emigration, they have extended a line of farms along the eastern shore of the lake, at least sixty miles in extent, — farms that equal in fertility the finest prairies of the East. We traversed some thirty-five miles of these cultivated fields, and every mile only increased our admiration of the results of this system of utilizing pure mountain water. The most beautiful crops of wheat formed the staple production, — beautiful not alone because they were abundant, but because ripened and harvested, so far as they had been gathered, without a drop of rain, the straw and the ear so bright that they shone like silver in the sun. There was nothing that struck me more forcibly in connection with the standing wheat and the stacks which had been harvested, and the straw as it had been cleaned, than this peculiar brightness. The fields of corn and sorghum were standing up more luxuriant and taller than anything we had seen east of the Mississippi, and equal to anything we had seen in Iowa. The orchards were on every farm, and although not extensive, were loaded with fruit, some of it ripening, but the most in about the same stage as at the East in the same latitude. The road-side for the greater part of the way from Uintah to Salt Lake City was a succession of apple and peach orchards; the fruit, especially the apples, of large size, and the trees literally bending to the ground with their burdens.

WONDERFUL CROPS.

At Salt Lake City, I inquired of Mr. Hooper, the delegate to Congress from Utah, in regard to the actual results of this system of farming, and he stated that there had been produced from a single acre ninety-three bushels of wheat; and I learned from another source that nine hundred bushels had been raised from ten acres. These, of course, were exceptional cases, and were the result of manuring, as well as irrigation, and the most careful cultivation. The seed was planted, rather than sown, and every possible care taken in the cultivation. By the same system of irrigation, Salt Lake City, which had not a tree or shrub when it was first settled by the Mormons, is now one great park of locust and cottonwood trees, the former raised entirely from the seed, and the latter transplanted from the canons in the mountains. Every street has its stream of water, and every garden in the town is regularly watered under the direction of commissioners.

This is certainly a wonderful change for a score of years. One cannot but admire the enterprise which has created a garden out of a vast desert, and in entering the valley at this season of fruits, we could not fail to be struck with surprise at the wonderful results which have been reached; but the amount of labor expended in preparing the soil for cultivation has been small compared with the toil of the early pioneers at the East, who had dreary forests to clear away before they could go to work upon the soil itself. Here the settlers had only to turn the water upon the soil, and the work was almost done."

MARL AS A FERTILIZER.

The most valuable properties of marl consist of phosphoric acid, potash and lime, which it contains in nearly equal proportions. Marl supplies a soil with all the essentials for vegetation with the exception of nitrogen, and this is furnished by clover. A poor, sandy soil requires not only marl, but a substance containing nitrogen.

Some sanguine agriculturists believe that marl will become as valuable for plant food as the coal mines are to commerce. While the one was formed from vegetable life by the action of ages, the other was formed of myriads of minute creatures, in shape and size not unlike a tobacco seed, deposited in immense beds by the action of the ocean. These animalculæ were only a step advanced from vegetable life in their development. These mites of old ocean have left a broad, deep and exhaustless bed of material, as valuable in its way as the stratum of coal in the mountain side. These deposits have a deep-green tinge, and are called green sand-marl. There are three distinct layers, separated by clay deposits, which were probably formed at three epochs. The layers are remarkably uniform, varying but slightly at the top and bottom. The strata themselves are from fifteen to thirty feet thick. In some places the marl is within three or four feet of the surface, so that by removing a slight top layer of sandy loam the bed may be reached; but generally a stratum several feet thick of spurious or useless marl covers the green sand. As a general thing, the lower or older the bed the less phosphate of lime it contains and the more carbonate. In some of the beds are found shells which crumble between the thumb and finger, and recently a shark's tooth was found which belonged to a monster of immense proportions. Usually, however, the beds are uniform in color and appearance, the spade cutting it as easily as a knife passes through a green cheese. The lumps as thrown out, cling together until they become dry, when they crumble and become as fine as an ash-heap. At first marl was sought for the potash it contained; but when analysis subsequently disclosed the fact that it contained phosphoric acid, Professor Mapes and other eminent agriculturists hailed it as an important discovery which would add greatly to the wealth of the country. As a rule, the more nutritious a grain or root the more phosphate it takes to grow it. A field without phosphorus is incapable of growing grain, and no plant suitable for food can be properly cultivated without the co-operation of this substance in some form.

A ton of Peruvian guano, containing four hundred and seventy pounds of the phosphates, costs eighty dollars. The same amount of money will buy eighteen hundred pounds of phosphoric acid, beside as much more of potash, of which there is little in guano.

The use of marl as a fertilizer is now attracting the attention of agriculturists in this section, it having been demonstrated by a practical test that it can be made as active and lasting a fertilizer as the best super-phosphates sold in the markets, and at a cost so trifling as to defy competition. Hon. Benj. T. Biggs, member of Congress from Delaware, a careful and practical farmer, made a trial of ammoniated marl, which had been treated and nitrogenized by a new patented and cheap process, with entire satisfaction.

This process can be put into use without expensive works, and ammoniated marl, equal in value to Coe's, Phillips' or Baugh's best phosphate of lime, can be sold at less than one-fourth the cost to the farmer. — *Phila. Pathfinder.*

Cheering Prospects. — In 1869, says the Charleston *News*, the twelve Cotton States will show more true prosperity than any other section of the world. It estimates the crop of cotton for the present year, which it fixes at 3,000,000 bales. The average number of all crops will amount to $64 per head of the population. And then it states a fact which goes far to account for this gratifying state of things, that "there are now no less than 200,000 whites cultivating cotton with their own hands." Now we do earnestly hope that no one of our subscribers will feel constrained to write to us and say that these statements of the *News* are not true news. We want to believe them, and we do believe them, and they bespeak a glorious future for the South, at least in the line of material prosperity. — *N. Y. Observer.*

The Address at the Cattle Show and Fair of the Franklin County Agricultural Society, held at Greenfield, September 30, was given by the Editor of the Journal.

GERMAN VINEYARDS.

We extract the following from one of a series of articles lately contributed to a New York paper, over the signature of Clark Bell:

My first view of the vineyards of Germany was of those along the river Main, in the vicinity of Frankfort, and thence down its banks to the confluence. The surface of the country is simply undulating, or rolling, and the vineyards cluster everywhere, as well on the slopes and hillsides as on the flat and level land. The vines are planted close together, not quite as closely as in Austria, but much closer than with us, and usually four to five feet apart; and while they are generally trained to single stakes, one to each vine, I observed occasionally a trellis of wood about four feet high, with two slats only, supported by posts firmly driven into the earth. While I frequently observed this trellis, it was after all only of exceptional use, the single stake being of almost universal adoption. The vines themselves, though small as contrasted with Italy or our own country, were of splendid color, of vigorous growth (it was in early August), and were very beautiful. Great attention was paid to the culture, and the vineyards were kept scrupulously clean and neat.

Between Frankfort and Mentz, and a little to the eastward of the latter place, is a small vineyard, which I should not estimate at more than eight acres in extent, but it is the world-renowned vineyard of Hockheimer. This vineyard produces a brand of wine which commands now, and has for a long time, fabulous prices. It is worth almost its weight in hard money. Four thousand plants are here set on each acre. The vines are unusually small, and the product of wine relatively very little indeed. The vintage is late, and the grapes are left hanging until dead-ripe, and the bad and decayed berries picked out carefully. Great care is taken with the pressing; the wine is fermented in large casks, and racked repeatedly before using. The village of Hockheim, near it, is completely surrounded with vineyards. All the trees have been scrupulously cut away, as the German idea is that a tree is injurious to the vine. This village is said to have given the name of Hock to the great mass of German wines.

Along the Rhine itself, from the water's edge to the top of the hillsides, on almost every inch of land that is arable, the vine is planted and grown, and thrives.

In some places I observed divisions on steep hillsides, formed by facing the terrace with a stone wall (as in all countries it is a favorite method of facing the better class of vineyards, especially on very steep declines). Still, as a whole, the hillsides of the Rhine would be classed as vineyards without terraces, and I should estimate that ninety per cent of these vines are trained to single stakes.

The soils of the various parts of this river are as different and as various as the different kinds of wines. Decomposed granite and quartz make good vinelands if in favorable locations. The latter mingled with clay slate is observed in successful vineyards. It is claimed as a matter of experience that marls mixed with pebbles produce the very best wines. Generally any soil will support the vine which is light and dry, if it be also stony or sandy. It is fatal if infected with stagnant water. The vineyardists never take offence at stones in the vineyard. Even large ones are frequently left remaining under the belief that they improve the quality and hasten the maturity of the fruit, but good, strong rich soils never produce good wines. There is no idea more firmly fixed in the German mind, than that the smaller and less luxuriant the plant the better the wine. He has no sympathy with that natural pride which the novitiate vine-grower here feels in the extraordinary growth of his vine, in a single season, which is often measured and treasured and boasted of. Mynheer would only shrug his shoulders and say, "Mein Gott! How can you get good wine from such a green pumpkin vine of a plant?" — *Country Gentleman.*

Value of Spare Minutes. — Madame de Genlis composed several of her charming volumes while waiting in the school-room for the tardy princess to whom she gave daily lessons. Daguesseau, one of the Chancellors of France, wrote an able and bulky work in the successive intervals of waiting for dinner. Elihu Burritt, while earning his living as a blacksmith, learned eighteen languages and twenty-two dialects by simply improving his "odd minutes." A celebrated physician of London translated "Lucretius" while riding in his carriage upon his daily rounds. Dr. Darwin composed nearly all of his works in the same way, writing down his thoughts in a memorandum book which he carried for the purpose. Samuel Smiles says, in his late work, that he personally knew a man who learned Latin and French while carrying messages as errand-boy in the streets of Manchester. Burney, the musical composer, learned French and Latin while riding horseback from one pupil to another. Kirke White also learned Greek while walking to and fro from a lawyer's office.

We find here a clew to the immense amount of labor accomplished by some. Such improve their odd minutes. *Change* of labor is rest, and the *waiting* minutes may usually be filled up with some light occupation of the brain or fingers, which will save much of the annoyance experienced from waiting, and accumulate in time a storehouse of gain.

"Who uses minutes, has hours to use;
Who loses minutes, whole years must lose."

Boston Journal of Chemistry.

BOSTON, OCTOBER 1, 1869.

THE STATE ANALYZATION OF LIQUORS.

There is a large amount of distrust manifested by the intelligent physicians of Massachusetts regarding the purity or integrity of the liquors vended under State authority. As guardians of the public health, and the agents through whom these "medicinal" spirits are to be mainly dispensed, if the intentions of the law are faithfully met, they have not only a right, but it is their *duty*, to inquire regarding the time and care used in the analysis, and also of the competency of the chemist who is appointed to do the work. Without expressing any direct or positive opinions upon these points, we desire to call attention to some of the absurd provisions of the law, and leave our medical readers to form their own views of the probable value of these State analyzations Those sections of the act of 1869 relating to the duties of the State chemist, or "inspector," are as follows:

SECT. 25. The duties of said inspector of liquors shall be to inspect and analyze all liquors of the commissioner, as provided in section three of this act, and also all liquors sent to him by the Constable of the Commonwealth or any of his deputies, under the seal of the agent from whom the said liquors were obtained, as hereinafter provided; keeping a record of the result of his analysis, and reporting the result of such inspection and analysis to the officer from whom the said liquors were received.

SECT. 26. It shall be the duty of the Constable of the Commonwealth, either personally or by deputy, to visit each town and city agent as often as once in every three months, take samples of all liquors kept for sale by the said agent (allowing the said agent to seal the said samples with the seal of his agency), and forward the same to the inspector and assayer of liquors, with a certificate setting forth the kinds of liquors sent, from whom they were obtained, and the date when obtained; and upon the receipt of the report of the inspection and analysis of said liquors, if it shall be found that any of the said samples of liquors were adulterated, to immediately proceed in a prosecution against the said offending agent, as provided in the preceding sections of this act.

By these provisions, the State chemist is required to analyze, during the year, all the liquors purchased by the State agent in Boston, and also all those sent to him by the High Constable, or his deputies. The law *requires* the Constable to visit each town in the State "*as often as once in three months*," and take specimens of all the various kinds of liquors sold by each town agent, and forward them to the chemist for analyzation. Now let us look at the amount of labor which the cruel, but "wise legislators," have heaped upon this unfortunate individual. There are in the Commonwealth about three hundred and fifty towns; and each town is *compelled* to have one or more liquor agents. Each agent must vend at least *ten varieties* of liquor, embracing rum, brandy, gin, whiskey, and the various kinds of wines and malt liquors. Specimens of the liquors of all these agents must be analyzed by the chemist *four* times during the year; therefore there *must be*, according to the simple rules of arithmetic, 14,000 *examinations or analyzations* from this source. The purchases of the State agent, which are to be analyzed, cannot be less than 7,000 packages (probably double this estimate), making, in the aggregate, 21,000 analyzations during the year. In a year there are 313 working days, of 1,440 minutes each, making in all 450,720 minutes. This will give 21½ minutes to each analysis, if the assayer labors every moment of his time, day and night. If, however, the gentleman adopts the "eight-hour system of labor," he will be narrowed down to *five minutes* of time in which to make each "assay." In this estimate of the labors of the chemist, which is perfectly fair and legitimate, no account is taken of the examination of liquors *seized* by the State constables, which he is required to analyze. These specimens must certainly amount to many thousands in number. Five minutes (probably not one) allowed to each analysis! The work should be done by machinery propelled by steam-power. The State pays *fifteen cents* for each analysis, according to the above estimate.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The recent meeting of this Association at Salem was, upon the whole, the most interesting and profitable of any one we have attended during our connection with it, a period of sixteen years. It was interesting and pleasant in its social aspects, as well as important in its business and scientific results. The people of Salem seemed to vie with each other in their efforts to render the stay of the *savans* among them agreeable; and, if any one went away dissatisfied, it must be owing to very unreasonable expectations on the part of the individual.

During the war the meetings of the Association were suspended, and those that have occurred since its close have not been attended by so many of the scientific men of the Southern States as formerly. Some of the most learned and genial members were formerly from the Gulf States, and to them the Association was indebted for useful and important papers. Prof. La Conte, of Georgia, is much missed in the meetings, and there are others we might name who, if living, will, we hope, be present at the Troy meeting. A noticeable feature of the late session was the presence of a large number of young men, and the part they took in the proceedings afforded evidence of diligent and original research in the different fields of scientific inquiry.

The special and emphatic praise bestowed by Profs. Agassiz, Pierce, and Henry, upon the papers of Prof. Morse and the other young men connected with the Peabody Academy of Science, was not only most flattering, but just and well deserved. Prof. Agassiz remarked, on the last day of the meetings, that no papers of greater scientific importance had been presented than those read by the gentlemen referred to, and he hoped they would be printed in full in the Proceedings. The address of the President of the Academy, Wm. C. Endicott, Esq., at the dedication of the museum, on the first day of the meeting, was a model one in its way. The chaste and simple eloquence of the speaker, together with the sound, sensible views advanced, completely enchained the brilliant audience; and, at the close of the address, they signified their satisfaction by a spontaneous and general clapping of hands. The whole of the exercises on Wednesday afternoon were of unusual interest. It was cause of very much regret that the founder of the Academy, Mr. George Peabody, was prevented by illness from participating in the exercises; but he was worthily represented by ex-Governor Clifford, who in an eloquent and effective speech, elicited the warm applause of the audience.

The value of these meetings to students in science can hardly be overestimated; and, although many of the papers read and discussed are regarded by the outside world as abstruse, technical and without practical value, yet this is an erroneous view to take of the matter. All genuine researches in physics or natural science, however abstruse they may be, have a direct or remote bearing upon the great practical events of life, and therefore are of benefit to the world. All new discoveries in science are necessarily for a time recondite, and but partly intelligible even to the discoverers themselves; but ultimately the simple is evoked from the complex, and benefits flow out to the world. How little the world knows regarding the life of these toilers in laboratories, dissecting rooms, libraries and museums! The patient, protracted, exhausting labors, in daylight and darkness, the racking of the brain, the draughts upon the ingenuity, the mistakes, the errors, the disappointments, — who can know of these but the toilers themselves? And yet it was only necessary to cast the eye over the members, in session at Salem, to learn that great intellectual labor is not antagonistic to health. Profs. Agassiz, Henry, Silliman, T. Sterry Hunt, O. C. Marsh, Horsford, Wurtz, Joy, Gould, and a score of others, whose rubicund countenances and rotund forms were everywhere present, would seem almost to prove that robust health is an attendant upon severe, exacting scientific labor. Hard brain-work does not necessarily kill people, or impair health. It is care, fret, anxiety, that causes sad inroads upon the system, especially when they come in connection with severe mental exertion.

A VALUABLE LINIMENT. — A liniment which we have found most serviceable in the family and in the stable is prepared as follows:

℞ Alcohol (95 per cent), 1 quart.
Fluid extract of arnica, 4 fluid ounces.
Camphor, 2 fluid ounces.
Stronger aquaammonia, 1 fluid ounce.
Tinct. opium, 1 fluid ounce.
Water, 1 quart.

Add to the alcohol the arnica, camphor, ammonia, and tincture of opium; and, after the camphor is dissolved, the water may be added. This liniment may be applied for the relief of sprains, bruises, rheumatic and neuralgic pains, etc., with decided advantage. For use in the cow and horse stable, it will be found most efficient. It can be furnished by druggists at about one dollar the quart, and is much to be preferred to the expensive liniments which are so freely sold in the shops.

THE INHALATION OF CARBONIC ACID.—The old idea, that carbonic acid is in itself a *poison*, still prevails to a considerable extent, even among well-informed people. Carbonic acid exerts no more corrosive or poisonous influence upon the system than water. Water deprives persons of life, when they are immersed in it, by excluding oxygen from the respiratory organs; and this is why fatal effects are obtained from carbonic acid. Carbonic oxide (CO), when inhaled, is poisonous; it acts upon tissues, produces chemical changes in the blood, and arrests respiration. Not so carbonic acid: we can *drown* in it; but it is in no sense a *poison*. From laboratory experiments in inhaling carbonic acid, we are led to think that possibly it may be found to possess valuable therapeutic properties, when its nature is fully understood. The asphyxia which it produces, although apparently painful and injurious, or attended with fatal consequences, is probably not so. A technical laboratory may be said to be never free from the gas; and the only influence it exerts upon workmen is of a somnolent nature. Breathed in small quantities, mixed with air, it causes a sleepy feeling, unattended with headache. In the manufacture of nitrate of ammonia from the carbonate in a large way, vast quantities of the gas are liberated; and we have seen mice, in attempting to run across the laboratory floor, tumble over, and remain asphyxiated for a long time, and then, upon a subsidence of the flow of gas, recover, and scamper away as if nothing had happened. The dog, which so many of our readers have seen thrust into the celebrated cave, *Grotto del Cane*, near Naples, evidently suffers but very little; and, although made perfectly insensible many times in a day, is not apparently injured in health. These examples, when taken in connection with other significant facts, incline us to think that a series of carefully conducted experiments in the employment of certain quantities of carbonic acid, diluted with air, may lead to the discovery of a peculiar anæsthetic, or sleep-producing agent, of a simple and desirable nature. If the pressure of exacting duties permits, we intend to institute a series of experiments of the nature indicated, at no distant day; and our readers will know of the results.

THE USE OF PHOSPHATES IN BREAD-MAKING.—It is quite amusing to read, in the English scientific and popular journals, accounts of a *very recent* discovery of Prof. Liebig, in which he recommends phosphoric acid as a substitute for bi-tartrate of potassa, and tartaric acid, in bread-making. This application of phosphoric acid is not very *new* in this country, Prof. Horsford, of Cambridge, having suggested it a long while ago. It is as many as *sixteen years* since the professor placed in our hands, for trial in the family, a parcel of granular phosphoric acid, combined with bi-carb. of soda, designed as a bread-raising powder. This parcel was the result of his very first experiment; and we found it to produce most excellent, and, we believed, healthful bread. The chemical changes which result when this mixture is combined with dough, and submitted to the action of moisture and heat, are very easily understood. Carbonic acid is liberated by the decomposition of the soda carbonate; this gas lifts and expands the dough; and, by the union of the acid with the soda, phosphate of soda is formed, and remains in the loaf. This phosphatic salt is a normal constituent of the blood and tissues, and therefore cannot but be healthful in its influence. We have always regarded the idea or discovery as highly creditable to Prof. Horsford; and there is great injustice done him in coupling the name of Liebig with it.

ALUM REMEDY FOR CHRONIC DIARRHŒA.—Dr. Russell, of Grand Rapids, Mich., writes us as follows: "Having suffered from drinking Cochituate water through a lead pipe in my office in Boston, causing partial paralysis of the rectum and diarrhœa for twelve months, I was induced to use the following prescription, given me by Prof. Geo. B. Wood, Philadelphia, with the happiest results:

Pulv. alum, gra. X.
" nutmeg, gra. V.

This powder to be taken three times a day.

Since my recovery, the prescription has been used in cases caused by lead-poison, and others of chronic diarrhœa, with uniformly good results.

THE MECHANICS' FAIR.—This association held its tri-yearly fair in this city in September, and a very satisfactory exhibition was made of the mechanical and industrial products of New England. It may be regarded as one of the largest and most complete exhibitions ever made by the association, and the large halls were thronged with visitors during its continuance. No exhibitions in the country are more worthy of the attention of manufacturers, inventors, etc., than those of the Massachusetts Charitable Mechanic Association.

☞ Very many of our subscribers, residing in the Western and Southern States, will find upon their *Journals* the little yellow slip upon which the name is printed, and the date to which subscription moneys are paid. We desire to have the names and place of residence of all our subscribers perfectly correct; and therefore, if there is any error in spelling or direction, in any case, please inform the office at once, that it may be corrected. It will take our printer another month to get the entire list into type, so many are the names of our patrons.

SPOTS ON THE SUN.—From the first to the third of September, the sun was almost wholly free from spots; but on the fourth they reappeared, and as many as five were distinctly counted. Two of them were of immense size, and appeared in the form of elongated cones, with numerous protuberances. The large and small spots together at one time covered more than one-fifth of the sun's diameter. During the entire summer, there have been but few days when patches of opaque matter have not been observable in the sun's photosphere. There can be no question but what these spots exert a very great influence upon our planet, and produce meteorological and electrical changes of stupendous magnitude.

THE ATLANTIC CABLE OF 1866.—Some two months since a fault was discovered in this cable, which has not yet, we believe, been repaired. It is not of a nature so serious as to interrupt communications, but still it is very troublesome, and must be found and put in order. Four interruptions have occurred in this cable, while in the one of 1865, so many months lost on the bed of the ocean, not a single one has occurred. It is probable that deep-sea cables will continue to improve in insulation as they grow older; and hence, unless some unforeseen casualty occurs, the property will continue to grow more valuable.

☞ WE venture to express the opinion that this journal has, at the present time, the largest circulation of any journal of its class in the world.

HAY CATARRH.—A gentleman in Illinois writes us that he has been a great sufferer from hay catarrh for several years, and that he has found relief in the free use of very finely powdered *catechu*. He snuffs it up the nostrils several times in the day. By the use of catechu, he states that a speedy and permanent cure is effected. This substance is very cheap, and is found in the shops in the form of hard, gummy masses, easily pulverizable. It holds a large amount of tannin, and therefore has very astringent properties. It is worth a trial, as it can do no harm.

☞ THE beautiful new type in which this number of the *Journal* appears gives it an exceeding neat and comely appearance. Every number is stereotyped, and consequently from the plates we can supply copies of the back numbers of this volume to any extent desired.

BOOK NOTICES.

A GENERAL TREATISE ON THE MANUFACTURE OF SOAP; Theoretical and Practical, comprising the Chemistry of the Art, a Description of all the Raw Materials and their uses. By Prof. H. DUSSAUCE, lately of the laboratories of the French Government, etc. Philadelphia: Henry Carey Baird. 1869.

The manufacture of soap is a great industry in this and all other countries. To every class of society, from the highest to the lowest, soap is an absolute necessity. The measure of the civilization of a people is afforded from a knowledge of the amount of soap consumed by any nation. A full, complete and clear treatise upon soap-making has long been needed, and we are glad that its preparation fell into the able hands of the late Professor Dussauce. This treatise may be regarded as an exhaustive one, as all that is known of the arts and chemical processes involved in the manufacture of soap are here placed before the reader. To soap-makers it is an indispensable treatise, and the general reader will find in its pages a vast amount of interesting and valuable information. The compiler, Dr. D., was an indefatigable worker in the various departments of industrial science; and the present volume is the last of many treatises prepared by him, his death having occurred in June last.

A NEW ELEMENTARY COURSE IN THE GERMAN LANGUAGE, for the Use of Schools. By GABRIEL CAMPBELL, M. A., Professor in the State University of Minnesota. Third Edition. Boston: Woolworth, Ainsworth & Co.

The German language does not receive that attention in our schools which its great importance demands. The culture of the age requires an acquaintance with the science and literature of Germany; and better would it be for the youth of our country if a portion of the time which they are required to spend in the study of Latin and Greek were devoted to modern languages, especially the German. This school-book is a very excellent elementary work, and one which in method, arrangement, and clearness of illustration has hardly been surpassed.

Medicine and Pharmacy.

PAU AS A HEALTH-RESORT.

Dr. J. Whipple, of this city, communicates to the *Medical and Surgical Journal* some statements respecting the old French town of Pau as a winter resort for invalids. Dr. W. has resided there for several winters, he being an invalid, and his statements are worthy of entire confidence. He contemplates returning to France, and will act as consulting physician to any American invalids who may need his services. Dr. W. writes with great good-sense, and with that caution and moderation which inspires confidence in what he says.

Pau is in the extreme south of France, and is accessible from all points by rail. It is distant seventeen hours from Paris, and twenty-two from Marseilles. It

has a population of 20,000. The situation of the town is very beautiful, and possesses many attractions, natural and artificial. Dr. Whipple says:

"The place has been for thirty years much frequented by English, and later by our own countrymen, and the Anglo-Saxon race is famous for carrying along with it its customary comforts and for establishing a regular source of supply when it becomes stationary. So in Pau, comfortable, besides well-furnished apartments and hotels, and *maisons garnies* second to none in Europe, are excellent markets and good grocers provided with English and American articles, obtainable almost nowhere else on the continent except in Paris. Good servants and particularly good cooks are to be had for moderate wages, and very fair horses and excellent carriages at extremely moderate rates; though, if any one is ambitious of great excellence or elegance in his mount or equipage, he must import them. The expense of living at Pau need not be great. Viewed after our extravagant American standard, it is a very cheap place. I should say one might live in perfect comfort on two-thirds what it would cost to live in a corresponding style at Paris.

"There are three English and one Scotch Presbyterian churches, all organized within several years. There is a comfortable English club in a commodious club-house (built 1869), with good restaurant, an excellent and quite extensive library, and a large file of newspapers of all nations. This is easy of access to all visitors. There is a very pretty new theatre, where there are through the season dramatic and operatic performances, though it must be confessed that they are less famous than those at the Comedie Françaises and the Grand Opera.

"Pau is freer from the appearance of a place of resort for invalids than any place I know, when there are so many who really seek it for sanitary reasons. The attractions of the place for the general visitor are so numerous that the proportion of invalids is largely reduced, and the place itself is so cheerful in its aspect, and so much that is gay and lively is going on throughout the season, that one soon forgets the pale and sickly look of the poor fellow he has just passed.

. . . .

"Now for what many will regard as the most important point of all, — the climate of Pau. If we take the word of some who have written about it, it is the climate we may expect to find in Paradise. If we listen to some one who has spent a rainy week there only, looking in vain from the Castle Terrace or the Place Royale for the white peaks of the mountains which he is told lie just over the river, and seeing Pau only from its muddy streets or his hotel window, we shall wonder that any one ever left the shadow of the State House to encounter the wretched climate and dull stupidity of Pau. *Medio tutissimus ibis.* One will have to go farther than Pau to find a perfect climate, and one might go very far, too, and find no better. During the season of 1866–7 there were but seven days of what any one could call cold weather. About the middle of January came a fall of snow, perhaps six inches, — very unusual for Pau, — and for nearly a week the ground was slightly frozen every night. That was all the winter we had. The rest of the season, even invalids scarcely had need of a top-coat.

. . . .

"There is always a good deal of rain; but, in spite of it, the place is not damp. The situation of the town and the nature of the soil is such that the water very soon leaves the surface, and there is nowhere about the town any standing water. I used to find that my tobacco, left open in a room where the sun never shone, got so dry at the end of a few days that I could not smoke it. Even when it does rain, it is rare that an invalid, properly protected, cannot keep out of doors; for the air is almost invariably milder during a fall of rain than on the bright days. When the sun does shine, the brightness of the day makes one forget that he has ever seen any other weather. There is an indescribable charm in a sunny winter day at Pau which I have never seen equalled elsewhere.

"About the city there is ordinarily almost no wind, and it is extremely rare — not more than three or four times in a season — that the wind is strong enough to be disagreeable to the most sensitive throat or lungs.

"Those who are forced to seek a warm climate — especially if they have been accustomed to the changes of a New England winter and spring — are apt to expect of the climate to which they are sent all that is wanting in that they have left, and often fail to derive the fullest advantage from the change by refusing to see that in all climates certain precautions are necessary, and that none are without disadvantages. So I have often heard it said, "Pau is subject to as sudden and as great changes of temperature as Boston." Hardly as sudden, and certainly by no means as great. Yet there are sudden changes, which will certainly prove detrimental if ignored. For instance, on a bright day there is a very perceptible difference between the sunny and the shady sides of the street. There is always a great change of temperature just at sunset. For half an hour before and as long after sunset, the strongest peasant will wrap himself in his frieze cloak, which he always has at hand. Later in the evening the peculiar chill of the sunset hour vanishes entirely. But these are changes which can be guarded against, and that most easily. I have been often surprised to find a most singular and unaccountable obstinacy against taking proper precautions, because, as I have heard remarked, "if I have got to take precautions, I might just as well have staid at home." I have never seen a sudden change of temperature in Pau which could not be perfectly easily remedied by buttoning or unbuttoning a moderately thick coat. And here I may mention something worthy to be borne in mind. Such clothing should be worn as can be easily adjusted to suit these changes.

"As I have already said, there is a great deal of rain at Pau; and if one is opposed to carrying an umbrella, or to wearing thick boots, let him keep away from the neighborhood of the Pyrenees. But, fortified with these, there are few days when one cannot keep out very comfortably. There are days when the air seems rather chilly and cold, and one is very apt to complain of this until he remembers that the brightness of the preceding day may make the contrast more striking, and, on consulting the thermometer, he finds to his surprise that it indicates a degree of cold which would not trouble him if he had not expected something more nearly approaching perfection in a place of sanitary resort.

"The season for Pau is from October until May or June. Strangers ought not to go much earlier than October, and it is hardly safe to leave before May. Many lose the whole advantage gained during the winter by going north before the warm season is sufficiently advanced. Not only do they lose the benefit of their winter visit, but they lose the most beautiful season for Pau and its most charming environs.

"I think these recommendations may certainly be claimed for it, viz: accessibility by easy conveyance, a large degree of general comfort, healthy diversion and cheerful surroundings for well or ill, and a climate sufficiently mild to admit of out-of-door life to a great degree. These are not very frequently united in one place. If one has already found a climate which suits well his individual case, I would certainly not advise him to change it for that of Pau; nor to go there at all, if he is prejudiced against the place. In such case he would probably only see the disadvantages of the place — which are not lacking — and would certainly fail to derive the expected advantage from his residence there. I am firmly of the belief that climate, aside from other influences, will prove ineffectual in arresting and curing disease."

Dr. E. B. Shedd, in the *British Medical Journal*, recommends the following treatment for typhoid fever: "As soon as there is abdominal tenderness, give drachm doses of glycerine three times daily." This, he says, acts wonderfully well, causing a speedy abatement of all the symptoms.

Mr. Wilcox, late House-surgeon of King's College Hospital, recommends the use of the sulphates in chronic cystitis, where the urine decomposes before it is eliminated. By the employment of the sulphate of soda, all putridity disappears, and the urine becomes clear and colorless.

Quarrels Among Doctors. — The September number of the *Nashville Medical and Surgical Journal* comes to us freighted with a heavy load of what may be called private griefs. Very nearly the entire number is taken up by Dr. Bell and Dr. Bowling, the editors, in statements and charges relating to matters concerning which they are at variance with Dr. Gaillard, editor of the *Richmond and Louisville Medical Journal.* The public take but little interest in quarrels. What appears, for the time being, a very grave matter to the combatants, is of the least possible consequence to the great outside world. Regarding the merits of the controversy, or quarrel, between these gentlemen of high respectability, in Nashville and Louisville, we profess to have but little knowledge. We seldom or never engage in quarrels; and, although frequently subjected to injustice and wrong, we endeavor to look at the matter from the most charitable standpoint, and, if punishment of our enemy seems necessary, we find it most effectually accomplished by some act of kindness, extended to him when opportunity occurs. The gentlemen have manifestly wrought themselves up into a state of abnormal excitement, and in their statements and rejoinders use epithets, and make personal flings, which do not form pleasant reading to disinterested parties. We hope the matter will now be allowed to drop, and hereafter all will be quiet south and west of the Potomac.

A Simple Remedy for Whooping-Cough. — Dr. Howard Sargent, of this city, writes us a note, saying that for eight or ten years past he has used, as a remedy for whooping-cough, a tea made from red-clover blossoms He remarks: "It is so simple that many would not give it a second thought. I can say with truth that I never knew it fail. I generally expect a cure in ten days. Four years ago I had children in three families sick at the same time: they were all well in ten, twelve, or fourteen days. There is some care and art necessary in making the tea. I select and cure the blossoms myself, and take of the best blossoms about ℥ji to a pint of boiling water, steep for four hours, and give a wineglassful occasionally during the day. Should it operate on the bowels, no harm is done; the dose, in that case, may be diminished. I ask physicians to try it before they reject it. I sometimes add a little honey to make it more palatable."

FOR TOOTHACHE.

EXTRACTUM GALLÆ COMPOSITUM.

℞ Gallæ pulv., No. 40, four troyounces.
Pyrethri rad. pulv., No. 40, three troyounces.
Opii pulveris, half a troyounce.
Glycerinæ, a troyounce.
Alcoholis Diluti, a sufficient quantity.

Mix the powders, moisten the mixture with three fluidounces of the diluted alcohol mixed with the glycerin, and pack in a conical percolator. Then pour on diluted alcohol until a pint of tincture has passed. Evaporate on a water bath to a soft extract and preserve it for use.

This extract has been used for thirty years as an application to painful decaying teeth where the nerve pulp is sufficiently accessible to bring the extract into contact with it. The glycerin has been added more recently to prevent the extract from becoming friable. A solution in which these quantities are present in a pint, odorized with oil of gaultheria, makes a good liquid preparation, applied on cotton. The soft extract is applied by inserting a pellet in the cavity and then a wad of cotton, advising the patient to reject the saliva which freely flows from the action of the pyrethrum on the salivary glands.

Ointment for Hæmorrhoids, by the late Prof. W. R. Fisher.

Take of Sulphate of Morphia,	three grains.
Extract of Stramonium,	thirty "
Olive Oil,	sixty "
Carbonate of Lead,	sixty "
Lard Cerate,	three drachms.

Rub the extract, if not uniformly soft, with a few drops of water; add the powders and olive oil, and rub till perfectly smooth, and then incorporate them with the cerate.— *American Journal of Pharmacy.*

ANCIENT MEDICAL SCIENCE.

The greatest name in medical science, in ancient or in modern times, — the man who did the most to advance it; the greatest medical genius of whom we have record, — is Hippocrates, born on the island of Cos, B. C. 460, of the great Æsculapian family, and was instructed by his father. We know scarcely more of his life than we do of Homer himself, although he lived in the period of the highest splendor of Athens. And his writings, like those of Homer, are thought by some to be the work of different men. They were translated into Arabic, and were no slight means of giving an impulse to the Saracenic schools of the Middle Ages in that science in which the Saracens especially excelled. The Hippocratic collection consists of more than sixty works, which were held in the highest estimation by the ancient physicians. Hippocrates introduced a new era in medicine, which, before his time, had been monopolized by the priests. He carried out a system of severe induction from the observation of facts, and is as truly the creator of the inductive method as Bacon himself. He abhorred theories which could not be established by facts. He was always open to conviction, and candidly confessed his mistakes. He was conscientious in the practice of his profession, and valued the success of his art more than silver and gold. The Athenians revered him for his benevolence as well as genius. The great principle of his practice was trust in nature; hence he was accused of allowing his patients to die. But this principle has many advocates among scientific men in our day; and some suppose the whole philosophy of homœopathy rests on the primal principle which Hippocrates advanced. He had great skill in diagnosis, by which medical genius is most severely tested. His practice was cautious and timid in contrast with that of his contemporaries. He is the author of the celebrated maxim, "Life is short and art is long." He divides the causes of disease into two principal classes; the one comprehending the influence of seasons, climates, and other external forces; the other, from the effects of food and exercise. To the influence of climate he attributes the conformation of the body and the disposition of the mind. He also attributes all sorts of disorders to a vicious system of diet. For more than twenty centuries his pathology was the foundation of all the medical sects. He was well acquainted with the medicinal properties of drugs, and was the first to assign three periods to the course of a malady. He knew, of course, but little of surgery, although he was in the habit of bleeding, and often employed his knife. He was also acquainted with cupping, and used violent purgatives. He was not aware of the importance of the pulse, and confounded the veins with the arteries. He wrote in the Ionic dialect; and some of his works have gone through three hundred editions, so highly have they been valued. His authority passed away, like that of Aristotle, on the revival of European science. Yet who have been greater ornaments and lights than these distinguished Greeks?

The school of Alexandria produced eminent physicians as well as mathematicians, after the glory of Greece had departed. So highly was it esteemed, that Galen went there to study five hundred years after its foundation. It was distinguished for inquiries into scientific anatomy and physiology, for which Aristotle had prepared the way. He was the Humboldt of his day, and gave great attention to physics. In eight books he developed the general principles of natural science known to the Greeks. On the basis of the Aristotelian researches, the Alexandrian physicians carried out extensive inquiries in physiology. Herophilus discovered the fundamental principles of neurology, and advanced the anatomy of the brain and spinal cord.

Although the Romans had but little sympathy for science or philosophy, being essentially political and warlike in their turn of mind, yet, when they had conquered the world, and had turned their attention to arts, medicine received great attention. The first physicians were Greek slaves. Of these was Asclepiades, who enjoyed the friendship of Cicero. It is from him that the popular medical theories as to the "pores" have descended. He was the inventor of the shower-bath. Celsus wrote a work on medicine which takes almost equal rank with the Hippocratic writings. Medical science at Rome culminated in Galen, as it did at Athens in Hippocrates. He was patronized by Marcus Aurelius, and availed himself of all the knowledge of preceding naturalists and physicians. He was born at Pergamus, about the year A. D. 165, where he learned, under able masters, anatomy, pathology, and therapeutics. He finished his studies at Alexandria, and came to Rome at the invitation of the emperor. Like his patron, he was one of the brightest ornaments of the heathen world, and one of the most learned and accomplished men of any age. "*Medicorum dissertissimus atque doctissimus.*"* He left five hundred treatises, most of them relating to some branch of medical science, which give him the merit of being one of the most voluminous of authors. His celebrity is founded chiefly on his anatomical and physiological works. He was familiar with practical anatomy, deriving his knowledge from dissection. His observations about health are practical and useful. He lays great stress on gymnastic exercises, and recommends the pleasure of the chase, the cold bath in hot weather, hot baths to old people, the use of wine, three meals a day, and pork as the best of animal food. The great principles of his practice were, that disease is to be overcome by that which is contrary to the disease itself; and that nature is to be preserved by that which has relation with nature. As disease cannot be overcome so long as its cause exists, that, if possible, was first to be removed, and the strength of the patient is to be considered before the treatment is proceeded with. His "Commentaries on Hippocrates" served as a treasure of medical criticism, from which succeeding annotators borrowed. No one ever set before the medical profession a higher standard than Galen, and few have more nearly approached it. He did not attach himself to any particular school, but studied the doctrines of each — an eclectic in the fullest sense. The works of Galen constituted the last production of ancient Roman medicine; and, from his day, the decline in medical science was rapid, until it was revived among the Arabs. — *Dr. Lord's Old Roman World.*

* St Jerome, *Comment. in Aoms*, c. 5, vol. vi.

Telegraphing Pulse-beats and Heart-throbs. — At the session of the American Association for the Advancement of Science, at Lyceum Hall, Salem, Mass., Friday evening, Dr. Upham announced that a telegraphic wire connecting New York, New Haven, Boston and Salem, had been generously devoted to the use of the Association for the evening, and that arrangements had been made to attempt the experiment of telegraphing from the City Hospital, Boston, the movement in the heart and pulse of a variety of subjects, both in normal and abnormal condition, which should be observed simultaneously in the four cities. The telegraphic instruments were connected with the wire, the physicians in attendance at the City Hospital, Boston, answered "Ready." Mr. Farmer arranged the electro-magnetic recording apparatus, lighted the magnesium lamp, (the gas lights being turned down), throwing a beam of light on the little mirror attached to it, and which was thus reflected as a spot of brilliant light upon the wall, visible to the whole audience. In a moment connection was made with the pulse of a healthy subject in Boston, and sixteen miles away. Presto! the spot of light vibrates up and down, up and down on the wall; we see the motion in Salem; the audience counts sixty to the minute. Next the wire is connected with the wrists of an excitable young disciple of Æsculapius, and we are amused to see the spot of light vibrate up to ninety. The next case was that of the movements of the heart of a patient with chronic pneumonia, followed by one having organic malformation of the heart. In both these cases the irregular action was, of course, accurately indicated.

We were informed from the hospital that the nervous gentleman had consented, for the sake of science, to give an exhibition in his own person of the effects of *veratrum viridi* in reducing the action of the heart.

The drug was taking effect; the connections are made, and the beam of light beats to the slower time of sixty-four instead of ninety. A few minutes later it declined to forty-eight, which, considering the peculiarities of the individual, was startling.

At the close of this interesting session, Dr. Groux telegraphed the motion of his own heart to Boston, New Haven and New York, from which reports will be doubtless made by the accomplished observers stationed at those points. — *Telegrapher.*

For tapeworm, the following method seldom fails, if the child is strong enough to bear the necessary fasting: In the evening a dose of *castor-oil* must be given; the following morning, after the bowels have been relieved by the aperient, the oil of male fern is to be given in the following draught:

℞ Olei felicis mas., ʒ jss.
Syrupi.
Mucilag. acaciæ, aa ℥ ss.
Aq. cinnamoni, ʒ j. M

ft. haustus.

After three hours, this draught must be followed up by a second dose of castor-oil.

Cure for Warts. — Warts may be readily cured by cutting a hole in a piece of sticking plaster, the size of the wart, applying the sticking plaster so that the wart protrudes, and then using —

℞ Caustic potash, ℥ ij.
Gum arabic, ℥ ss.
Flour sufficient.

M. — Make a paste.

S. — To be left on for a few hours.

Dr. W. Marshall recommends, in the *Glasgow Medical Journal*, the union of chloroform and opium for the relief of pain. From ten to twenty drops of chloroform are combined with from ten to forty drops of Batley's Sedative, and given at one dose. This generally gives relief, and induces sleep.

TREATMENT FOR PIN WORMS.

Editor Journal of Chemistry :

Several weeks since, I noticed in your valuable *Journal* the use of lard as a cure for pin-worms. A few days after I saw that notice, an elderly man, whom I had formerly treated for that troublesome difficulty with lime-water injections, etc., called upon me again with the same complaint. The idea occurred to me, that, if fatty matter alone would procure relief, the well-known benefit of mercurial ointment in cases of itch would afford a better probability of success than simple lard. I therefore directed equal parts of mercurial unguent and lard to be used after each evacuation, and at night on going to bed, and also to pass a portion of the ointment within the sphincture. The patient has been completely relieved, or cured, by this application.

Respectfully yours,
Joseph White, M. D.

Canajoharie, N. Y., August 2, 1869.

☞ With all the care exercised in correcting typographical errors, some very provoking ones will occasionally occur. In the formula for Dr. Hill's new myrrh mixture, published in the last *Journal*, the scruple sign (℈) was used for O, pints.

The corrected formula is as follows:

MIXTURE OF MYRRH AND PYROPHOSPHATE OF IRON.

℞. Gum myrrh Turkey,
Pyrophos. iron, āā. ℥ij.
Sugar, ℥v.
Tinct. ol. gaultheria, ʒx.
Brandy, Oss.
Aqua, Oiij ss.
Carb. magnesia, ℥j.

Dr. J. Waring Curran recommends the iodide of ammonium in diseases of the glandular system. The following are his prescriptions in Goitre:

℞ Ammonii iodidi, gr. xv.
Spiritus chloroformi, ʒ ij.
Aquæ camphoræ, ad ℥ viij. M

S.— ℥ j ter in die.

℞ Ammonii iodidi, ʒ ij.
Glycirine, ʒ ij.
Adipis benzoat, ℥ jss. M.

ft. unguent.

Dr. Smith, in "Wasting Diseases of Children," recommends the following vermifuge mixtures:

℞ Santonini, gr. xv.
Pulv. zingib., gr. v.
Pulv. jalapæ, ʒ ss.
Sulphuris loti, ℥ j. M

ft. confect.

S. — A teaspoonful two or three times a day; for the *lumbricus* and the *tricocephalus dispar.*

Dr. Boulou has devised the following plaster for rheumatic and neuralgic pains:

℞. Empl. plumbi, ℥ xvj.
Ext. pini sylvestris.
Ext. Belladonna, aa ℥ jss.

Spread evenly over fine strong linen, so that every square inch should contain two grains of the active ingredient. — *Medical Archives.*

The following plan has been repeatedly used with success in strangulated hernia: Place the patient in most convenient position for taxis, inject hypodermically, immediately over point of obstruction, twelve drops of Magendie's solution of morphia; cover the patient's face with a towel, and pour over the tumor, from a considerable elevation, a bucket of very cold water; push the bowel back before the shock is recovered from. This plan will frequently succeed when all others have failed.

Japanese Dentistry.—They have dentists in Japan, who evidently do not enjoy the benefits of dental associations and journals. The Japanese are a remarkable people ; their jugglers are unsurpassed ; but commend us not to their dentists. Their manner of extracting a tooth must be tempting to their patients, and reminds one of the method of removing a rusty screw. The tooth is tapped with a mallet, until it can be extracted with the fingers ; pleasantly suggestive of an amount of malleting which we should think would not commend Japanese dentistry.—*Medical and Surgical Reporter.*

CASTOR OIL AND GLYCERIN POMATUM.

A correspondent says: "You would oblige the pharmaceutists of Philadelphia by giving a formula for castor oil and glycerin pomade, so that every one can make it, in your next number."

The Editor is disposed to comply with this request, though he thinks there are many of his readers who have recipes as good, or perhaps better than the one he now communicates:

CASTOR OIL AND GLYCERIN POMATUM.

Take of White Wax, an ounce and a half,
Glycerin, pure, two fluidounces,
Castor Oil, twelve ounces,
Oil of Lemon, five drachms,
Oil of Bergamot, two drachms,
Oil of Lavender, one drachm,
Oil of Cloves, ten drops,
Annatto, ten grains,
Alcohol and Water, a sufficient quantity.

By a moderate heat, dissolve the wax in a small portion of the castor oil (one-fourth), and triturate it with the remainder of the oil and the glycerin till it is quite cool; then add volatile oils. Lastly, rub the annatto with a drachm of water till smoothly suspended, add a drachm of alcohol, and stir the coloring into the pomade until it is thoroughly mixed.

It is quite necessary to use the blandest castor oil, and to heat it as little as possible, to avoid the ricinic odor which excessive heat develops in castor oil.—*Prof. Proctor in American Journal of Pharmacy.*

CINCHO-QUININE.

Messrs. J. R. Nichols & Co.

I have used in my practice this summer forty-five ounces of cincho-quinine, and its use has afforded me entire satisfaction. I have found it in intermittents as reliable as the sulphate of quinine; and the advantages which have been claimed for it over that salt are just in every respect. A. C. JACKSON, M. D.

GOSHEN, Ind.

I have used the cincho-quinine in several important cases, and carefully noted its effects. I am satisfied it is fully equal to the sulphate, and, in many respects, superior to any quinine I have ever used in a practice of twenty-two years. J. L. HARRIS, M. D.

CAZENOVIA, N. Y.

I have for some time intended to present to you the results of my trials of cincho-quinine. Circumstances have prevented me from doing so at an earlier date. I take pleasure in saying that the article has been used with much satisfaction by me, and, if I can obtain a supply, shall always use it in place of the sulphate. Its taste being far less bitter and disagreeable is a great point. Unlike sulphate of quinine, when used for a considerable time in full doses, it does not produce headache, perversion of sight and sound, and other disagreeable symptoms. I would recommend the profession everywhere to make trial of cincho-quinine.

P. A. MARK, M. D.

QUINCY, Ill.

COD-LIVER OIL, WITH HYPOPHOSPHITES OF LIME AND SODA.—We have received from George F. Fort, M.D., ex-Governor of New Jersey, and one of the most distinguished physicians in the country, the following statement respecting the effects of the cod-liver oil with hypophosphites of lime and soda. He says:

"I procured of you, last spring, a supply of Cod Liver Oil with hypophosphites of lime and soda, which I desired to use in the case of a young lady troubled with a cough of long standing. I feared serious pulmonary trouble, she having lost a sister, of phthisis. Shortly after commencing with the oil, she began to improve; and she continued taking it ten weeks, at the end of which time she was *perfectly relieved.* It is certainly a valuable remedy or combination, and, if accessible to the medical gentlemen in this section, would be largely employed."

For the convenience of small dealers, we present below prices of our chemical products, in small quantities, such as are often wanted. For prices in packages, or in large quantities, see our regular monthly Price-List.

PRICES OF VIALS AND BOTTLES.—g.s.v., means glass-stoppered vial, the price of which is 10 cents, more or less; c.v., corked vial, 6 cents, more or less; c.b., corked bottle, 12 cents, more or less; g.s.b., glass-stoppered bottle, 18 cents, more or less. The cost of the bottles and vials as given is to be added to the price of the articles in all cases. In remitting cash for goods, remember to include price of package as per list below.

Acid, Acetic . . . . 5lb. bot. 25 lb.	$0.30
" " glacial, . . . g.s.v.7 oz.	.13
" Benzoic . . . . . (lb.5.25) oz.	.42
" Carbolic, Crystals, C.P. v.8 oz.	.20
" " " C.P. bot. 20 lb.	1.80
" " Sol. extra c.b.8 lb.	.67
" " Com., Can incl., gal.	3.00
" *Chromic*, 1 oz. vials, g.s.b.7 oz.	.58
" Citric . . . . . . c.b.12, lb.	1.33
" Gallic . . . . lb.	
" " . . . . c.v. 5 oz.	.35
" Hydrosulphuric . . c.b.11 lb.	1.00
" Hypophosphorus . . c.v.4 oz.	.29
" Lactic, dilut. . . . g.s.v.8 oz.	.27
" " concent. . . g.s.v.8 oz.	1.02
" Nitrate Mercury . g.s.v.10 oz.	.25
" Phenic, Crystals . . . v.8 oz.	.20
" Phosphoric, 50 p.c. c.s.b. 9 lb.	1.41
" " 25 p.c. anhyd. c.b.9 lb.	.71
" Prussic . . U. S. P. g.s.v.7 oz.	.13
" Pyrogallic . . . . c.v.5 oz.	1.10
" Sulphurous, solu. . c.b.11 lb.	.39
Acid, Valerianic, ... g.s.v.7 oz.	1.33
Ammonia, Spirits, . . 5 lb. c.b.25 lb.	.50
" " Aromatic, 5 lb. 25 lb.	.55
" Borate, ... c.v.4 oz.	.56
" Hydrosulphide (Hydrosulphuret) g.s.b.20 lb.	.80
" Hypophos. . . . c.b.12 lb.	3.63
" " c.s.v.4 oz.	.26
" Iron Alum . . . c.v.4 oz.	.20
Ammonia, Nit. pure, C. P. bulk, lb.	.85
" Valerianate, crys. g.s.v. 7 oz.	1.23
Ammonium, Bromide, . . . c.b.8 lb.	2.75
" " v.4 oz.	.20
" Iodide, ... v.7 oz.	.70
Amyl, Acetate of Oxide, . g.s.b.20 lb.	6.80
Antimony, Sol. Chloride, c.s.b.11 lb.	.39
Arsenic, Donovan's Sol. c.s.b.10 lb.	.40
" Fowler's Sol. . c.s.b. 10 lb.	.25
" Iodide . 1 oz. vials, g.s.v.7 oz.	.73
Atropia, in ⅛ oz. vials, . . ⅛ oz. ea.	3.75
" Solution, Fleming's, 4 oz. v.	.50
Bismuth, Citrate (Salt), . c.s.v.4 oz.	.66
" Elix. Cal. & Iron (doz. $10) lb.	.90
" Liquid (Ammon.), c.s.b.11 lb.	1.24
" Tannate, ... c.s.v.4 oz.	1.46
Black Drop, ... c b.10 lb.	6.70
Caffeine, ⅛ oz. vials, . . . ⅛ oz. each	1.37
Calcium, Chloride, sol., c.s.b. 10 lb.	.90
Cantharidal Rubefacient, ... oz.	.45
" Vesicant, ... oz.	.50
" Collodion, ... oz.	.42
Cerium, Oxalate, 1 oz. vials, c.v. 4 oz.	1.36
Chlorine Water . . . . . c.b.11 lb.	.64
Chloroform, C. P. . . . . g.s.b.13 lb.	1.87
Cinchona, Sulph., in oz. vials. v.5 oz.	.55
Codeine, ⅛ oz. vials . . . . . ⅛ oz.	2.50
Cod-Liver Oil . . . . doz.	9.00
Cod-Liver Oil with Hypophosphites of Lime and Soda combined, doz.	9.00
Collodion, Surg. . . . . doz.	3.00
" " . . . . . . b.10 lb.	1.90
Creosote . . . . g.s.v.14 lb.	1.21
Dover's Powder . . . . . . c.b.9 lb.	3.41
Egg Preservative (Judd's) . . . doz.	9.00
Elixir Calisaya . . . . doz.	10.00
Elixir Cinch. Iron & Strych. . . . lb.	.90
" Phosph. Iron & Quin. . . . lb.	.90
" Pyrophosp. " & Soda, . . . lb.	.90
" Rhubarb & Magnesia . . . . lb.	1.00
Ether, Acetic . . . . c.b.10 lb.	.90
" Butyric, conct. . . . c.b.10 lb.	4.40
" Chloric . . . . . . c.b.10 lb.	1.00
" " conct. C. P. . c.b.10 lb.	1.60
" Spirits Nitros. C. P. . c.b.10 lb.	1.15
Ether, Spirits Nitros, FFFF, c.b.10 lb.	50
Ether, Sulphuric, fort . ext., c.b.10 lb.	1.15
Extract Cannabis Indica . *true*, 7 oz.	1.68
" Nux Vomica . . in jars, 7 oz.	.58
Extract of Flesh . . . . oz.	1.10
Ferrated Tincture Bark . . . b.12 lb.	.88
Fusel Oil, purified . . . . c.b.11 lb.	1.39
Glycerine, chem. pure, *extra*, including white bottle and carton . lb.	1.25
Glycerine, condensed . . g.s.b.15 lb.	.70
" " . . c.s.b.10 lb.	.70
Glycerole Hypophosphites, c.s.b.9 lb.	1.11
Glonoine, Tincture . . . . . . oz.	.55
Gold, Chloride, 15 grain bots. 24 doz.	8.50
Gold, Chloride, and Sodium, 15 gr. bot. 24 doz.	$4.25
" " " ⅛ oz v. 30 oz.	11.00
Granville's Lotion, ... c.b.10 lb.	.50
Hoff. Anodyne, ... c.b.10 lb.	.50
Hoffman's Anodyne, officinal U.S.P. c.b.15 lb.	2.85
Hypophosphite of Iron, in 1 oz. vials c.v.4 oz.	.56
" Lime, " c.v. 4 oz.	.26
" Manganese, " c.v.4 oz.	.86
" Potassa, " c.v.4 oz.	.26
" Soda, " c.v.4 oz.	.28
Infusum Opii Deod. . . . c.s.b.15 lb.	4.50
" " per doz.	4.00
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Iodoform . . . . . . ⅛ oz. plain vials	5.75
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" " and Manganese, v. 4 oz.	.66
" By Hydrogen . . . . c.b. 11 lb.	2.64
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" Hydrocyanate, ... c.v.4 oz.	.83
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" Nitrate . . . . c.b. 14 lb.	.21
" Perchloride, dry, g.s.v. 7 oz.	.13
" Perchloride, sol. c.s.b. 10 lb.	.42
" Perchloride, sol. 36° B.c.s.10 lb.	.65
" Pernitrate . . . . . c.b. 10 lb.	.45
" Persulphate, Mon's Styp., sol. c.s.b. 10 lb.	.65
" " " " 1 oz. vls. doz.	2.00
" " Mon's pow. 1 oz. vls. doz.	2.25
" " " " c.b. 16 lb.	1.64
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" Carb. Proto., pure precip., c.b. 14 lb.	.41
" Carb. Proto. (Vallet's mass.) pots 10 lb.	.50
" " " Saccharine, c.b 14 lb.	.76
" Pyrophosphate, in scales . 4 oz.	.16
" " w.b. 15 lb.	1.50
" " Elixir . . doz.	10.00
" " " and Bark,	10.00
" " and Mang. 14 lb.	2.00
" Sulphuret . . . . . . c.b. 8 lb.	.42
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" " " c.b. 10 lb.	.75
" Tart. et Potas., plates, w.b.15 lb.	1.50
" " " c.v. 4 oz.	.15
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" Sub. Acetate Sol. c.b. 10 lb.	.34
Liebig's Nutritive Food . . . . doz.	2.50
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" " boxes 25 lbs. ea.	2.50
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" " " demi. 55 gal.	4.00
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Potassium, Bromide, ... c.b.4 oz.	.13
" " . . . . c.b.8 lb.	1.92
" Chloride . . . . c.b.20 lb.	1.10
" Iodide . . . . . c.b.9 lb.	5.66
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" " " . c. b. 11 pt.	.12
" Silicate, (soluble glass) . . lb.	.25
" " Solution, demi. 55 gal.	1.75
Silver, Bromide . . . . . c. v. 4 oz.	2.76
" Chloride, ... c. v. 4 oz.	1.63
" Cyanide. . . . . . c. v. 4 oz.	2.66
" Iodide . . . . . . c. v. 4 oz.	2.66
" Oxide . . . . . . c. v. 4 oz.	2.11
Spirits Lavender, Comp. c. b. 10 lb.	55
" Chloroform, U. S. P. c. b. 10 lb.	.90
" Rosemary . . . . c. b. 10 lb.	.45
Strychnine, Sol. Fleming's, 4 oz. v.	.45
" Valerianate, g. s. v. 8 oz.	5.92
" " Elixir . doz.	5.00
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" Protox. Iron with Iodide of Potassa, lb.	.90
" Protox. of Iron with Quinine, lb.	1.00
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" " Ox. Muriate, c.s.b. 10 lb	.30
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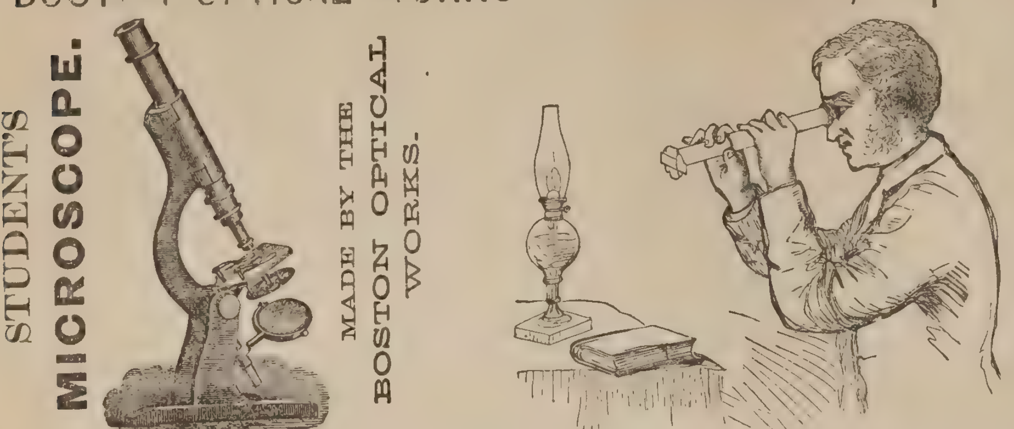

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VOL. IV.—No. 5. BOSTON, NOVEMBER 1, 1869. FIFTY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

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Contents.

Familiar Science.

THERMO-ELECTRICITY AND ONE OF ITS APPLICATIONS.

It is well known that electricity may be developed or produced in various ways; as by friction, by chemical action, by magnetism, etc. One of the ways in which it may be generated is by *heat*. If one of two pieces of copper wire be heated, and an end of it be pressed against an end of the other piece, a current of electricity will pass from the hot to the cold piece, and may be detected by a delicate galvanometer. If pieces of any *two* metals be brought in contact, and the point of junction be heated or cooled, a flow of electricity takes place from one to the other. For example, when a bar of antimony, *A*, is soldered to a bar of bismuth, *B*, (see Figure 1) and their free ends are connected with a galvanometer, *G*, a current passes from the bismuth to the antimony when the junction is heated. When *S* is cooled by applying ice, or otherwise, a current in the opposite direction is produced. Such a combination of metals is called a *thermo-electric pair*, and the electricity produced is called *thermo-electricity*, that is to say, *heat electricity*.

Figure 1.

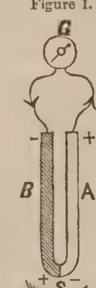
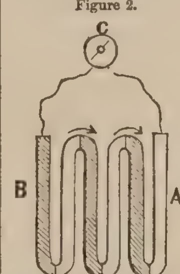


Figure 2.



A single pair of this kind has very little power, but when several pairs are united, as shown in Figure 2, a stronger current is obtained. Such a collection of pairs is called a *thermo-electric battery* or *pile*, or, more concisely, a *thermopile*. The upper row of soldered ends forms one *face* of the pile, and the lower row the other face.

If, now, one of these faces be heated more than the other, an electric current passes through the bars; and the greater the difference in temperature between the two faces, the stronger is the current.

We have said that the current may be detected by a *galvanometer*, but perhaps some of our readers may not know what *that* is. It consists essentially of a magnetic needle, arranged so that the current of electricity can be made to pass around it through wires parallel to its position when at rest. When thus at rest, of course it points north and south, but as soon as the current passes through the wires it causes the needle to swing round towards an east and west position. The stronger the current, the farther it turns aside, so that its motion serves not only to detect the electricity, but also to measure it.

When the galvanometer is used with the thermopile, one end of the wire passing round the needle is connected with the free end of the antimony bar, *A*, in the figure above, and the other end with the free end of the bismuth bar, *B*.

Such an apparatus, if delicately constructed, is the most sensitive of all thermometers. If the hand be held several feet from one face of the pile, the heat radiated from it will set the electricity flowing through the soldered bars and deflect the needle of the galvanometer. If a piece of ice be held at considerable distance from the same face of the pile, the needle instantly swings in the opposite direction, showing a current whose course is opposite to that of the former one.

But of what use is this thermometer, except as a scientific plaything? It has been the means of settling a question which had long been matter of dispute among scientific men. Is there any heat in the rays of the stars? Does any warmth come to our world mingled with the light which finds its way across the immense interval which separates them from our solar system? The ordinary thermometer does not indicate the slightest rise of temperature when exposed to the rays of the stars. It is very far from being sensitive enough to measure the small amount of heat in the stellar beams. But the thermopile has caught the warmth radiated from a star, has measured it again and again, and has thus solved the problem which so long baffled the skill of the wise men.

The method of using the pile in this investigation will be understood from the following description:

"It is this instrument which Mr. Huggins has employed in his researches into the heat of the stars. It was attached to his telescope so that the image of a star formed by the eight-inch object-glass might fall upon the surface of the pile. So delicate was the arrangement, and so susceptible to the minutest variations of temperature, that his apparatus often had to be left for hours until it had come to equilibrium and the needle was at perfect rest. When the time arrived for experiment, the shutter of the observatory dome was opened, and the telescope was turned upon a part of the sky near a bright star, but not actually on the star. The needle was then carefully watched, to determine whether the change of position produced any effect. After waiting sufficiently long to be certain that there were no signs of change, the telescope was moved over the small distance necessary to bring the image of the star directly on the face of the pile, when the needle was immediately seen to move. The telescope was then moved slightly away from the star, when the needle returned to its place. The stellar ray was then again made to fall upon the pile, and again the needle was thrown out of its position. These observations were repeated, with great care and patience, on different stars, and at different times, until it has been conclusively established that heat is a constituent of the stellar rays."

The star Regulus, which was one of those selected by Mr. Huggins for his experiments, is so far away from our earth that its light, flying at the rate of 190,000 miles in a second, takes *twenty-six years* to reach our earth. The rays of heat which struck upon the face of the

thermopile, started the electric current through its network of metallic bars, and swerved the needle of the galvanometer, started from their starry home twenty-six years before. The old astrologers taught that the stars had an influence upon the events which take place on this earth of ours; and so indeed they have, in a more wonderful way than Chaldean sage ever conceived. Modern science has shown that all matter, however distributed through the immensities of space, is essentially the same, being made up of the same chemical elements with which we are familiar in this little corner of the universe. It has proved, too, that *force* is everywhere the same in its nature, and everywhere indestructible, though everywhere capable of infinite transformations. The *heat* which we can produce by our lamps and furnaces may be transmuted in the thermopile into that other form of molecular motion which we call *electricity*, and this again into ordinary *mechanical motion* in the needle of the galvanometer; and the heat which has come to us from the most distant star, though too slight in amount to be directly appreciable by our senses, is found to be capable of going through the very same metamorphoses and manifesting its energy in the same varied phenomena.

Verily, truth is stranger than fiction, and the sober realities of science more wonderful than any Arabian tale of magic.

COPPER IN THE COLORING OF A BIRD'S WING.

The *turaco* or *plantain-eater* of the Cape of Good Hope is noted for the beauty of its plumage, and especially for the rich red upon its wings. This red coloring-matter has been analyzed, and found to contain nearly six per cent of copper, which cannot be detected by the ordinary tests, nor removed from the red compound without destroying it. This coloring-matter is, in fact, a natural organic compound, of which copper is an essential constituent. The name *turacine* has been given to this substance. Traces of copper had previously been found in animals, as in oysters, which, living in streams flowing from the neighborhood of copper mines, had assimilated certain salts of that metal. The copper apparently had no effect upon the health of the oyster, though it did upon the health of people who ate the bivalve. But in this case, as in all others of the kind heretofore observed, the presence of the copper was clearly accidental; while in the turaco the metal is a normal part of the coloring-matter of the bird's plumage. Of course it must be obtained in minute quantities with the food, and stored up in this singular way in the system of the animal. In the very same feather, partly red and partly black, the copper is found in the red parts, but not at all, or the merest trace, in the black. If a few fibres from the red part be burned, the spectrum of copper is readily detected in the flame.

It is a curious fact that this red in the wing of the turaco is not a *fast* color. A pair of fine birds which were kept in captivity washed it all out of their plumage in a few days by bathing in the water which was left them to drink, the turacine being soluble in water. Except for the loss of their beauty, the birds did not appear to be any the worse for the change. It would seem, therefore, that we have here an instance of the elaboration of a chemical substance perfectly unique in its nature and containing a metal whose salts are usually regarded as poisonous to animals; and yet the sole purpose which, so far as we know, it serves in the animal economy, is one of pure decoration. How will those who take an exclusively utilitarian view of the plan of creation explain this?

THE WORLDS IN SPACE.

At the late meeting of the British Association for the advancement of science, held at Exeter, England, Professor Miller gave a Saturday evening lecture which was a very attractive popular presentation of some of the great facts in astronomical science, followed by an account of the most recent discoveries in that department of research. The difficulty about astronomical facts is that the mind must make an unwonted effort to grasp them. They transcend our familiar figures and standards so enormously that we listen to them without fully comprehending them. A general and vague notion of void immensity is left in the mind, but nothing more. Professor Miller, however, put the main facts of the science before his hearers, with great clearness; and those who listened to him could not but come away with new views of that majestic creation, of which our own world, vast as it appears to us, forms so minute a part. Abandoning the hard language of figures and the usual formulas, the lecturer invited his hearers to construct an orrery in their imaginations. It was Sir John Herschel's illustration of the solar system, with some modifications, extended to take in the immensely broader domain of the stellar universe.

We are to suppose ourselves on a vast level plain, in the centre of which we place a globe, two feet in diameter, to represent the sun. At the distance of seventy-two yards from this globe, we place a pea, which figures the earth, eight thousand miles in diameter; with the moon under the form of a mustard-seed, seven inches from the pea. Between the earth and the sun, at distances of about twenty-seven and forty-seven yards from it, Mercury and Venus would be placed, the former as a small shot, the latter as a pea, a little smaller than the earth. Mars would be another small shot, one hundred and nine yards from the centre; Jupiter and Saturn, oranges of small size, the former a quarter of a mile, and the latter two-fifths of a mile, from the sun; while Uranus and Neptune would be plums, at distances of three-quarters of a mile and a mile and a quarter respectively. Put in the asteroids and satellites in their proper places on the same scale, and the circular field of two miles and a half diameter would then be an exact map of our solar system, the little celestial family to which the planet on which we live belongs. With regard to the nearest of the kindred systems—the next-door neighbors of our planetary household—even a scale so liberal fails us instantly. The earth's surface, rolled out flat, would not be wide enough to admit into the chart the brightest of the fixed stars. To put down Sirius in his right place, he should be 40,000 miles away from the two-feet globe which represents the sun. And let it be borne in mind that this distance is merely "to scale," *the earth being a pea.* The true interval between that bright star and the earth is so prodigious, that light, which travels seven times round our globe in a second, and reaches us from the sun in eight minutes, takes *twenty-three years* in the journey from Sirius to our eyes.

These facts have long been known; but another fact of more recent discovery invests them with an entirely new interest. Immensely distant as these bodies are, science has compelled them to disclose the secrets of their composition. Some of the telescopic stars are hundreds of times farther off than Sirius; yet, with the aid of the spectroscope, astronomers have catalogued the component substances of those distant suns, and have revealed the momentous fact that the bodies which spangle immeasurable space contain matter identical with that which we know here in our own little world. Even the light of the nebulæ, which are so far away that figures cannot express the bewildering interval, yields its testimony that throughout the whole visible universe the material of creation is the same. A succession of ingenious investigations into the nature of the red flames which shoot from the sun, has shown that vast eruptive conflagrations of hydrogen are blazing there, while many of the metals familiar to us are vaporized in the inconceivable heat of that heaving sea of fire. Doubtless these metals, gases, and other forms of common matter are differently mingled, and under different conditions, in the various planets, and suns, and systems; but the new optical chemistry has demonstrated that the worlds, as far as we can reach them with eye and glass, are all formed of the same primary materials, "aggregated," Professor Miller said, "into masses which, though differing from one another in composition, like the various veins of ore that occur in mines upon the surface of our globe, are yet all evidently of common origin; all obey the same laws, and all possess a chemical nature similar in kind." These intimate relations between bodies so far distant must inspire us with a new sense of the unity of creation; and (again to quote the learned lecturer) "if the measurement of such distances, the estimate of the mass and the magnitude, the calculation of the velocity of these bodies in space, and the determination of their chemical composition at distances the accurate conception of which transcends even the ability of imagination—if these, I say, be not beyond the power of man, it may well be supposed that there is no limit to the discoveries which are within his reach."

This exultation at the rewards of man's patient inquiry into the secrets of nature is a just and proper pride. This joyous hope of discoveries to come, which will surpass even such prodigious results, is no wild dream, but a well-grounded and sober anticipation of the glorious extension of the realm of knowledge. From the height already reached, after long and weary labor, a new landscape of boundless extent is seen outspread before us, and we *know* that its complete exploration can make no demand upon our powers beyond what they have already been able to bear. It is only a question of time and patience, not of strength and skill.

The discovery that all the visible worlds are of like nature to ours, suggests the thought that, as matter is common to this "world of worlds," so *life*, veiled in material forms, is also common. Hydrogen—now known as a metal, even on our own earth, in alloy with palladium—is burning with jets of fierce flame ten thousand miles high upon the sun's photosphere, and perhaps is frozen into blocks of manageable building material in the planet Neptune. In different worlds matter is differently conformed and employed; but, since it is universal, how strong is the presumption that life also, under unimagined conditions and guises, accompanies all its countless transformations! And when we have ascended so far above this poor little speck, the earth, as to conceive the planets peopled; when we have launched on beyond them into the abyss of space, to follow our astronomers to Sirius and the fixed stars, and to imagine the planets which revolve about those distant suns as also the abodes of wonderful and lovely forms of sentient life, is it possible that we should fail to recognize the unity of design and of power embodied in the government of the universe? Astronomy, reënforced by the marvellous aid of chemistry, cannot but develop a wider and bolder idea of the love, the wisdom, and the purposes of Providence. Well might the cathedral preacher at Exeter, on the day after Prof. Miller's lecture, discourse

from the text, "What is man that Thou art mindful of him?" — not in the spirit in which the inquiry is usually discussed, but dwelling rather upon the answer found in the same Psalm, "Thou madest him to have dominion over the works of Thy hands"; and enlarging, with devout thankfulness, upon the exalted heritage of man as little lower than the angels, endowed with the capacity of tracing the thoughts of God in the laws of the natural world, and finding, at every step, fresh proof of that Divine love, of which the written Word, with its messages of grace, is but another revelation.

DEEP SEA SOUNDINGS.

A systematic course of deep-sea dredging was carried on last year by Dr. Carpenter, Prof. Thomson, and other naturalists, under the auspices of the Royal Society, and with the aid of the British government, the vessel having been furnished by the Admiralty. Dredging was successfully done at a depth of 650 fathoms; and a varied and abundant submarine fauna was found at depths where it had been supposed that no animals, or only those of the lowest type, could exist.

This summer, another expedition of the same kind, with a larger vessel, has been organized, and dredging has been carried down to more than 2,400 fathoms — a depth nearly equal to the height of Mt. Blanc. Animal life has been found, even at that depth, in considerable *variety*, though its *amount* and *kind* are limited by the Arctic coldness of the temperature. Careful soundings with thermometers made for the purpose proved that the temperature decreases as the depth increases. The fall of the mercury is at first more rapid, but soon becomes pretty uniform. All the observations confirm the theory that there is a regular flow of warmer water from the equator towards the poles, and of colder water from the poles towards the equator, the former current extending down some 700 or 800 fathoms, and the latter occupying the lowest depths. These deep waters have been analyzed, and are found to contain a large proportion of carbonic acid gas, and also of organic matter.

THE ICEBERG.

"Observe the little bit of ice that clicks in your tumbler at dinner-time. Observe it closely, and you will perceive how very small a part of it floats above the surface of the water — not more than one-eighth, at the farthest — while the remaining seven-eighths float beneath. Now, this little bit of ice is an iceberg in miniature — an iceberg in every essential feature, except that it did not, in all human probability, come from Greenland. In shape, in general transparency, in the play of light upon it, in its prismatic character, in its frequently-cavernous form, in the general shape of the projecting tongues which lie beneath the surface of the water, in the delicate mist which plays around its summit in the warm air, it is the very image of those great, floating monoliths of the Arctic frost which come sailing down Baffin's Bay with the polar current, in all their stately grandeur and magnificence, scorning, as they tread their watery way, the great billows of the ocean with a cold disdain, sending them away, moaning and shattered, in defeat, chilling the air for leagues around, yet gathering to themselves the gorgeous colors of the sky; immovable from their steadfast course, and majestic as the 'silvery moon,' that, like the iceberg, 'bathes its sides in the trembling wave.'

"The iceberg is the largest independent floating body in the universe, except the heavenly orbs. There is nothing approaching it, within the range of our knowledge, on this globe of ours; and yet it is, as we have seen, but a fragment of the ice-stream, which is, in its turn, but an arm of the ice-sea. And yet the iceberg is to the great quantity of Greenland ice as the paring of a finger-nail to the human body; as a small chip to the largest tree; as a shovelful of earth to Manhattan Island. Yet magnify the bit of ice in your tumbler until it becomes, to your imagination, a half a mile in diameter each way, and you have a mass that is far from unusual. Add to this a mile, two miles in length, and you have what may be sometimes seen. I have sailed alongside of an iceberg, two miles and a half, measured with a log-line, before coming to the end of it.

"The name signifies, as we have seen before, ice-mountain; and it is truly mountainous in size. Lift it out of the water, and it becomes a mountain one thousand, two thousand, three thousand feet high. In dimensions, it is as if New York City were turned adrift in the Atlantic, or the Central Park were cut out and launched in the same place. An iceberg of the dimensions of the Central Park is far from unusual. And its surface is not in form unlike it either. It is undulating like the Park, and craggy, and crossed by ravines, and dotted with lakes — the water of the lakes being formed from the melting snows of the late winter, and also of the ice itself after the snows have disappeared before the influence of the summer's sun. I have even bathed in such a lake, although I am glad to say but once, and that was in 'those days of other years,' when the youthful insanity is strong to *say*, 'I have done it' — a disease which I believe to be amenable only to that treatment popularly known as 'sad experience.' Skating on an iceberg lake is far more satisfactory and sensible.

. . . . . .

"We still stood upon the summit of the bluff, overlooking the fiord and the ice-stream.

"The ice-stream had been constantly emitting sounds, sometimes by the breaking off of a small fragment from its front, sometimes by a partial crack opening far up in the body of it, as it strained in its rocky bed; but now a loud report, as of 'deep-mouthed thunder,' broke from its profoundest depths — seemingly, indeed, as if from the very bowels of the earth. It fairly shook the ground on which we stood.

"Philip said, quietly, 'The ice-stream is going to calve.'

"An instant afterward the report was repeated, louder and still more startling. The shock beneath my feet was more sensibly felt: it seemed like the first warning cry of a coming earthquake.

"Philip said again, 'See! it is rising.'

"A portion of the glacier was being lifted by the sea. A great wave was rolling back with this movement of the ice, and was dashed wildly against the ice in front.

"An instant more, the sound, which was before so deep and loud, now broke through the air with a crash that was almost deafening — as when a heavy gun is fired near by.

"I knew that a monstrous crack was opening in the ice-stream.

"The position of the crack was soon seen. A fragment, of enormous proportions, had been disengaged. Its front raised itself aloft as if it were some great leviathan endowed with life, and while it rose the crack opened wide. The unwieldy mass plunged forward, crashing against other ice-masses, scattering the broken fragments to right and left with irresistible force. Then the inner side rose up and the front sank down, while vast volumes of water that had been lifted with it went roaring and hissing over its sides into the foaming and violently agitated sea.

"Thus an iceberg had been born.

"It would be impossible, with mere words alone, to give any adequate idea of the action of this new-born child of the Arctic frosts. Think of a solid mass of ice, a third of a mile deep, and more than half a mile in diameter, hurled like a mere toy into the water, and set to rolling to and fro by the impetus of the act — as if it were Nature's merest football — down one side, until the huge mass was nearly capsized; then back again, and down the other side, with the same unresisting force; and so on, up and down, swashing to and fro, for hours, before it comes finally to rest. The disturbance of the water was inconceivably fine; waves of enormous magnitude were rolled up with great violence against the glacier, covering it with spray; and vast billows came tearing down the fiord, their progress marked by the crackling and crumbling of the ice, which was in a state of wildest agitation throughout a space of several miles. Over the smaller of the icebergs these billows broached completely, breaking as if a tempest were piling up the waters, and heaving them with infuriated might against a rocky shore. Then, to add to the commotion thus made, the great, wallowing iceberg that was the cause of it all was dropping fragments from its sides with each vacillation, the reports reaching the ear above the general din and clamor. Then other bergs, as they were successively set in motion by the waves, also dropped pieces from their sides; and at last, as if it were the grand *finale* of the piece — the clash of the cymbals and the big bass-drum of Nature's grand orchestra — a monstrous berg, near the middle of the fiord, split in two, and, during the noise of moving waters and crumbling ice, filled the air with a peal that rang among the bergs and crags, and, echoing from hill to hill, died away only in the void beyond the mountain-tops; while to the noisy rhythm the huge leviathans of the fiord dance their wild, ungainly dance upon the waters.

"It was many hours before this state of wild unrest was succeeded by a calm; and when at length the iceberg that I had seen born came quietly to rest, and the other icebergs had ceased to dance their dance upon the troubled sea, and the billows had stilled their lashings, it seemed to me that, in beholding this birth of an iceberg, I had beheld one of the most sublime exhibitions of the great forces of Nature. It was indeed a convulsion!" — *Dr. I. I. Hayes, in Appleton's Journal.*

Experiments made at the Botanic Garden, London, showed that a leaf of the *Victoria Regia* would sustain a weight of 426 pounds before sinking. The leaf selected for the trial is said to have been one of the smaller ones of the plant.

Arts.

POTASH FROM A NEW SOURCE.—THE STASSFURT MINES.

The alkaline salt potash is so important in agriculture and the arts, that we think a full explanation of the method of obtaining it in large quantities from a new source will be interesting to the readers of the *Journal.* Potash, as is well known, was formerly the cheapest of the alkalies, but it is now the dearest; and in every possible case its place has been filled by one of the other alkalies, usually soda. The principal, and for a long time the only, source of potash, has been the ashes of plants; but within a short time potash salts have been discovered in vast amounts at the salt mines of Stassfurt, Prussia. Their value was not at first recognized, but did not long escape the notice of the very eminent chemist, Heinrich Rose, who pointed out their importance. At the present time, they are extensively worked. They are found overlying the salt-beds, in layers of various thicknesses, and are associated with salts of lime and magnesia. The principal forms in which they occur, are known as mineral species under the names of polyhalite, sylvite, carnallite and kainite; accompanying them are found rock-salt, anhydrite, kieserite, tachydrite, and boracite. Polyhalite is a hydrated sulphate of potash, lime, and magnesia; sylvite is chloride of potassium; carnallite, a double chloride of magnesium and potassium; and kainite, a compound of hydrated chloride of potassium and sulphate of magnesia. Of the associated minerals, it need hardly be said that anhydrite is the anhydrous form of sulphate of lime; kieserite is a hydrated sulphate of magnesia; tachydrite, a double chloride of calcium and magnesium; and boracite, a borate of magnesia.

Carnallite is the material worked for the extraction of potash. It is found mixed with rock-salt, kieserite, and small quantities of the other species mentioned above. As the mineral comes from the mine, it contains about one-sixth its weight of the potassium salt (the chloride), the rest being rock-salt and the chloride of magnesium, which is combined with the potassium salt as carnallite. In the process used to get the chloride of potassium in a reasonable degree of purity, advantage is taken of the different degrees of solubility of the various substances with which it is associated. The chlorides of potassium and magnesium are much more soluble than the chloride of sodium; so by treating the salt mass with an insufficient quantity of hot water, the two first-named salts are dissolved, while the most of the common salt is left behind undissolved. Chloride of magnesium is very soluble in cold water, and common salt is equally soluble in hot and cold water, so that both these remain in solution, while the potassium salt crystallizes out in a state of tolerable purity, about 80 or 90 per cent. of chloride.

This product is good enough for commercial purposes and is used for making other salts. By further concentration of the mother liquor, the original salt, carnallite, deposits, and can be again worked over, while chloride of magnesium only is left in the solution. From the chloride of potassium the sulphate can be prepared by treatment with sulphuric acid; and from the sulphate the carbonated and caustic alkali, by Leblanc's process. This method, however, requires the use of a material (the acid), which is obtainable at the mines only at a considerable expense. It was therefore desirable to employ, if possible, the natural sulphate of magnesia, which is very plentiful at Stassfurt. After a great

deal of experimenting, this was finally accomplished in a very ingenious manner by the formation of a double sulphate of potash and magnesia. This is done by simply adding sulphate of magnesia to the solution of chloride of potassium, a double decomposition taking place, with the production of sulphate of potash and chloride of magnesium. But the sulphate of magnesia, as mined, is mixed with common salt, from which it must first be freed.

The mixture of rock-salt and sulphate of magnesia is placed in water. The magnesia sulphate is but slightly soluble in the brine which is soon formed and collects at the bottom of the vessel, from which it is removed and used to form the double salt above mentioned. By careful treatment of the double salt, a part of the sulphate of magnesia can be got rid of, and from the residue carbonate of potash produced by Leblanc's process. Another mode of treating this double salt, is by a solution of chloride of potassium, and then, by a series of crystallizations, are obtained pure sulphate of potash, the double sulphate again, and a double chloride of potassium and magnesium (carnallite). The sulphate of potash is of course fit for the market, but the other salts are again worked over in the ways previously described.

As already stated, the deposits at Stassfurt are of enormous extent, and from them potash and its salts are now produced in such great quantities that their cost has been very materially lessened, so that even in agriculture they can be advantageously used. The processes employed for their extraction seem simple, and indeed are not very complex, yet are of a very interesting character, must be carried on with care and judgment, and require skill in manipulation. Separations of the kind we have been describing, are only possible on a large scale. One of the most important points connected with them is the manner in which the various mother liquors are brought into use. For instance, if the raw mass of rock-salt, chloride of potassium, and magnesia salts, instead of being treated with pure water, is acted upon by a mother liquor, already saturated with the two former, it is evident that almost all of the magnesia compounds will be dissolved, leaving the alkaline chlorides behind. Again, in the process given above, by which pure sulphate of potash is obtained, it will be noticed that at the same time other salts are formed, only to be worked over again. The final mother liquors contain very little besides magnesia salts, and are utilized to some extent as a source of magnesia.

TOLLES' NEW METHOD OF ILLUMINATING OPAQUE OBJECTS FOR THE MICROSCOPE.

Microscopic objects may be classed in two groups; those that are transparent, and those that are opaque. The first can be examined by the highest amplifying power that the optician can produce, but until recently it has been impracticable to apply high powers to opaque objects, for the reason that the lens must approach so near to the object (often within one one-hundredth of an inch, and in case of very high powers, of French or English make, one-half of that distance), that the lens itself would prevent any light from reaching the object. In 1865 or 1866, Prof. H. L. Smith, then of Kenyon College, Ohio, devised a plan by which light was admitted through the side of the tube of the microscope, and reflected down through the lenses of the objective to the object, which was thus illuminated and seen by the observer. Prof. Smith described his invention in the *American Journal of Science.* When his description reached England some of the London opticians attempted to accomplish the same result, by using modifications of what they called the "American Contrivance," after plans that Prof. S. had tried and abandoned as unsatisfactory.

None of these plans have come into general use; the great difficulty with them has been that most of the light is reflected to the eye of the observer by the lenses, before reaching the object, thus producing a glare, which renders the object indistinct. By very careful and tedious manipulation, the writer has sometimes obtained a pretty good effect with Prof. Smith's illuminator, but more often, after working a long time, has failed.

Soon after Prof. Smith's instrument was described, Mr. Tolles, then in Canastota, produced an instrument varying materially from the others. In this a prism is inserted in the side of the objective, between the front and middle combinations, of such a shape that a beam of light, received at the side of the objective, is thrown by a totally reflecting surface through one side of the front lens, at such an angle that none of it is reflected, but all passes through and is condensed on the object, and from that reflected back to the eye. Only one of these instruments (now owned by a physician of this city), was then made. Recently Mr. Tolles has made two more of them, and their performance is such as to promise that little, if any, improvement can be expected in this direction. Opaque objects are seen with 4-10ths and 1-4th inch objectives, (from 200 to 500 diameters) brilliantly illuminated on a black background. The appearance of diatoms is similar to that obtained with the parabola, but the details of surface are shown with a distinctness never before seen. Of how much utility this is to prove, and what discoveries are to be made in the works of nature with it, are among the problems that the microscopists are called on to solve. C. S.

GREAT LABORATORIES.

The new chemical laboratory of Berlin University has recently been opened. It contains 21,680 square feet, and has cost nearly $250,000, which has been paid by the Russian government. The celebrated Dr. A. W. P. Hofmann has charge of it.

The magnificent edifice for physiological, chemical, and physical experimentation just finished at Leipzig, is said to have cost $300,000. It surpasses anything of the kind in Europe.

Through the influence of Claude Bernard (who has just been made a Senator and a member of the French Academy), the project of a similar structure in Paris has received a favorable hearing from the Emperor, and will doubtless be carried out at once.

Protection of Wood from Fire. — The *Deutsche Industrie Zeitung* says, that at one of the collieries in Westphalia, woodwork not exposed to the open air is painted with a mixture of 5 parts of alum, 7 parts of rye meal paste, and 3 parts of finely divided clay. For woodwork exposed to the weather a mixture is used, consisting of $2\frac{1}{2}$ parts of sal ammoniac, 1 part of sulphate of zinc, 2 parts of joiners' glue, 20 parts of zinc-white, and 30 parts of water. These mixtures prevent wood from bursting into a flame when ignited, and greatly delay its destruction even when a severe fire is raging.

We see that John H. Weeden, of Waterbury, Conn., has taken out a patent for a "head-rest attachment for church-pews," which is intended "to support the head of the worshipper (or *sleeper?*) when inclined," and which "may be conveniently detached from the pew when not required for use."

A Few Recent Inventions. — A Michigander has invented a whistle for sailing-vessels, to be used for the same purposes as the steam-whistle. It is worked by compressed air, forced into a reservoir by a bellows.

At a late meeting of the Royal Society of London, there was exhibited a pneumatic signal apparatus, which is so arranged as to display a green, red, or white light at the mast-head, according as the helm of the ship is turned to starboard, port, or midships. If generally adopted, it would render collisions at sea well nigh impossible.

There was also shown a self-registering ship's compass, which records all the movements of the vessel on a ribbon of paper kept moving by clock work.

Another curious contrivance was an automatic trigger for firing torpedoes under water. When a ship comes over the place where the torpedo is sunk, the masses of iron in the vessel attract a magnet, which pulls the trigger and ignites the charge.

Much interest was excited by an instrument with the pretty name of *Stethosphygmograph*, which gives simultaneous indications of the movements of the heart, pulse, and lungs.

Simple Preservation of Copal Varnish. — Dissolve one part of camphor in twelve parts of ether. When the camphor is completely dissolved, add four parts of colorless and finely powdered copal. The copal to be carefully selected. Place this mixture in a bottle and shake until the copal is swollen and partly dissolved, then add four parts of proof alcohol and one quarter of a part of rectified spirits of turpentine — shake again sufficiently and the varnish is ready for use. After the bottle has stood several days, however, the varnish divides into two distinct strata; the lower reiher in copal, but the upper finer and perfectly colorless. Prof. Boettger, the author of the formula, claims the superiority in transparency, elasticity, hardness, and durability for this varnish. The lower stratum may be again treated with camphor, etc.

Madder. — The place which madder occupies among dye-stuffs with the calico-printer has been compared to that which iron holds among metals with the machinist. It owes its value as a dye to two organic compounds, *alizarine* and *purpurine*. The former has recently been obtained artificially by German chemists, but it is not yet known whether it can be manufactured cheaply enough to be of commercial importance. Should it come to be used instead of the natural root, hundreds of acres now employed in the raising of madder will be set free for other agricultural purposes. In this way, a single chemical discovery may give a new direction to the industry of thousands, and even of whole nations.

Hallogenin. — Under this name, a mixture is sold in Germany to prevent the forming of incrustations in steam boilers. It is said to answer the purpose very well. It consists of 65 per cent of sal ammoniac, 17 per cent of chloride of barium, and 18 per cent of catechu.

A Chemical Experiment. — When Isaac Hopper, a member of the Society of Friends, met a boy with a dirty face or hands, he would stop him, and inquire if he ever studied chemistry. The boy, with a wondering stare, would answer "No." "Well, then, I will teach thee how to perform a curious chemical experiment," said Friend Hopper. "Go home, take a piece of soap, put it in water, and rub it briskly on thy hands and face. Thou hast no idea what a beautiful froth it will make, and how much whiter thy skin will be. That's a chemical experiment; I advise thee to try it."

AMMONIA AND COALS.

In London over 1,000,000 tons of coal are used annually in making gas. In this coal is contained a small quantity of nitrogen (not over one per cent), from which is derived the ammonia so largely employed in agriculture and the arts. The utilization of this, formerly a waste product, has added millions of dollars to the wealth of England. In London alone, 10,000 tons of sal ammoniac are produced by the gas manufacturers annually, and in the United Kingdom more than 100,000 tons. How insignificant appears this trace of nitrogen in coals, about one pound in the hundred, and yet we see how important it becomes when manipulated by the chemist and compelled to enter into compounds of the highest usefulness in the industrial arts. It is impossible to examine attentively into any of the art processes, without being impressed with the important service which chemistry has performed in facilitating and perfecting the same, and in utilizing waste products.

The most ancient building in Paris, and the only one dating back to Roman times, is the *Palais des Thermes*, the ruins of Baths erected about A. D. 360. They are in the gardens of the Hotel de Cluny, and are carefully preserved.

The next oldest building is the most ancient *hospital* in Europe, and perhaps in the world, — the *Hotel-Dieu*, near the Cathedral of Notre Dame. It was founded about A. D. 660. The ancient pile is soon to be demolished to make way for a new structure of palatial extent and splendor.

Parisian Copying Ink. — Take 30 parts by weight of extract of logwood, and 7½ of crystallized carbonate of soda; boil these with 240 parts of water, and add, while vigorously stirring, 30 parts of glycerine. When the fluid has become cold, dissolve in it 1 part of neutral chromate of potassa, and add lastly 7½ parts of gum arabic, previously made into a thick mucilage with water. It is not necessary to moisten the paper in using this ink.

M. Morren has found that several inorganic substances are decomposed when a ray of sunlight is made to pass through them. Sulphurous acid gas, for example, is broken up into oxygen and vapor of sulphur. He has also found that a solution of sulphate of quinine, even in very thin layers, arrests the chemical rays as completely as a thick plate of yellow glass.

Electric light, produced by magnetic-electrical machines, is to be used for the signal lamps of the Steamers of the Transatlantic French Steam Navigation Company.

Agriculture.

ABOUT GRAPES.

The present season has been quite a favorable one for grapes in Eastern Massachusetts, and we trust it has been generally favorable throughout the grape-growing region of the country. We have fruited this year about *thirty varieties*, embracing all those which have had any special claims to attention among grape growers, in this cold latitude. The growth, quality, and time of maturity and ripening of each have been carefully noted, not only this year, but for several years, and we are now ready to declare our preferences and also give reasons for entertaining those we have. Out of the thirty varieties, there are but *ten* which are worthy of special attention from growers in this locality. They are the Concord, Delaware, Hartford, Prolific, Adirondack, Diana, Rebecca, Allen's Hybrid, Iona, Israella. All but one of these have been perfectly ripened in our vineyard at Lakeside the present autumn, and that is the Iona. This grape will not do for Massachusetts. It is too tender and too late, and besides, it does not ripen evenly. Upon each bunch a few berries have ripened quite well, while the remainder were entirely unfit for eating. It is evidently an excellent grape, beautiful in form, color, and in the grouping of the berries upon the stem. It appears to be a good bearer, and the vine is nearly as hardy as the Rebecca. The fruit when ripe resembles the best foreign varieties. We think this grape, when grown in the Middle and Southern States, will prove to be a great favorite. The best, the most delicious grape that can be grown in the open air in this section, is the Delaware. We do not believe that by any process of hybridising, or by growth from seed, a better grape will ever be produced suited to northern climates. Indeed, do we need or want a better grape? If we can grow this splendid fruit in all its perfection here, let us accept the boon with thankfulness, and not complain that we are unable to do better. The Delaware is a first-class grape; it is sufficiently hardy, it is a generous and constant bearer, it is not liable to mildew, it ripens well eight years out of ten, it is a small grape, and the berries cling firmly to the stem. These are certainly strong recommendations, and before we consign such fruit to neglect or forgetfulness, let us be sure we have a better one.

The Concord must long remain a standard fruit for vineyard culture. It is not as good as the Delaware, but it is perfectly hardy, a good bearer, thrives on weak silicious soils, and does not fall from the stem. We are thankful for the Concord. Bushel after bushel of the fruit has disappeared in our family during the present autumn, while surrounded by an abundance of other and more highly vaunted varieties.

The Adirondacks and Israellas are good and early grapes. They are worthy the attention of cultivators, if the vines are sold at prices no higher than Delawares or Concords. It is high time the deceptions practised by vine-raisers and nurserymen ceased. The *new* varieties recommended and sold at enormously high prices, have not, in most cases, proved as good as the old varieties. We advise our readers to cling to our long-tried good grapes, and pay no attention to the statements of interested parties regarding new kinds, which they offer at high prices. Fortunes are made by speculators in vines, plants, seeds, etc., while there is no improvement found in the growth or quality of the plants or grains.

THE CATTLE SHOW AND FAIR AT GREENFIELD, MASS.

The annual fair of the Franklin County Agricultural Society was held at Greenfield, the last days in September, and after a thorough examination of the stock, fruits and vegetables exhibited, we have no hesitation in saying that it was the most extensive and the *best* which has ever come under our notice. In every particular it surpassed the N. E. Fair at Portland, and also the State, County, and other fairs which have been held this autumn, in N. England. The number of cattle on exhibition, was over 700, and there were *fourteen* herds, which included three hundred and fifty-one heads. The show was mostly made up of thoroughbreds, and all were of extraordinary size, beauty, and general excellence. There were three pairs of yearling steers, whose average weight exceeded 2,500 lbs. each pair. The town of Shelburne exhibited in one team 55 yoke of oxen, no one of which weighed less than 3,700 lbs. One weighed 4,800 lbs. Wm. H. Bardwell, of Greenfield, had four yokes, which weighed in the agregate 17,225 lbs. The heaviest yoke of cattle on exhibition weighed within a fraction of 5,000 lbs. Of the herds exhibited, the finest was owned by D. O. Fisk, of Shelburne, who had 35 noble animals. Geo. E. Taylor had 13 thoroughbred Short Horns, including a heifer that weighed 1,590 lbs.; another that weighed 1,400; and still another 1,290 lbs.

The most beautiful and valuable herd upon the grounds, was that owned by T. M. Stoughton, of Gill, numbering 41 pure blood Jerseys. The first view of this herd, as we came upon the hill overlooking the fair grounds, was exceedingly pleasant. They were feeding in one corner upon a rising ground quite at their leisure, and as a chime of fourteen bells had been distributed among them, the interest and novelty of the show was heightened by the pleasant accompaniment of music. The color and size of the animals varied and gave to the whole a very picturesque effect. Mr. Stoughton's Jersey cows produce upon an average about 15 lbs. of butter per week, which, owing to its great excellence, sells readily at 75 cents per lb.

We have not space in which to present even an outline of the interesting and extraordinary features of this exhibition. The fruits were as remarkable as the animals. It required over 700 plates to contain the specimens of apples, peaches, pears and the different varieties of grapes, which were entered for premium. The hills and rich meadows of Greenfield, Deerfield, Shelburne, Gill, etc., have furnished remarkable products the past season, and the farmers have reason to be proud of their magnificent herds, orchards, and grain fields.

The two days in which the fair was held, were delightful, and the crowds of visitors who thronged in the streets of the pleasant town of Greenfield, afforded evidence of the interest which centred in the show. Of the address, the Greenfield *Gazette and Courier* remarks as follows:

"Dr. Jas. R. Nichols, of Boston, the orator of the day, gave a most learned and interesting address, full of practical information to farmers, and presenting facts which all should learn and cherish. We shall publish the address in full in another week, our crowded columns not permitting it in this issue. A vote of thanks was tendered the Doctor by the Society."

The topic of the address was "*Some of the Relations of Water to Agriculture.*" We believe that at farmers' meetings no subjects of discussion should be introduced outside of those strictly relating to the interests of agriculture. If our noisy politicians and reformers cannot find some more appropriate place than cattle shows, for the utterance of their demagogical speeches, relating to labor reform, politics, women's rights, etc., they had better remain quiet.

THE COMPARATIVE VALUE OF CHEMICAL AND BARN-YARD MANURES.

A recent French writer states that 1,200 kilos, (about 24 cwt.) of chemical manure, costing 360 francs (about 72 dollars), produced on an average 54,222 kilos. of beet; while 72,000 kilos. (about 71 tons) of ordinary farm dung, also costing 360 francs, produced only 48,888 kilos. He gives the average of 160 cases of beet culture, all of the year 1868, as being about 4 tons to the acre in favor of chemical over farmyard manure. A contributor to the *Mark Lane Express*, of London, gives, in confirmation of these French views, the results of experiments made for fourteen years continuously in the raising of wheat and of barley, with the use of farm dung and various chemical

manures, and the advantage in every instance is clearly on the side of the artificial fertilizers. In some cases, the use of barnyard manure shows a loss instead of a profit.

It would be more satisfactory if the writer had explained precisely what the manures are, which in his tables of statistics he indicates only by numbers. In his preliminary remarks, he assumes the cost of barnyard manure as from 8 to 10 shillings a ton, and that of "muriate of ammonia, 16s. per cwt., sulphate of ammonia, 14½s., sulphate of potash, 15s., sulphate of soda, 4s., sulphate of magnesia, 6s., and superphosphate, 5½s. per cwt." These figures will enable the American farmer to compare the *relative* cost of the two kinds of manure in this country with their relative cost in Europe, and thus to judge (at least in a general way,) how the profit from the use of the two here will compare with the results obtained there.

RIPENING GRAPES BY CUTTING AWAY THE LEAVES.

The August number of *Cosmos* contains a paper on this subject by M. J. Comte, which was read at a meeting of the Agricultural Society of Agen. It appears to have been an old custom, and one still kept up in the South of France, to pull off the leaves of the vine so as to let the full sunlight fall on the grapes, which soon get an amber color and appear as if over-ripe. The author strongly condemns the practice. He states that the leaves, as arranged by nature, are absolutely necessary for perfecting the maturity of the grapes; in other words, for converting into grape-sugar a portion of the acids which are present in large quantity in the unripe fruit. This change is brought about by the addition of carbon to the acids, and this *carbonisation* (as Comte calls it) is effected by the leaves. Fully ripe grapes (of course, he is speaking of grapes which have a green color when ripe) should be of a pure green, and not of the yellowish shade exhibited by those which have been exposed to the light by stripping off the leaves. The taste of these yellow grapes is intensely sour, while that of the green-colored ripe grapes is sweet.

It is very short-sighted practice to keep hogs lean during the latter part of summer, and then endeavor to fatten them in cold weather, when it will require a much larger amount of food to produce the same result than would be necessary in warmer weather. Hogs should always be kept in condition, and then they can at any time be readily and cheaply fattened.

Feed for hogs should be ground, and steamed or boiled. In winter, boiling is much better than steaming, for the reason that it takes less fuel to boil a small quantity than to steam it; and further, that you can boil merely what is wanted for a feed at one time, and give it moderately warm. Small quantities of salt should be added to the feed for hogs, as they like it better, and it is more healthy.

Grapes.—Several vines in a cold grapery connected with our premises, present some singular features, which are new to us. Upon the vines, which are of the Black Hamburg variety, there is a large product of perfectly well matured, ripe fruit, and also grapes in large clusters, which are in the various stages of growth, and also blossoms just developing. The vines have been in blossom during nearly each month of the summer, and immature fruit has resulted therefrom. In fact, three or four crops have been progressing upon the vines at the same time. If any of our readers have vines behaving like these, we should like to be informed of it.

Boston Journal of Chemistry.

BOSTON, NOVEMBER 1, 1869.

DRY SEWAGE.

At the recent meeting of the British Association for the Advancement of Science, the subject of sewage was very fully discussed. The relative merits of water and dry sewage were the theme of a paper by Mr. E. C. Stanford, which embodied the results of considerable practical experiment. He contended earnestly for the dry system, and disposed of the objections raised as to the earth system, namely: the large quantity of earth required (three and a half times the weight of the excreta), and the difficulty of obtaining the requisite quantity, and drying it. He urged that both these difficulties were removed by the use of charcoal, and seaweed charcoal in preference, as the most porous, the most absorbent, and the cheapest. This charcoal, after being used, can be stored for any length of time, can be used several times, and requires only one-fourth of the weight compared with earth. It soon dries; and when convenient, it can be re-burned, by which means the whole of the ammonia is collected. The weight of the charcoal is increased about five per cent with each using; and if dried and re-used five times, is increased about twenty-per cent with each re-burning.

THE PHILOSOPHERS MADE FUN OF.

A very lively burlesque upon the late meeting of the British Association, at Exeter, has been published in London, with the title of "*Exeter Change*." Among the articles which it contains is one headed, "On the Alcoholic Compound termed Punch, by John T—nd—ll, L.L. D., F. R. S.," which is a capital imitation of the style of a certain eminent physicist. The closing paragraphs are as follows:—

"Experiment has proved that the juice of three or four lemons and three-quarters of a pound of loaf sugar, dissolved in about three pints of boiling water, give saporous waves which strike the palate at such intervals that the thrilling acidity of the lemon and the cloying sweetness of the sugar are no longer distinguishable. We have in fact a harmony of saporific notes. The pitch, however, is too low, and to heighten it, we infuse in the boiling water the fragrant yellow rind of one lemon. Here we might pause if the soul of man craved no higher result than lemonade. But to obtain the culminating saporosity of punch, we must dash into the bowl at least a pint of rum and nearly the same volume of brandy. The molecules of alcohol, sugar, and citric acid collide, and an entirely new set of vibrations are produced—tremors to which the dullest palate is attuned.

"In punch, then, we have rhythm within rhythm, and all that philosophy can do is to take kindly to its subtle harmonies. It will depend in some measure upon previous habits, whether the punch when mixed will be taken in excess or in moderation. It may become a dangerous ally of gravity, and bring a sentient being to the gutter. But, on the other hand, it may become the potent inner stimulus of a noble outward life."

Baron Liebig on Bread Making.—In our remarks regarding the use of phosphoric acid in bread making, in the last number of the *Journal*, we omitted to say that while many of the English papers and magazines give the credit of the discovery to Liebig, the great chemist himself distinctly bestows it upon Horsford, to whom it rightfully belongs. More than six months since, he published an article upon bread making in the *Annalen der Chemie und Pharmacie*, in which he makes most flattering allusions to the latter named gentleman. He says, "the phosphoric baking powder of Prof. Horsford in *North America*, I hold to be one of the weightiest and most beneficent inventions which has been made in recent times." This is important praise, coming, as it does, from the greatest living chemist.

We are sorry to see, however, that Liebig like so many foreigners (especially the English) is apparently very loose in his ideas concerning trans-atlantic geography. "*North America*" is a great continent, and it contains a nationality called the "United States," the citizens of which have supplied to the world more important inventions, and made more wonderful discoveries in science and art, than all other nations in the same period of time. The United States is hardly put down on English maps, and when anything remarkable is announced as having occurred here, the English people do not seem to understand it, and proceed to blunder and misstate, until they get others as deep in the fog as themselves. We are willing to pay the expenses of a Yankee schoolmaster to go over to the little islands constituting the "United Kingdom," and teach the English people *geography*.

Patents.—The activity of the Patent Office mill has never been greater than at the present time, as may be inferred from an examination of the grists of patents which are weekly ground out. We entertain the highest respect for inventors, and deeply sympathize with them in the weighty anxieties and labors which rest upon them. We mean by inventors, those who are really such,—those who invent original machines and processes, or improve upon those which are known and understood. All "patent-seekers" are not inventors; neither are all "patent-getters" inventors. The largest part of the patents secured are entirely valueless, and had better never been asked for, or granted. By adroit management, many worthless patents are sold, and tens of thousands of dollars have been lost in patent investments, by unsuspecting, confiding mechanics, farmers, merchants, etc. On the other hand, some that are really valuable, are never brought out to benefit the world, owing to the

poverty or modesty of the inventor. The great patented improvements and inventions, — those which have a high money value,—seldom benefit the discoverer or patentee. The sharpers, moneyed men, or speculators, turn the poor inventor out of court, steal the product of his brain, and seize the wealth which flows from the sale of the improvement. The world is full of "hard cases" of this character, and there is but little hope that justice will overtake the offenders. The patent business, as conducted in this country, has a history, thrilling and instructive, and a large volume would be required to narrate all the "joys and sorrows" that have been experienced by patentees.

THE STUDY OF PRACTICAL SCIENCE. — We have in this country a considerable number of institutions for teaching practical science and art, and also a few which profess to afford assistance and encouragement in prosecuting experiments in science and invention. They are, however, as a class, very far from meeting the great want of the times. Our young men place themselves under instruction in these institutions, and after years of what is called "study" they go out into the world but little better qualified to advance the boundaries of knowledge than before commencing study. The institutions alluded to, some of them at least, need a thorough renovation; a new element must be infused into them. There must be less of the abstract, and more attention given to the practical and useful. Instructors appear to think more of advancing their own interests, and creating a reputation, than of the welfare of their pupils. One half of the professors and instructors are not qualified for the posts they occupy. The chemistry taught in many of the colleges is simply a kind of entertaining pyrotechny, and the gassy lecturer not only fills the lungs of his auditors with gas, but he drowns or suffocates the activities of the brain also, with the agent. If some competent writer or investigator will take hold of this matter and hold up to public gaze the imbecility or incompetency of many of our schools of science, socalled, he will do a good service to the community.

MASS. AGRICULTURAL COLLEGE. — We visited this new institution at Amherst in October, and under the guidance of Prof. Stockbridge, examined the grounds, farm buildings and arrangements for instruction in agricultural science. There are at present one hundred and two students connected with the institution, good, hale, hearty, intelligent looking young men, who, we hope, if they learn how to use the plow and hoe at Amherst, will never relinquish them for pen or sword.

The situation of the farm is indeed beautiful, and the variety of soil, with upland and lowland, is favorable to the growth of all the cereal, root, and grass crops. So far as situation is concerned we doubt if a more favorable place for the location of the college could be found in the Commonwealth. We have some views to express regarding our State institution, and Agricultural Colleges in general, which must be deferred to the next number of the *Journal*.

Seven out of sixty-four fires in New York during the month of August, were caused by *kerosene*. Out of 100 samples of oil tested by the Board of Health, only *one* came up to the legal standard. Manufacturers and dealers are reckless in their violation of the law, and will continue to be so until public sentiment demands its rigid enforcement. The crime ought to be punished as severely as arson.

Hon. S. S. Fisher, U. S. Commissioner of Patents, in a recent address before the American Institute, gives some comical examples of the "Yankee notions" for which patents are sometimes sought. "One man lately wished to patent the application of the Lord's Prayer, repeated in a loud voice, to prevent stammering; another claimed the new and useful attachment of a weight, or other article possessing gravity, to a cow's tail, to prevent her from switching it while milking; another proposed to cure worms by extracting them with a delicate line and a tiny hook baited with a seductive pill; while a lady patented a crimping pin, which she declared might also be used as a paper-cutter, as a skirt supporter, as a paper-file, as a child's pin, as a bouquet-holder, as a shawl fastener, or as a bookmark."

The English Chemical Society has instituted a gold medal in honor of Faraday, to be given to such foreign chemists as shall distinguish themselves in the science.

BOOK NOTICES.

A MANUAL OF ELEMENTARY CHEMISTRY, Theoretical and Practical. By George Fownes, F. R. S., late Professor of Practical Chemistry in University College, London. From the tenth revised and corrected English edition. Edited by Robert Bridges, M. D., Prof. of Chemistry in the Philadelphia College of Pharmacy. Philadelphia: Henry C. Lea.

This is a thoroughly revised and much enlarged edition of a manual which has been very popular as a textbook in our colleges and medical schools. The work of revision, since the death of the author, has been done by Bence Jones and Henry Watts, whose names ought not to have been omitted from the title-page of the American edition. The work has now become quite too large for use as a text-book, but as a compendious work of reference on chemistry it is unquestionably the best now before the public.

A COURSE OF PRACTICAL CHEMISTRY, for the use of Medical Students. By William Odling, M. B., F. R. S. From the Fourth and Revised London Edition. Philadelphia: Henry C. Lea.

This edition of Odling's excellent little manual is considerably improved, especially in the analytical portion; and the new atomic weights and formulæ have been substituted for the old. While making these changes, we are surprised that the author did not likewise adopt the new nomenclature, which is rapidly coming into general use among scientific men.

THE POLYTECHNIC is a new semi-monthly paper, "devoted to the interests of polytechnic and scientific schools and a record and review of civil, mechanical, and mining engineering, and general college news"; published by M. L. Marks, Troy, N. Y. The first two numbers are handsomely printed, and on the whole, are quite promising.

The "Address Commemorative of Reuben D. Mussey, M. D., L. L. D.," delivered by Prof. A. B. Crosby, as an Introductory to the annual session of the Dartmouth Medical College, has been published in a neat pamphlet. It is a just tribute to the memory of a remarkable man.

Messrs. Lindsay and Blakiston's "*Physician's Visiting List,*" for 1870 has been received. This is almost an indispensable annual among physicians, and its merits are well understood.

Dr. S. W. Butler, editor of the Medical and Surgical Reporter, Philadelphia, has ready the *Half Yearly Compendium of the Medical Sciences*, for the half year ending July 1869. It is a very valuable publication, in many respects more desirable and useful than Braithwaite's Retrospect. Both of these semi-annual visitors should be found upon the table of every physician.

☞ *The New York Medical Journal*, a notice of which will be found in our advertising columns, is a journal of high merit and excellence. The editor and the contributors rank among our most distinguished medical men, and each number contains matter which does honor to American medical literature. It is published by D. Appleton & Co., New York.

Medicine and Pharmacy.

RECREATION FOR PHYSICIANS.

No class of men work harder, or bear about from day to day a heavier load of responsibility than physicians. If any laboring or professional man needs recreation, the restless, care-worn physician certainly does, and it is his duty often to break away from his arduous labors and engage in some pursuit or pleasant recreation which will afford rest to mind and body. The mind needs to be switched off from the strictly professional track, in order that its normal, healthy tone may be maintained. Studying disease constantly, and thinking about, and prescribing for ills of every conceivable form and type, tends not only to dwarf the mind, confining it to a single line of thought, but it produces morbid reactions, and sometimes serious mental disturbance. It is almost impossible for the physician to take a "vacation." He can hardly leave home for a longer period than a single day, without provoking the displeasure of some patient or friend, needing his services. If it is deemed impossible to take long seasons of rest, let him take short ones, and take them often. A half day spent in pleasant, social intercourse, or a yacht excursion, or in joining what is known at the North as a "chowder party," will work wonders in the way of recuperating the exhausted energies, and relieving the mind from abnormal tension.

The old Essex North Medical Society of Massachusetts have taken the initiative in introducing the element of recreation into their meetings. A pleasant harbor excursion at Newburyport was enjoyed by the Society in August, and in September they accepted our invitation to meet at "Lakeside Farm," an account of which meeting may be found below, taken from the *Newburyport Herald.* At neither of these meetings was there a "case" described, or any mention made of pills or boluses. Every topic of that kind was ignored, and the hours were devoted to social enjoyment. We believe other medical societies will do well to follow the example of the Essex, and as often as convenient let the members meet together to promote good cheer, to drown selfishness and professional animosities, and above all, to relieve the over-burdened mind of anxiety and care. The physician is not necessarily doomed to an eternal round of professional labor, to a tread-mill the creaking of which must never cease. Let us have a little wholesome recreation, we say.

At the meeting at Lakeside, Dr. Perkins, of Newburyport, made a few sensible remarks regarding the importance of physicians devoting a portion of their time to the investigation of the physical and natural sciences. In this way, a change in the direction of the thoughts is secured, and a healthful reaction results. Besides, it is important that medical men should be familiar with the different departments of science, as they are intimately connected with, or illustrate and throw light upon many of the dark problems in medical science. The physician should be a man of culture, of much general information, in order that he may influence and mould society for its good. It is certain that chemistry is too much neglected by physicians. Experimentally studied, it would prove a kind of healthful recreation, of much benefit to mind and body, and it will be well for physicians when they are led to regard it in this light.

THE DOCTORS AT LAKESIDE.

THE ESSEX NORTH DISTRICT MEDICAL ASSOCIATION held its semi-annual meeting at Haverhill, where the members were entertained by Dr. Nichols. It was the largest meeting the Society has ever had, the presump-

tion being that the fraternity anticipated a good time, from the Dr.'s well known genius in that direction. The host had carriages in waiting at the bridge, which conveyed the party to his residence in the city, where they proceeded to view his garden and grapery. This is alone worth a visit, as illustrating the perfect success of Dr. Nichols' system of special fertilizers, as more vigorous vines and more magnificent clusters of grapes cannot be found in the country. The party then drove to "Lakeside"—the doctor's estate on Lake Kenoza. This embraces a hundred acres of hill and dale, valley and grove, of every variety of soil that is needed on an experimental farm, though it is no longer experimental, for the Dr. has completely established the theory of mineral manures by such success with every variety of crop for a series of years as no farm in these parts ever boasted before. He has this year raised over thirty bushels of wheat to the acre; his corn is acknowledged to be the finest in the country; his beets can't be beat; while his grass land reminds one of the rank growth of the prairies. His reclaimed meadow and his system of drainage are models of scientific farming. But the most interesting feature of the place is the vineyard, which contains seven hundred vines, four years old, which under the Dr.'s skilful manipulation yield their luscious fruit by tons. There are twenty-four varieties in all, fifteen of which were ripe and graced the dinner table.

Old Ike Walton says, "that God could have made a better berry than the strawberry, but doubtless he never did;" so we might say that doubtless he could have made a more beautiful place than Lakeside, but doubtless he never did. Kenoza is a lake of the purest crystal, five miles in circumference, in an emerald setting of hills and groves. The Doctor has civilized the groves, trimming them up and laying out tasteful walks, building seats and tables and all the conveniences for picnic life. He has a picturesque stone house on the beach and a wooden cottage, at some little distance in the grove. These are within a quarter of a mile of the farm house, and ten minutes' drive of his town house. Fine yachts and row-boats, which are duly provided with boat houses and wharves, leave nothing to be desired in the way of rustication.

About two o'clock the company returned from their strolls and farm inspection with appetites to do justice to a dinner that was in perfect keeping with everything else about "Lakeside." Our former experience at one of these doctors' meetings taught us that the profession loved good living themselves, whatever they may allow their patients, and Dr. Nichols was evidently aware of the tastes of his visitors. From the savory chowder, through all the courses of salads, meats, sweets and ices, to the great piles of pears, peaches, and grapes, beautifully set off with flowers, that constituted the dessert, everything was simply perfection. As to the coffee, cigars, etc., they were pluperfect.

Dinner over, the Society was called to order by Dr. Lamb, of Lawrence, President. Dr. Root, of Byfield, Secretary and Treasurer, read the report of the last meeting, which our readers will recollect was out in our harbor. Speeches were then made by Dr. Perkins, of this city; Surgeon-General Dale; Dr. Nichols; Dr. Jeremiah Spofford, of Groveland, the veteran of the Society; Dr. Sargent, of Andover; Dr. E. G. Kelley, of this city, and others. A vote of thanks was passed to Dr. Nichols for his kind reception and bounteous hospitality. An invitation was then given the Society by Dr. Kittredge and Surgeon-General Dale, to become their guests at Andover at the next meeting in January, which was duly accepted. The meeting then adjourned, and the rest of the afternoon was devoted to sailing, fishing, and rambling round, *ad libitum*. A better company and a better time we never want to see. —*Newburyport Herald, October 1st.*

SOPHISTICATIONS IN DRUGS.

In a former issue of the *Journal*, we had something to say regarding adulterations in articles of food, and promised to consider at another time the subject of adulterations in drugs and medicines.

As regards medicines, it is not unreasonable to assume that there are some physicians, who have been in practice ten, perhaps twenty years, who have never employed but few, if any, remedial substances of perfect purity, or those of the highest integrity. The doubt or suspicion with which many physicians regard all medicinal agents, arises from disappointments met with in their employment, and these provoking failures are due, in a great measure, to the bad character of the substances employed. It is impossible for medical men to realize the extent of the falsifications practiced in drugs. The shops are crowded with inert and factitious substances. In medicinal effect, the difference is immense between pure and commercial glycerine, between pure and commercial essential oils, copaiva balsam, olive oil, senna, gums,—in fact all unmanufactured and manufactured substances. The *cheap*, *commercial* articles are what go into the saddlebags of country physicians, and oftener than is suspected into the prescriptions of those in the city. The close competition in trade existing between jobbers and importers of drugs in cities, leads to extraordinary and persistent falsification. This deplorable competition extends into the shops of dispensing druggists and the prominent end is to secure *cheap* drugs, *quality* being too often a secondary consideration. A country druggist going to the city to purchase medicines, is naturally desirous of procuring them at the lowest rates possible. He has a list of wants, which he submits to the "pricing process" among the jobbers, and the party who names the lowest prices secures the order. At all points in the United States *competition* among wholesale druggists and jobbers was never greater than at the present time, and the stream of evils which flows from it was never so mischievous in its influence.

In an interview with a wholesale drug dealer of high respectability, who failed in business several years since, he attributed the failure to the attempt, on his part, to supply or sell only such drugs as were of known purity and excellence. He was confident the demand on the part of the trade for that class of goods was not sufficient, in a city of a quarter of a million inhabitants, to sustain a single dealer.

The falsification of drugs is not alone confined to the more costly substances, but extends to those which are common and low priced. Our medical readers will be astonished to learn that a drug so cheap as the sulphate of magnesia (Epsom salts) is *cheapened* and extended by the admixture of common salt, sulphate of lime, sulphate of soda, etc., to a large extent. We recently saw in the warehouse of a dealer, in one of our large cities, a huge pile of barrels filled with "salts" of this character, which were being sold rapidly to the trade, at *half a cent* less per pound than the true article. In physical appearance they would be satisfactory to physicians and consumers. But it is unnecessary to dwell upon the fact that drugs are largely sophisticated. This is a matter generally admitted and understood by dealers and prescribers. The inquiry arises "What is the remedy?" The remedy for the evil is in the hands of those most directly interested in its abatement. It is clear to us that physicians alone can so far remove the evil as to be able to protect themselves, and do much towards preventing the general sale of spurious or attenuated medicinal substances in the community.

To reach this end, two requisites on their part are necessary; first, a competent knowledge of the true character of medicines. Every physician should be able to know from physical appearances or chemical tests, what substances are pure and what are spurious; and, second, with this knowledge, he should possess the independence and courage to inspect rigidly the stocks of those through whom he is supplied with remedies and reject all that are impure, or that are of a suspicious character. Chemistry and Pharmacy do not receive that attention in our medical colleges which their importance demands.

The trouble is, physicians are oftentimes not competent judges of the quality of medicinal agents; they are compelled to trust to the statements of dealers and dispensers; and the venders, in turn, are as much in need of therapeutical knowledge as prescribers. It would be well for every medical association in the country to have specimens of all important therapeutical agents, which are of known integrity and purity, and retain them for the inspection and study of the members of the society at their meetings. This would familiarize the members with the appearance of pure drugs, and do much towards enabling them to detect factitious substances in the market.

BROWN-SÉQUARD ON EPILEPSY.

Brown-Séquard, for whom a Professorship of Experimental Medicine has just been created at Paris, has been lecturing upon epilepsy. He hopes that his experiments may bring to light the means of a cure for this disease, —in some of its forms, at least. It is certain that he can produce epilepsy in some animals, not only by a lesion of the nervous centres, which have been generally considered the exclusive seat of the malady, but also by peripheric irritations.

He showed to his class a dozen or more Guinea pigs which had suffered a section of a lateral half of the spinal cord from one to six months ago. These animals were not merely spontaneously epileptic, in consequence of this mutilation, but the epileptic attacks, which lasted from thirty to sixty seconds, could also be provoked at the will of the experimenter. In order to produce them, it is necessary to irritate a certain portion of the body, to which Brown-Séquard has given the name of *zone épileptogène*. This zone includes the skin of the lateral part of the face and neck, animated by the third and fourth pairs of cervical and the fifth pair of cranial nerves. The irritation of no other part of the body is attended by the same results. If the spinal cord has been cut on the left side, the epileptic zone of the opposite side must be pinched. It is a remarkable fact that the irritation of the nervous centres themselves which supply this zone, does not disturb the animal in the least. The same phenomena show themselves, if, instead of the hemisection of the spinal cord, a section of the great sciatic of the thigh is made. Indeed, the epileptic attack is even more violent.

Another remarkable fact is the loss of sensibility in the epileptic zone after hemisection of the spinal cord and if, by means of a caustic or the hot iron, the skin of this region be destroyed, so as to form an eschar, the animal is cured of the epilepsy, and both the spontaneous and the provoked attacks cease at once.

The cervical ganglia of the sympathetic nerve play an important part in epilepsy. The pallor of the face, which is almost a constant initiatory symptom of the attack, is produced by the contractions of the vessels of the face which are under the control of nerves emanating from these ganglia.

The dilatation of the pupil of the eye, which is the second most frequent symptom, is produced by a contraction of the vessels at the base of the brain, also under the control of these ganglia. These phenomena can be demonstrated upon the epileptic animals used in the experiments.

Further investigations in this new direction will be awaited with great interest by all medical men. Some of Brown-Séquard's epileptic rabbits have already been taken to England, where they have attracted a good deal of attention.

THE SPECTROSCOPE IN PHARMACY.

English chemists have been experimenting with the spectroscope upon the solutions of substances used in pharmacy. When light is allowed to pass through a solution, it is partly absorbed, giving rise to shadow-like bands, called *absorption bands*. These bands are constant and give a *spectrum peculiar to each preparation.*

Many substances which form merely colorless solutions (as the salts of manganese, for example) afford, nevertheless, very strong absorption bands.

The strength of the solution under examination must be carefully graduated. If it is too strong, too much light will be absorbed, and the bands will be large, cloudy, and obscure. The liquid may be diluted by degrees until the spectrum is most advantageously seen. As the dilution proceeds, the finest and faintest lines disappear, and afterwards the darkest. A few trials will soon enable one to decide upon the degree of strength best for the purpose.

Some of the spectra of medicinal preparations (as Tinct. Hyoscyami, Tinct. Cannab. Ind., etc.) are extremely beautiful, vying with those of any of the mineral salts commonly used as objects for exhibition.

This spectroscopic examination promises to be an effective means of detecting adulterations and substitutions; for hardly ever do the spectra of any two articles appear exactly the same. The smallest discrepancy is immediately seen when the spectra are placed side by side, by means of an additional prism.

The process will also be an aid in many analytical researches, since the several constituents of a mixture may often be detected by the peculiarities of their spectra. Thus, cochineal may be at once detected in Tinct. Cardam. Co. and Tinct. Cinchon. Co. The coloring matter of blood will show its own bands when mixed with cochineal. The spectrum of a tincture made with the leaves of the biennial henbane differs entirely from that of the annual.

The geologist often has occasion to determine whether a clay contains the protoxide or the peroxide of iron, or both. Spectral analysis will settle the question at once, and point out the protoxide, peroxide, or magnetic oxide.

On the whole, this new field of spectral analysis is likely to prove very interesting, and one of great importance from its practical applications.

PRUSSIC ACID.

We learn from the *Journal des Connaissances Medicales* that, at the last sitting of the French Academy of Medicine, Dr. Scoutettenn communicated the substance of an essay which created quite a sensation. It was a posthumous disquisition on hydrocyanic acid, found among the papers of the late celebrated Professor Schönbein, of Basle. The question discussed was, whether there was a test for the above mentioned liquid besides those of M. Liebig and M. Buignet, which, within certain limits, may reveal the presence of prussic acid, but are insufficient to fix its quantity and detect a crime with certainty. Professor Schönbein then proceeds to describe a reagent discovered by himself, and delicate enough to bring out to view even the millionth part of a drop, whether diluted with water, or vaporized in the air; a circumstance affording new proof of the incalculable divisibility of matter. Dr. Scoutettenn, who lives at Metz, announced, in his communication, that he had repeated the late Professor Schönbein's experiments, with the aid of two chemists, MM. Guebin and Pont, and that he begged to submit some of the test-paper prepared by himself to the Academy for further trial. The specimen forwarded was of the kind called filtering paper, and had been soaked in a solution of three gms. of guaiacum resin in 100 gms. of alcohol. To use it, a solution of ten decigr. of sulphate of copper in fifty gms. of distilled water, should be made, and the paper, which is white, cut into narrow slips. One of the latter being wetted with the solution, it is then exposed to the action of the minute quantity of hydrocyanic acid dissolved in water, and suspended in the air; the paper will then instantly turn blue. Dr. Scoutettenn remarks that these slips of paper will be useful in examining the quality of the medicinal waters or syrups containing a very small quantity of the acid. The paper need only be placed on the unstoppered neck of the phial containing the medicine, and the blue color will at once become visible. Various other experiments are described, all tending to the same result.

NEW TESTS FOR BLOOD-STAINS.

Prof. Bloxam has found that a mixture of tincture of guaiacum and ozonized ether (that is, a solution of peroxide of hydrogen in ether) instantly produces, with blood or blood-stains, a beautiful blue tint. Prof. B., in the case of a stain twenty years old, extracted a single linen fibre with an almost inappreciable amount of the stain upon it; and on subjecting it to this test, the blue color was readily distinguished through the microscope.

The spectroscope may also be employed as an extremely delicate test for blood-stains. Mr. Sorby has shown that the one-thousandth part of a grain of the red coloring matter of the blood may be thus detected with the greatest certainty.

APOMORPHIA.

Dr. Matthiessen, the celebrated chemist, in his investigation of the opium alkaloids, has found that by the action of muriatic acid on morphia, a new base is produced, which, in its composition, differs from morphia by the removal of one equivalent of water. Its physiological action, however, is wholly different from that of morphia. It is free from narcotic properties, but acts as a powerful emetic, the action of which is not followed by injurious effects. It seems likely to become a valuable medicinal agent.

Recipe for Burns.—Make a saturated solution of alum (4 oz. in a quart of hot water). Dip a cotton cloth in this solution and apply immediately on the burn. As soon as it becomes hot or dry, replace it by another and continue doing so as often as the cloth dries, which at first will be every few minutes. The pain will immediately cease, and after twenty-four hours of this treatment the burn will be healed, especially if commenced before blisters are formed. The astringent and drying qualities of the alum will entirely prevent their formation. The deepest burns, such as those caused by boiling water, drops of melted metal, phosphorus, gunpowder, fulminating powder, etc., all have been cured by this specific.

Dr. Cameron, a Dublin chemist, has been experimenting on the milk of the sow, and has shown that it contains 18 per cent of nutritious matter, while human milk contains but 11 per cent. The relative nutritive values of different kinds of milk may be thus arranged in an increasing order: human milk, cow's, goat's, ewe's, mare's, ass's, and sow's. This accounts for the rapid growth of young pigs compared with other animals.

Dr. Demarquay, of Paris, has recently performed the difficult operation of removing the greater part of the tongue. The patient had suffered from a disease in this organ for more than twenty years. The operation was perfectly successful, and the patient is now able to articulate quite easily and correctly, notwithstanding the loss he has sustained.

French chemists have proved that fruits,—as apples, cherries, currants, etc.,—after being gathered, begin to absorb oxygen and give off carbonic acid. They give many details of their experiments; as, for instance, that 5 apples, weighing together 348 grammes, yielded, between the 19th of January and the 15th of July, 6,648 cubic centimetres of carbonic acid.

Dr. Magni, Professor of Ophthalmology in the University of Bologna, has gone to Lima, Peru, to operate on a merchant for cataract. His fee is to be 100,000 francs (about 20,000 dollars in gold), besides the expenses of himself and assistant.

DETECTION OF BLOOD STAINS.

Dr. Richardson, in the *American Journal of Medical Science*, speaking of this subject, says:

Through the courtesy of Dr. Linderman, Director, and Mr. J. R. Eckfelt, Chief Assayer of the United States Mint, I was enabled to estimate the delicacy of the microscopic test for blood, as follows: Upon a square of waxed paper determined by Mr. Eckfelt, on the accurate balance used for the National Assays, to weigh exactly 48 milligrammes, I made twenty dots of fresh blood from my finger, which, when dry, added .4 of a milligramme to the original weight, and consequently were each on an average equivalent to about .02 of a milligramme, or 1-3200 of a troy grain nearly. The fourth part of one of these spots, weighing of course in round numbers 1-12000 of a grain, was detached with the point of a cataract needle, and when moistened under the 1-25 showed many hundred well-defined red blood corpuscles; ten circular ones among them, measured with the micrometer, averaged 1-3494 of an inch in diameter, and could, therefore, by this criterion of superior size alone, be diagnosticated from the corpuscles of an ox, sheep, or pig, with the same feeling of certainty with which any surgeon could testify that a perforation of the skull only half an inch across could not possibly have been made by any bullet measuring an inch in diameter.

The Race.—The Harvard and Oxford boat race is the subject of an editorial in the London *Lancet*. That journal states that if the diet-scale of the Harvard crew had been really such as was reported, the physical powers and the health of the Americans would have been seriously affected. On inquiry it appears that the Harvard men, while training, were allowed plenty of meat, with milk, rice, vegetables, and fruit, and that their dietary differed from that of their opponents in the matter of beer. The Americans used no beer, wine, or spirits. The *Lancet* says that it cannot express an opinion on the influence of the rowing or steering of the two boats, or on the effect of the want of experience in the Harvard men of the currents of the Thames, but that the difference in diet had clearly no effect on the result, and concludes as follows: "The crews were well matched, the race was most severely contested, and it is evident that the Oxonians had to put forth their full powers to make the victory theirs."

Medical Education.—The following authentic copy of an official document has been sent to the *Medical and Surgical Reporter*, from one of the counties of Pennsylvania. We recommend it as a model form:

Post Mortem. —— day of July, 1869.
Alexander Montgomery, deceased; found upper portion of Oss Frontalis lacerated and entirely Anti-Anastimose, also the Ossa Parietals, for half way back toward the Oss Occipital Anti-Anastimose, the entire wound being immediately along the coronal suture; from internal examination found buried deep in the Cerebrum two pieces of Stone which I removed therefrom.

—— ——, M. D.

The whole of the above I certify to being true and correct.

Paste.—The following is a recipe for making common paste which will keep for a long time without fermentation:

Dissolve an ounce of alum in a quart of water warmed; when cold add as much flour as will give it the consistence of cream; then strew into it as much powdered rosin as will lie on a shilling, and two or three cloves, ground. It will keep for a year, and when dry may be softened with water.

Various stories of fatal cases of poisoning by wearing stockings and other articles dyed with *coralline red*, have appeared in foreign papers, and have been reprinted here. M. Guyot, in the *Comptes Rendus* of Aug. 6, 1869, gives the results of an exhaustive series of experiments, which prove that coralline is not a poison, whether taken internally even in large doses, or infused directly into the blood.

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PRICES OF VIALS AND BOTTLES.—g.s.v., means glass-stoppered vial, the price of which is 10 cents, more or less; c.v., corked vial, 6 cents, more or less; c.b., corked bottle, 12 cents, more or less; g.s.b., glass-stoppered bottle, 18 cents, more or less. The cost of the bottles and vials as given is to be added to the price of the articles in all cases. In remitting cash for goods, remember to include price of package as per list below.

Acid, Acetic . . . . 5lb. bot. 25 lb.	$0.30
" " glacial, . . . g.s.v.7 oz.	.13
" Benzoic . . . . . (lb.5.25) oz.	.42
" Carbolic, Crystals, C.P. v.8 oz.	.20
" " " C.P. bot. 20 lb.	1.80
" " Sol. extra c.b.8 lb.	.67
" " Com., Can incl., gal.	3.00
" *Chromic*, 1 oz. vials, g.s.b.7 oz.	.58
" Citric . . . . c.b.12, lb.	1.33
" Gallic . . . . lb.	
" " . . . . c.v. 5 oz.	.35
" Hydrosulphuric . . c.b.11 lb.	1.00
" Hypophosphorus . . c.v.4 oz.	.29
" Lactic, dilut. . . . g.s.v.8 oz.	.27
" " concent. . . g.s.v.8 oz.	1.02
" Nitrate Mercury . g.s.v.10 oz.	.25
" Phenic, Crystals . . . v.8 oz.	.20
" Phosphoric, 50 p.c. c.s.b. 9 lb.	1.41
" " 25 p.c. anhyd. c.b.9 lb.	.71
" Prussic . . U. S. P. g.s.v.7 oz.	.13
" Pyrogallic . . . . . c.v.5 oz.	1.10
" Sulphurous, solu . . c.b.11 lb.	.39
Acid, Valerianic, ... g.s.v.7 oz.	1.33
Ammonia, Spirits, . . 5 lb. c.b.25 lb.	.50
" " Aromatic, 5 lb. 25 lb.	.55
" Borate, ... c.v.4 oz.	.56
" Hydrosulphide (Hydrosulphuret) g.s.b.20 lb.	.80
" Hypophos. . . . c.b.12 lb.	3.63
" " c.s.v.4 oz.	.26
" Iron Alum . . . c.v.4 oz.	.20
Ammonia, Nit. pure, C. P. bulk, lb.	.85
" Valerianate, crys. g.s.v. 7 oz.	1.23
Ammonium, Bromide, . . . c.b.8 lb.	2.67
" " v.4 oz.	.20
" Iodide, ... v.7 oz.	.70
Amyl, Acetate of Oxide, . g.s.b 20 lb.	6.80
Antimony, Sol. Chloride, c.s.b.11 lb.	.39
Arsenic, Donovan's Sol. c.s b. 10 lb.	.40
" Fowler's Sol. . c.s.b. 10 lb.	.25
" Iodide . 1 oz. vials, g.s.v 7 oz.	.73
Atropia, in ⅛ oz. vials, . . ⅛ oz. ea.	3.75
" Solution, Fleming's, 4 oz. v.	.50
Bismuth, Citrate (Salt), . c.s.v.4 oz.	.66
" Elix. Cal. & Iron (doz. $10) lb.	.90
" Liquid (Ammon.), c.s.b.11 lb.	1.21
" Tannate, ... c.s.v.4 oz.	1.46
Black Drop, ... c b.10 lb.	6.70
Caffeine, ⅛ oz. vials, . . . ⅛ oz. each	1.37
Calcium, Chloride, sol., c.s.b. 10 lb.	.90
Cantharidal Rubefacient, ... oz.	.45
" Vesicant, ... oz.	.50
" Collodion, ... oz.	.42
Cerium, Oxalate, 1 oz. vials, c.v. 4 oz.	1.36
Chlorine Water . . . . . . c.b.11 lb.	.64
Chloroform, C. P. . . . . g.s.b.13 lb.	1.87
Cinchona, Sulph., in oz. vials. v.5 oz.	.55
Codeine, ⅛ oz. vials . . . . . . ⅛ oz.	2.50
Cod-Liver Oil . . . . doz.	9.00
Cod-Liver Oil with Hypophosphites of Lime and Soda combined, doz.	9.00
Collodion, Surg. . . . . doz.	3.00
" " . . . . . . b.10 lb.	1.90
Creosote . . . . g.s.b.14 lb.	1.21
Dover's Powder . . . . . . c.b.9 lb.	3.41
Egg Preservative (Judd's) . . . doz.	9.00
Elixir Calisaya . . . . doz.	10.00
Elixir Cinch. Iron & Strych. . . . lb.	.90
" Phosph. Iron & Quin. . . . lb.	.90
" Pyrophosp. " & Soda, . . . lb.	.90
" Rhubarb & Magnesia . . . . lb.	1.00
Ether, Acetic . . . . c.b.10 lb.	.90
" Butyric, conct. . . . c.b.10 lb.	4.40
" Chloric . . . . c.b.10 lb.	1.00
" " conct. C. P. . c.b.10 lb.	1.60
" Spirits Nitros. C. P. . c.b.10 lb.	1.15
Ether, Spirits Nitros, FFFF, c b.10 lb.	.50
Ether, Sulphuric, fort, ext., c.b.10 lb.	1.15
Extract Cannabis Indica . *true*, 7 oz.	1.68
" Nux Vomica . . in jars, 7 oz.	.58
Extract of Flesh . . . . oz.	1.10
Ferrated Tincture Bark . . . b.12 lb.	.83
Fusel Oil, purified . . . . . c.b.11 lb.	1.39
Glycerine, chem. pure, *extra*, including white bottle and carton . lb.	1.25
Glycerine, condensed . . g.s.b.15 lb.	.70
" " . . c.s.b.10 lb.	.70
Glycerole Hypophosphites, c.s.b.9 lb.	1.11
Glonoine, Tincture . . . . oz.	.55
Gold, Chloride, 15 grain bots. 24 doz.	8.50

Gold, Chloride, and Sodium, 15 gr. bot. 24 doz.	$4.25
" " " ½ oz v. 30 oz.	11.00
Granville's Lotion, ... c.b.10 lb.	.50
Hoff. Anodyne, ... c.b.10 lb.	.50
Hoffman's Anodyne, officinal U.S.P. c.b.15 lb.	2.85
Hypophosphite of Iron, in 1 oz. vials c.v.4 oz.	.56
" Lime, " c.v. 4oz.	.26
" Manganese, " c.v.4 oz.	.86
" Potassa, " c.v.4 oz.	.26
" Soda, " c.v.4 oz.	.26
Infusum Opii Deod. . . . c.s.b.15 lb.	4.50
" " per doz.	4.00
Iodide of Lime . . . . v. 7 oz.	.58
Iodide of Sodium . . . . . c.v.3 oz.	.52
Iodide of Sulphur . . . . g.s.v.7 oz.	.53
Iodine, resublimed . . . . . b.20 lb.	7.80
Iodine, Carbolate . . sol. c.s.b.11 lb.	1.24
Iodoform . . . . . . ½ oz. plain vials	5.75
Iron Ammoniated Citrate, very superior, w.b.15 lb.	1.50
" " c.v.4 oz.	.16
Iron Citrate, readily sol. w.b.15 lb.	1.50
" " " v.4 oz.	.16
Iron Citrate and Quinine, w.b. 15 lb.	11.10
" " " . . . c.v.4 oz.	.71
Iron Citrate & Strychnia, c.v. 4 oz.	.71
" Citrate Quinine and Strychine, v. 4 oz.	.81
" " and Manganese, v. 4 oz.	.66
" By Hydrogen . . . . c.b. 11 lb.	2.64
" Hydrated Sesquiox. c.b. 10 lb.	.80
" Hydrocyanate, ... c.v.4 oz.	.83
" Iodide, 1 oz. vials, g.s.v. 7 oz.	.53
" Muriate, Tinct. . . c.s.b. 10 lb.	.50
" Nitrate . . . . c.b. 14 lb.	.21
" Perchloride, dry, g.s.v. 7 oz.	.13
" Perchloride, sol. c.s.b. 10 lb.	.42
" Perchloride, sol. 36° B.c.s.b.10 lb.	.65
" Pernitrate . . . . . c.b. 10 lb.	.45
" Persulphate, Mon's Styp., sol. c.s.b. 10 lb.	.65
" " " 1 oz. vls. doz.	2.00
" " Mon's pow. 1 oz. vls. doz.	2.25
" " " c.b. 16 lb.	1.64
" Phosphate . . . . . c.b. 12 lb.	.75
" Carb. Proto., pure precip., c.b. 14 lb.	.41
" Carb. Proto. (Vallet's mass.) pots 10 lb.	.50
" " Saccharine, c.b 14 lb.	.76
" Pyrophosphate, in scales . 4 oz.	.16
" " w.b. 15 lb.	1.50
" " Elixir . . doz.	10.00
" " " and Bark,	10.00
" " and Mang. 14 lb.	2.00
" Sulphuret . . . . . . c.b. 8 lb.	.42
" Syrup Iod. . . . . g.s.b. 14 lb.	.75
" " " c.b. 10 lb.	.75
" Tart. et Potas., plates, w.b.15 lb.	1.50
" " " c.v. 4 oz.	.16
" Elixir Bark and Solution Protoxide, (per doz. 10.00) per bot.	1.00
" Protoxide, Solu. " "	1.00
Lactucarium, C. P. . . . . oz.	1.10
Lead, Acetate, chem. pure, c.b.11 lb.	1.14
Lead, Iodide, 1 oz. vials, c.v. 3 oz.	.57
" Sub. Acetate Sol. c.b. 10 lb.	.34
Liebig's Nutritive Food . . . . doz.	2.50
Lime, Carbolate, boxes 10 lbs. ea.	1.50
" " boxes 25 lbs. ea.	2.50
" " in bulk, by cask or ton,	
" " C. P. for sick-room, 2 oz. v. doz.	2.25
Lime, Horsford's Sulphite, in cartons, doz.	2.00
Magnesia, Cal. . . . . doz.	4.00
" Sulphite . . . . bot. 11 lb.	1.14
" Soluble Citrate w.g.b.20 lb.	1.80
" " " (small bottle) per doz.	3.00
Manganese, Black Oxide, purified, c.v.4 oz.	.31
Mercury, Bin Iodide . . . . c.v.3 oz.	.47
" Proto-Iodide . . . c.v.3 oz.	.47
Morphia, Sulphate, ⅛ths, 8 v. & box, oz.	9.00
" Acetate, " 8 v. & box, oz.	9.00
" Muriate, ⅛ths, 8 v. & box, oz.	9.00
" Valerianate, " 8 v. & box, oz.	14.00

Morphia, Pure (Alkaloid), ⅛ths, 8 v. & box, oz.	$10.00
" Bi-Meconate Sol. bo. 10c. lb.	4.50
Narceine . . . . . 10-grain vials, ea.	3.75
Oil of Cubebs, C. P. . . . c.b 10 lb.	4.15
Paper, Litmus . . . . . sheets, doz.	.85
" Tumeric . . . . " "	.85
Pepsine, pure . . . . oz.	6.50
" Wine . . in wine bots. doz.	33.00
Piperine . . . . c.v.4 oz.	1.56
Platinum, Chloride . . . g.s.v.10 oz.	1.40
Potassa, Acetate . . . . . c.b.15 lb.	.85
" Carbolate . . . . g.s.v.10 oz.	.50
" Chlorate, C. P. . . . c.b.20 lb.	1.10
" Liquor . . . . . . c.b.11 lb.	.19
" Permanganate, crys. c.v.4 oz.	.41
" " solution, ... lb.	.75
" " " demi. 55 gal.	4.00
" Sulphuret, ... c.b.11 lb.	.39
" Yellow Chromate . c.b. 15 lb.	.85
Potassium, Bromide, . . . c.b.4 oz.	.13
" " . . . . c.b.8 lb.	1.92
" Chloride . . . c.b.20 lb.	1.10
" Iodide . . . . . c.b.9 lb.	5.60
Propylamin, 1 oz. and ½ oz. vials, oz.	2.50
Proteine . . . . ½ oz. vials, oz.	2.75
Quinine, Cincho. . . . . oz.	2.35
(Discount 15 per cent.)	
Santonine . . . . c.v.4 oz.	1.31
Soda, Bi-Sulphite Liquor . . c.b.9 lb.	.60
Soda, Chloride, Liquid . . . . gall.	.75
" " " . c. b. 11 pt.	.12
" Silicate, (soluble glass) . . lb.	.25
" " Solution . . . . pint	.50
Silver, Bromide . . . . . c. v. 4 oz.	2.76
" Chloride, ... c. v. 4 oz.	1.63
" Cyanide. . . . . . c. v. 4 oz.	2.66
" Iodide . . . . . . c. v. 4 oz.	2.66
" Oxide . . . . . . c. v. 4 oz.	2.11
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" Chloroform, U. S. P. c. b. 10 lb.	.90
" Rosemary . . . . c. b. 10 lb.	.45
Strychnine, Sol. Fleming's, 4 oz. v.	.45
" Valerianate, g. s. v. 8 oz.	5.92
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Styptic Colloid . . 1 oz. g. s. v. doz.	5.50
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Syrup of Iodide Manganese . . . lb.	1.20
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Syrup of Lime . . . . . . c. b. 11 lb.	1.14
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" Protox. Iron with Iodide of Potassa, lb.	.90
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" " Ox. Muriate, c.s.b. 10 lb	.30
Valerianate Ammonia Elix. c b.15. lb.	1.65
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" " and Quin. 4 oz. v. doz.	6.50
Zinc, Chloride, dry, ... g s.b 7 oz.	.18
" " Sol. n edic. bot. 14 lb.	.26
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" Valerianate . . . ½ oz. vials	1.25

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BOSTON JOURNAL
OF
CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. IV.—No. 6. BOSTON, DECEMBER 1, 1869. FIFTY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.
RECEIPTS.—A receipted bill will be sent by return mail to any subscriber who will enclose with his subscription a three-cent postage stamp, for return postage.
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Contents.

Familiar Science.

EVAPORATING WATER IN CONNECTION WITH STOVES AND FURNACES.

THE readers of the JOURNAL are cognizant of the fact, that we have uniformly opposed the practice of evaporating large quantities of water upon stoves and in furnaces, on the ground that it was not conducive to health or comfort. The views expressed have not met with the approval of some writers, whose opinions we are accustomed to regard with deference and respect. We do not, however, upon a careful consideration of the whole subject, and from a repetition of experiments undertaken many years since, see any reason for changing or modifying the views expressed. There is a popular impression, hard to be eradicated, that stoves and furnaces *dry the air* which comes in contact with them. Air furnaces are constantly spoken against, because they *dry* or "burn up" the air and render it unhealthy to the occupants of dwellings. This is an error. Atmospheric air cannot be "dried up or burned up" by any heating apparatus in use at the present time. Heated air has a larger capacity to hold vapor than cold air, but none of its natural moisture is expelled from it by heat. A cubic foot of air at 10° Fahrenheit above zero, in winter, retains 1.11 grains of water; if it is allowed to flow through the air-box leading to a furnace, and thereby becomes heated, it still holds 1.11 grains of water, after reaching the interior of dwellings. If the temperature is raised to 70° Fahrenheit, it is capable of holding 8 grains to the foot. By heating air, no moisture is driven out, but the capacity to hold it is simply increased, and if we supply vapor, it will seize and hold it so long as the temperature is maintained. Air is said to be *saturated*, when it holds all the water it is capable of, and this capability of holding water depends upon the amount of heat that is combined with it. The hotter air is, the drier it appears. The reason why a furnace injudiciously managed appears to dry the air more than one well managed, is that the temperature is higher, and the air is thus rendered capable of retaining more vapor. Undue heat, then, proceeding from stoves and furnaces, gives rise to certain impressions which are best expressed by the word *dry*, and in order to remove or mitigate the evil, we place pans of water in connection with the source of heat and allow it to evaporate. Is this practice a good one?

To answer this question affirmatively we are required to believe that air admitted to our rooms in winter, heated to a point capable of affording comfort, say 70° Fahrenheit, is abnormal and needs to be interfered with, or saturated with moisture. This we do not believe. For fifteen years we have maintained in our dwelling in cold weather a uniform temperature, ranging between 65 and 70° Fahrenheit, and during that time not a drop of water has been evaporated, and scarcely an instance of illness has occurred. No *sensation of dryness* has been complained of by members of the family or by visitors. On the other hand, a delightful feeling of *comfort* is participated in by every one; there is no lassitude, no nervous uneasiness, no parched condition of the skin, or other unpleasant symptoms. The heat proceeds from coils of iron pipe heated by steam. The steam in the pipes never exceeds a temperature of 212°, as the boiler pressure cannot go higher than two pounds to the inch. The air that impinges upon these pipes, while in immediate contact, is heated to at least 100° Fahrenheit, but as soon as diffused, falls to the general temperature of about 70° Fahrenheit.

Now, it matters not what the source of heat is, the air is rendered no drier by passing around the fire pot of a furnace than by passing over steam pipes. Indeed, a room heated to 70° Fahrenheit by air which has passed over red-hot iron plates contains as much moisture as one of that temperature warmed by hot water or steam pipes. A temperature of 65 or 70° is a normal, healthful temperature, and contains all the moisture needed to secure the highest health.

The trouble is, most housekeepers maintain too high temperature in their rooms; the air is unduly heated, and hence arises the intolerable sensation of dryness. This sensation can be, and often is, produced in dwellings by high pressure steam. Air heated to 80 or 85° produces very different physiological effects from that of 70°. A rise of 2 or 3° in a room is noticed by those who are accustomed to a uniform temperature of 70° or a few degrees below, and a sensation of uneasiness is produced. The great advantage of low pressure steam is, that by its employment we are able to *avoid high temperatures*. With a boiler pressure just sufficient to drive the vapor through the coils, a perfectly uniform heat is maintained. Once regulated, it needs but little interference or care. The use of steam or hot water imparts no *moisture* to the air of dwellings; not an atom is allowed to escape from a well arranged apparatus.

Many times every winter, neighbors and friends on coming into our dwelling remark, "how delightfully *moist* and pure the air is, so different from *furnace* heat!" The erroneous idea is entertained that *steam* heat supplies *moisture* to the rooms.

If the heat of dwellings is kept at a normal standard, the warm air contains all the moisture needed for health or comfort. If the temperature is abnormally high, we do not believe the train of evils which follow are avoided by vaporizing large quantities of water. We have known of several pailfuls of water being evaporated every day in furnaces, and upon going into rooms have heard the peculiar noise occasioned by the ebullition of water in the furnace below. In such families there have been uniformly more catarrhal difficulties, more rheumatism, more headache, than in other houses where no evaporation is allowed. This subject is so important, that we shall continue the discussion in a future issue of the JOURNAL.

HOW TO DO FOR SICK PEOPLE.

The following directions for preparing articles of food etc., for the sick, are distributed through the Hospital for Incurables, Philadelphia. The methods given are so excellent and reliable, that we are led to present them to the readers of the Journal. It will be well for the reader to preserve the paper for reference in time of sickness.

BOILED RICE.

Most readers think this is something easily prepared. So it is perhaps, but few nurses have an idea of the necessity of having it properly done; that is, cooking it until every grain becomes perfectly *softened.* If the grains are not reduced to this soft state, rice is almost certain, when swallowed, to irritate the digestive organs, and instead of soothing the parts and sustaining strength, will actually produce a diarrhœa, etc. This has been frequently noticed in hospitals.

When properly boiled until each particle becomes so softened that the *grain* cannot be detected when eaten, there are few articles of diet for the sick which can be made more acceptable to the taste of invalids than boiled rice.

CORN STARCH.

To one tablespoonful of corn starch add enough cold water or cold milk to make a perfectly smooth paste. Then pour this into half a pint of boiling milk and carefully boil a few minutes, stirring it all the time, and putting in a little salt. Sweeten to the taste, and add any essence or spice liked by the person who is sick. Then set aside to cool.

This, like everything else which contains milk, requires great care to prevent it from scorching, and the least of it can be observed by the person for whom prepared. For this reason a sauce-pan with thick sides is usually preferred, and the heat should always be applied to the bottom of the vessel. In stirring be cautious not to splash against the sides of the utensil more than can be helped.

ARROW-ROOT.

Take a tablespoonful of arrow-root, and mix it with enough cold water to make a paste free from lumps. Pour this slowly into half a pint of boiling water, and let it simmer awhile until it becomes thick and jelly-like; sweeten to the taste, and add a little nutmeg or cinnamon. Instead of the half pint of boiling water, the same quantity of boiling milk, or half milk and half water, may be used. This will make it more nutritious.

OATMEAL GRUEL.

Mix a tablespoonful of oatmeal with a little cold water until it makes a smooth paste; pour this gradually into a pint of boiling water, and boil slowly for twentyor thirty minutes, stirring it all the time, and being very careful not to let it scorch in the least. Salt, spice, and wine or brandy should be added to it, unless there is some good reason for not doing so.

PANADO.

Take a slice of wheat bread, break into fragments, and sprinkle over it a teaspoonful of ground cinnamon; put into a cup, pour on it a pint of boiling water, and boil a few minutes until well mixed, when some sugar with a little grated nutmeg must be added. If desirable, a piece of butter may be put in, and also some wine or brandy.

BARLEY WATER.

Take nearly an ounce of pearl barley and wash it well. Then pour on it a pint of boiling water, and carefully boil to one-half. Strain the liquid through a towel, then add some sugar and lemon juice. A small piece of orange or lemon-peel, dropped in while boiling, makes it more acceptable to many persons.

CURRANT JELLY WATER.

A tablespoonful of currant jelly thoroughly mixed through half a pint of cold water.

A sick person may drink as much as wished of this acid water. As with all other drinks for the sick, a little at a time and often repeated is the way it should be given.

TOAST-WATER.

Carefully remove the crust from a slice of stale bread, and toast the slice through on both sides, but do not burn it. Break the slice into three or four pieces, and put them into a pitcher with a small piece of orange or lemon-peel. Pour on a pint of boiling water, cover up with a napkin, and, when cold, strain off the water for use.

It should be freshly made, especially in warm weather.

TOAST SOUP.

Take a thin slice of stale wheat bread, and toast until it is brown through and through; but be careful that you do not burn it. While it is still hot, spread some butter over it, but no more than will strike into the bread without leaving any on the surface. Now break it into fragments; put the pieces into a pitcher, and pour on rather more than half a pint of boiling water. A little pepper and salt improves the taste; so they may be added.

This drink is usually found very acceptable to sick or delicate persons, and, at the same time, quite nutritious. It was much recommended under the name of "toast soup," by the late Dr. William Darrach, of this city, and gave satisfaction wherever used.

WINE-WHEY.

Put half a pint of sweet milk over the fire, and, as soon as it begins to boil, slowly pour into it a wineglass of sherry wine mixed with a teaspoonful of sugar. Grate into it a little nutmeg, and, as soon as it comes to a boil again, remove it from the fire. When cool, strain for use.

BRANDY.

When brandy is ordered for a sick child, it is meant that a few drops, according to the age, should be given in water or some sweet milk, as often as the condition of the patient requires it. Unless told to do otherwise, keep it in reserve for the time of the day when the sufferer appears to exhibit signs of being weaker than usual, and then give enough to restore it to its average condition in health, trying not to get *above* that. Usually it is more frequently needed in the latter part of the day, or quite early in the morning, than at other times.

MILK PUNCH.

Pour two tablespoonfuls of good brandy into six tablespoonfuls of sweet milk and add two teaspoonfuls of ground loaf sugar. Grate some nutmeg into it, and the punch is ready for use.

An adult person can take a tablespoonful of this every two or three hours, but for infants or children you must remember that *one-fourth* of it is brandy. Milk punch is much ordered by physicians for people who have low fevers and for those who are debilitated.

BRANDY, EGG, AND MILK.

Take a fresh egg; break it; separate the yolk from the white, and whip each with a fork until it becomes a froth. Then thoroughly mix them together, and add enough good milk or ordinary cream, well sweetened with finely ground loaf sugar, to make a tumblerful. Next, pour in a tablespoonful of good brandy; if this is not convenient, a proportional quantity of the best whiskey may be used instead. See again that it is well mixed with a fork, when it will be ready for the sick person. A little grated nutmeg added improves the taste for some people.

ESSENCE OF BEEF.

Take a pound of fresh beef, as free as possible from fat; cut it up into very small pieces, or, what is better, shred it with a fork. Sprinkle over it a little salt, and put the meat into a stout stone bottle, such as mead or Scotch ale comes in; cork tightly and tie the cork down with a string. The cork is usually not put in until steam begins to escape from the bottle. Stand the bottle in a vessel of cold water, which should slowly be brought up to the boiling point, and kept at it for at least four hours. To prevent the bottle from breaking against the side of the vessel, by the movement of the boiling water, it should be secured by a piece of cord. Strain through a piece of coarse linen; then let the liquid stand awhile in a cup, and, with a spoon, carefully skim off any fat which may have arisen to the surface. It may be seasoned to the taste with pepper and salt.

The liquid obtained in this manner is one of the most agreeable and highly nutritious articles of diet which can be prepared for the sick.

THE STUDY OF NATURE WITHIN CITY WALLS.

We associate the study of nature with the country rather than the city. The brick walls and stone pavements, the dusty, smoky atmosphere, the noise and confusion of a great metropolis, appear anything but favorable to the pursuits of the naturalist. But even amid such unpromising surroundings he may carry on for years his investigations in the animal and the vegetable worlds, and may add largely to our knowledge of bird and insect, of herb and flower. We cannot better illustrate this study of nature under seemingly insuperable difficulties, than by translating from a lively French writer, the following account of what has been done in this way, even within the walls of Paris:

"One need not go far to study natural history. Even in Paris one may have all nature in a little corner. Did Méry leave the city to write his *Comédie des Animaux?* He wrote it in his lodgings in Paris, and his observations were made in his own rooms. The rat, which plays one of the principal parts, was one of his neighbors in the vacant lots of the *rue St. Georges*, about 1840. . . . Théophile Gautier, in his last fascinating book in which he describes his *Ménagerie*, was at no greater expense in travelling. With his dogs and his cats, his aviary and his monkeys, he wrote at home a volume of humor and experience, which long-winded lecturers on natural history may now look down upon with contempt, but which they will not disdain one of these days. Bernardin de St. Pierre needed only the strawberry vine which grew on his window-sill, to discover a whole world. L'Héritier de Brutéle, one of the botanists whom Cuvier most esteemed and praised, did not go beyond the *Place Vendôme*, to make some of his most curious observations. He was a clerk in the Ministry of Justice during the Directory — a period when many people were away from the city, and still fewer carriages were to be seen, so that wild weeds were at full liberty to grow between the stones of the square. He studied these weeds with the minutest, most microscopic attention. The mansions of the Place Vendôme were almost untenanted, and utterly out of repair. Their fronts were cracked and mouldy, but on these mouldy places mosses grew, and in the crevices were lichens and byssus, a rich harvest for the quill-driving botanist. He studied even the blackening color on the walls, and made the discovery that it was

due to a microscopic lichen. After a year of study, he had a complete herbal, in which surprises were not wanting. He had found in the heart of Paris, between two paving-stones of his dear square, herbs known only in the desert, whose seeds had been tossed hither by some wild African wind. Proud of this herbal, gathered where least likely to be found, he made it the subject of a little treatise, prepared with the greatest care, to which he gave the title of "The Flora of the Place Vendôme." Unfortunately it was not published, and I believe it has been lost since his death.

Another learned man, Dureau de la Malle, without leaving Paris, made the song of birds his especial study. That he might lose nothing of it amid the city noises, he made his observations in the early morning, when the town was asleep. He did not merely consider the music of the song, and how it varied in different species, but he attempted to discover and note with the greatest precision the time of year when it is first heard, and the hour of the day when the first note is uttered. He succeeded in doing this, and made himself a sort of alarm-clock of bird music, which no work of man's hands could equal in regularity and sweetness. He literally found, as Victor Hugo has said, that "the grave voice of the hours was changed into joyous song." The house where he lived in the *rue de la Rochefoucauld*, had a garden with trees enough to lodge all the families of its songsters, and with a soil moist enough for the quail to lay and hatch in it. . . . He went to bed regularly at seven o'clock, P. M., and rose at midnight. His study looked out on the garden, and in mild weather he opened all his windows that he might catch the first murmurs from the nests, the first trills which warbled in the bushes. Bending over his archæological studies, he was better on the watch for this awakening of song than poet or morning shepherd. I never open his excellent work on "The Political Economy of the Romans," without thinking of these concerts amid the leaves, of this music of the dawn, which his learning had for accompaniment as it delved in antiquity."

ACID RIVERS.—The *Rio Vinaigre*, in South America, has its source nearly two miles above the level of the sea on the volcano named the *Purace*. Humboldt was the first to ascertain that its waters contain free sulphuric and muriatic acids. According to Boussingault, this river empties into the Rio Cauca, into which it falls from a height of about 400 feet, discharging daily 34,784 cubic metres of water, containing 37,611 kilogrammes (more than 40 *tons*) of strong sulphuric acid and 31,654 kilogrammes (nearly 35 tons) of strong muriatic acid. No fish are found in the Rio Cauca for more than 10 miles below the point where it receives these acid waters.

In the island of Java there are several small streams and lakes which contain free sulphuric and muriatic acids; and on the island of Sumatra there is a lake which contains free nitric acid. All these phenomena are the result of volcanic action.

THE WONDERS OF AN ATOM.—All things visible around us are aggregations of atoms. From particles of dust, which under the microscope could scarcely be distinguished one from the other, are all the varied forms of nature created. This grain of dust, this particle of sand, has strange properties and powers. Science has discovered some, but still more truths are hidden within this irregular molecule of matter which we now survey than even philosophy dares dream of. How strangely it obeys the impulses of heat—mysterious are the influences of light upon it—electricity wonderfully excites it—and still more curious is the manner in which it obeys the magic of chemical force. These are phenomena which we have seen; we know them, and we can reproduce them at our pleasure. We have advanced a little way into the secrets of nature, and from the spot we have gained we look forward with a vision somewhat brightened by our task; but we discover so much to be yet unknown, that we learn another truth,—our vast ignorance of many things relating to this grain of dust.

It gathers around it other particles; they cling together, and each acting upon every other one, and all of them arranging themselves around the little centre, according to some law, a beautiful crystal results, the geometric perfection of its form being a source of admiration.

It exerts some other powers, and atom adhering to atom, obeying the influence of many external radiant forces, undergoes inexplicable changes; and the same dust which we find forming the diamond aggregates into the lordly tree, blends to produce the graceful, scented, and richly-painted flower, and combines to yield the luxury of fruit.

It quickens with yet undiscovered energies; it moves with life; dust and vital force combine; blood and bone, nerve and muscle, result from the combination. Forces which we cannot, by the utmost refinements of our philosophy, detect, direct the whole, and from the same dust which formed the rock, and grew in the tree, is produced a living and a breathing thing, capable of receiving a divine illumination, of bearing in its new state the gladness and the glory of a soul.—*Hunt's Poetry of Science*. .

COUNTRY AIR AND CITY AIR.—M. Houzeau has demonstrated that the air of the country differs remarkably from that of a great city. The former is strongly disinfectant, has a far greater bleaching power, and, especially after the fall of rain, has a decidedly more marked effect upon bright and oxidizable colors. All kinds of woven fabrics—linen, cotton, or woollen—are much more rapidly bleached in the country than in the city, even when the exposure to air and sunlight is precisely the same. It is likewise true that under the influence of country air many dyed tissues fade sooner; and that iron, steel, and even copper, become more quickly rusted.

TO SHOW THAT AIR HAS WEIGHT.—Teachers, and others who may wish to show the weight of air without the air-pump, can do it by the following simple experiment:—

Boil a little water in a flask to expel the air, then cork the flask tightly, let it cool, and weigh it carefully. Then remove the cork to admit air, and weigh it again, including the cork. The difference in weight will be perceptible with a good balance of the ordinary construction.

THE LEVEL OF THE MEDITERRANEAN AND RED SEAS.—During the celebrated Egyptian campaign of 1798, the difference of level between these two seas was calculated by the French engineers, and found to be .85 of a metre. The result obtained in making the survey for the construction of the Suez Canal, in 1866, was .86 of a metre. The accuracy of the earlier survey is very strikingly confirmed by the close coincidence of these results. They differ by less than 1-25 of an inch.

IS THERE ANY HEAT IN MOOONLIGHT?—The *Comptes Rendus* of September 20, gives a paper on this subject from the pen of M. Marié-Davy. According to the very accurate researches and experimental observations of this author, the heating power of the lunar rays is incapable of affecting by the one-millionth part of a degree, a very sensitive air-thermometer coated with lampblack. This result disagrees with that obtained by Lord Rosse.

ARTIFICIAL LIGHT.—The German chemist, Landsberg, says that artificial light contains 90 per cent of calorific rays, while sunlight contains only 50. To this difference he ascribes the disagreeable effect of artificial light upon the eyes. By passing the light through alum or mica, the calorific rays are intercepted, and this unpleasant effect is obviated.

Arts.

NEW THINGS IN PHOTOGRAPHY.

THE *Photographic News* (London) gives a specimen of a new style of photographic picture to which the name *Albertype* has been given. The process is described as follows:—

"A plate of glass is covered with a solution of albumen, gelatine, and bichromate of potash, dried and exposed to light until hardened. It is then again covered with a solution of gelatine and bichromate of potash, and when dry exposed under the negative, and the film is then found to possess qualities analogous to a drawing made with fatty ink upon lithograph stone. All those portions of the film that were acted upon by the light will refuse water and take printing ink, while those portions which were protected from light by the negative will take water and refuse ink. The ink and water will be absorbed by the film just in accordance with the gradations of light and shade in the negative. To produce a picture, wet the surface of the film, then apply ink, lay on paper and pass through a press; the operation being substantially the same as lithography. The process is said to be rapid, and excellent pictures of all sizes may be printed in admirable style."

A photographer in Germany has invented a method of producing stamps and seals from photographs. A thin layer of gelatine made sensitive with bichromate of potash is exposed to light under a photographic positive, and the parts acted upon by the light become insoluble in water. The gelatine is then immersed in water, and the parts which have not been rendered insoluble, swell up, producing a picture in relief, from which a plaster cast is taken. From this an electrotype copy can be made which can be used as a seal. The process may also be employed for obtaining electrotypes for the use of the printer.

The *Athenæum* (London) states that copies of photographic pictures are now made in England by printing on ordinary paper with printer's ink, and that they can be done at the rate of 12,000 a day. The editor has seen some of these "mechanical photographs," as they are called, and pronounces them excellent.

The important problem of measuring distances and constructing plans and maps by means of photography has at length been solved by a Berlin photographer. He has surveyed a Prussian fortification for the government with complete success, and has constructed a photogrammetric instrument of such simplicity that a workman quite unacquainted with the art was able to draw up a special plan of a fortress on the scale of 1 to 2,500 after a few short instructions.

MINERAL DISCOVERIES.—M. Palm states in a recent number of *Cosmos* that he has been on a long journey through a portion of Turkestan which is little known to Europeans, and that, on his way, he studied the saline deposits of the country. Some of these deposits are very rich in sulphate of soda. Millions of tons of this important salt exist in this distant region, inhabited only by a few wandering tribes and by the Cossacks who do duty along the great roads as a military police.

On the eastern shores of the Caspian sea, abundant seams of coal have been found. The steam-ships navigating that sea have hitherto used wood for fuel, which had to be transported from the Ural mountains, at great cost. The coal is of very good quality. More than forty years ago, the late A. von Humboldt stated his belief that coal would be found in this region

at no great depth under the surface of the ground, since this entire locality abounds in naphtha.

On an estate belonging to M. Carnac, near Balhannah, South Australia, a very valuable lode of bismuth has been found, while some miners were seeking for copper ore. Since bismuth has very much increased in price, and is increasingly in demand, this discovery is a highly welcome one.

FUSIBLE ALLOYS. — An alloy of $7\frac{1}{2}$ parts of bismuth, 4 of lead, $1\frac{1}{2}$ of tin, and 2 of cadmium, melts at a temperature of 66° Centigrade, or 151° Fahrenheit. There are several alloys of bismuth, lead, and tin, which melt below the boiling point of water. The one which is simplest in composition, and most easily made, consists of 2 parts of bismuth, 1 of lead, and 1 of tin. A bit of it dropped into boiling water becomes at once a melted globule. The experiment is a good one for school use.

Bismuth melts at about 500° Fahrenheit, lead at 600° or more, and tin at 440°. The fact that the melting point of the alloy is lower than that of any one of the ingredients goes to show that alloys are, in some cases, to be regarded as chemical compounds, and not as mechanical mixtures. Other phenomena confirm this view; as the evolution of heat, when certain metals are melted together, and the fact that the density of an alloy is not what it should be if the metals were merely mixed.

STEAM BOILER INCRUSTATIONS. — We learn from *Cosmos* that a series of experiments, made on purpose, and continued for a sufficient length of time to yield a reliable result, has fully proved that the addition to the feed-water of the steam-boilers of fatty clays, especially the kind known as fuller's earth, entirely prevents boiler incrustations, even where, of necessity, very hard water has to be used as feed-water. A loose, soft mud is deposited as soon as the motion of the water, due to the boiling, ceases on cooling. This mud readily runs off on opening the sludge-valve of the boiler.

The *Annales de Génie Civil* informs us that these incrustations may be prevented by the use of raw potatoes, which cause all solid matters to be precipitated at the bottom of the boiler in a fine powder, leaving the sides perfectly free. The experiment was tried with an engine of 8-horse power, into the boiler of which ten kilogrammes of potatoes per week were introduced through the safety-valve. Every week, when the fires were extinguished, the deposit was removed previous to the introduction of a fresh supply of potatoes. On examining the boiler after fourteen consecutive months of work, no traces of incrustation were perceptible; the appearance of the plates was blackish and slightly greasy, and the corners of the joints were in the same state as when first made. Refuse leather-cuttings from the tanneries will answer the purpose equally well.

PROTECTION AGAINST FIRE. — Prof. Reinsch, having been requested by an insurance company to report upon the best means of protecting timber against fire, experimented with various salts, and at last came to the conclusion that common salt answers the purpose as well as anything that can be found. Timber impregnated with a concentrated solution of rock salt will not burst into a flame, any more than if coated with silicate of soda. The salt is of course much cheaper than the silicate, besides being also a preservative against dry rot and noxious insects. Reinsch suggests that salt water would be far more effective than fresh for use in fire-engines; but it would be likely to injure the machinery.

COLLODION FOR PROTECTING SILVER WARE. — The loss of silver from the action of sulphur compounds in the air, especially where gas is burned, is very great. It has been said that many thousands of dollars' worth of the precious metal go down our sewers annually in the form of dirt from the cleaning of plate. A silversmith named Strollberger, in Munich, has been trying various plans to save his silver, if possible. He covered his goods with a clear white varnish, but found that it soon turned yellow and spoiled the appearance of the ware. Then he tried a solution of silicate of potash, but this did not answer. After various experiments, it occurred to him to use a thin coating of collodion, which he finds to be just the thing. He first warms the articles to be coated, and then applies carefully a thinnish collodion, diluted with alcohol, using a wide soft brush for the purpose. Silver ware, protected in this way, has been exposed in his window for more than a year, and is as bright as ever, while articles left uncoated have become perfectly black in a few months.

ANTI-RUST VARNISH FOR IRON AND STEEL. — Such a varnish, according to the *Manufacturer and Builder*, may be made of

Resin	120 parts.
Sandarac	180 "
Gum lac	60 "
Essence of turpentine	120 "
Rectified alcohol	180 "

Pound the first three ingredients, digest them by a regular heat until they are melted, and add the turpentine very gradually. After complete solution has taken place, add the alcohol, and filter through fine cloth or thick filtering-paper. The varnish should be kept in well-stoppered bottles.

NEW METHOD OF CONCENTRATING SULPHURIC ACID. — The concentration of sulphuric acid in platinum vessels is very expensive, owing to the great cost of the apparatus and of any repairs which it may require from time to time. On the other hand, if glass retorts are used, there is a great loss of acid from the frequent breakage during the process of boiling down. The *Journal de Pharmacie et Chimie* describes a new method devised by M. Cotelle. He has had made a column, lined inside with fire-bricks, and made outside of good ordinary bricks; it rests on a large pedestal. This column is open at both top and bottom; but in these openings are fitted fire-clay stoppers. The inside of this apparatus is fitted with previously-calcined pumice-stone; inside the lower portion of this column, openings are made between the bricks, through which a current of highly heated air is forced. From the top, the acid which has to be concentrated is made to trickle on the pumice-stone, and, meeting with a current of highly-heated air, the superfluous water is driven off, and the acid, on arriving at the bottom, is in a concentrated state, and runs off in properly-arranged vessels.

ELECTRO-PLATING OF PAPER AND OTHER FIBROUS MATERIAL. — A method has been devised for depositing copper, silver, or gold, by the electric process, upon paper or any other fibrous material. This is effected by first rendering the paper a good conductor of electricity without coating it with any substance which will peel off. One of the best methods is to take a solution of nitrate of silver, pour in liquid ammonia till the precipitate formed at first is dissolved again; then to place the paper, silk, or muslin, for one or two hours, in this solution. After taking it out and drying it well, it is exposed to a current of hydrogen gas, which reduces the silver to a metallic state. The material thus becomes so good a conductor, that it can be electroplated in the usual manner.

A NEW WHITEWASH FOR WALLS. — Soak one-fourth of a pound of glue over night in tepid water. The next day put it into a tin vessel with a quart of water, set the vessel in a kettle of water over the fire, keep it there till it boils, and then stir until the glue is dissolved. Next put from six to eight pounds of Paris white into another vessel, add hot water and stir until it has the appearance of milk of lime. Add the sizing, stir well, and apply in the ordinary way while still warm.

"Paris white" is *sulphate of baryta*, and may be found at any drug or paint store.

VARNISH FOR IRON. — The following is M. Weiszkopf's method of coating iron with a durable black and lustrous varnish:

Take oil of turpentine, add to it, drop by drop, and while stirring, strong sulphuric acid, until a syrupy precipitate is quite formed, and no more of it is produced on further addition of a drop of acid. The liquid is now repeatedly washed with water, every time refreshed after a good stirring, until the water does not exhibit any more acid reaction on being tested with blue litmus paper. The precipitate is next brought upon a cloth filter, and after all the water has run off, the syrupy mass is fit for use. This thickish magma is painted over the iron with a brush; if it happens to be too stiff, it is previously diluted with some oil of turpentine. Immediately after the iron has been so painted, the paint is burnt in by a gentle heat, and, after cooling, the black surface is rubbed over with a piece of woollen stuff dipped in and moistened with linseed oil. According to the author, this varnish is not a simple covering of the surface, but it is chemically combined with the metal, and does not, therefore, wear off or peel off as other paints and varnishes do from iron.

A DEEP WELL. — We learn from the French periodical, *Les Mondes*, that the deepest Artesian well in the world is in this country, at Saint Louis. As long ago as 1854, this well had been bored to a depth of 2,199 feet, without reaching water-bearing strata. In 1865, the previously suspended borings were resumed, and are yet pushed forward; but though a depth of 2,852 feet has been reached, no water-bearing strata have been found. The borings now proceed only about three inches depth every day, in compact solid granite, and the cost per month amounts to $1,600.

TO CLEAN PAINT. — There is a very simple method to clean almost any kind of paint that has become dirty, and if our housewives should adopt it, it would save them a great deal of trouble. Provide a plate, with some of the best whiting to be had, and have ready some clean warm water, and a piece of flannel which dip into the water, and squeeze nearly dry; then take as much whiting as will adhere to it; apply it to the painted surface, when a little rubbing will instantly remove any dirt or grease. After which, wash the part well with clean water, rubbing it dry with a soft chamois. Paint thus cleaned looks as well as when first laid on, without any injury to the most delicate colors. It is far better than using soap, and does not require more than half the time and labor. — *Coachmakers' Journal.*

MELTING POINTS OF METALS. — The melting points of several metals have been very carefully determined in a recent series of experiments by A. von Riemsdyk, of the Royal Mint at Utrecht. The results are as follows: tin, 228.5° *centigrade;* bismuth, 268.3°; cadmium, 320°; lead, 326°; zinc, 420°; silver, 1040°; gold, 1240°; and copper, 1330°.

Agriculture.

THE MASSACHUSETTS AGRICULTURAL COLLEGE.

A CONSIDERABLE portion of the farm at Amherst is in a rough, unreclaimed condition, and not suited to the growth of crops. The grounds immediately around the college buildings have been underdrained, plowed, and brought into good tilth. There is evidently impatience on the part of some to have the whole farm put in fine condition so as to be pleasing to visitors, but we do not share in this feeling. It is not necessary or desirable to have a "fine show farm" maintained at the expense of the Commonwealth. In hastening to accomplish this end, the designs of the institution must necessarily be frustrated. When all the land is underdrained, what facilities for practical instruction of the pupils in this most important work will remain? When there are no more ditches to dig, or swamp lands to subdue, how can the young men be drilled in this department of labor? Manifestly it will be better to drain and work over small patches of land each year, so as to give each class an opportunity to observe, and participate in the work. If it requires fifty years to transform the magnificent farm into a garden, so much the better for the young farmers who are expected to graduate at the college. The buildings, for the most part, are elegant and convenient, and when those now in process of completion are finished, the wants of the institution will be quite satisfactorily met, so far as structures are concerned. The new "model barn" is, however, certainly open to criticism. If this embodies all the barn-building wisdom and genius of the State, there is less of it than we supposed. A barn furnishes a poor "model," if it is wanting in a special effective method for ventilating its cattle stalls. The root department of the State barn, we fear, is not out of the reach of frost, and there is no receptacle for saving the liquid excrement of the animals. However, the structure was reported as not completely finished, and perhaps it will be less objectionable when the last nail is driven.

The conservatory is very fine, and notwithstanding the fault that has been found with its establishment in connection with the college, it seems to us not a useless appendage. If young men can be taught to love and cultivate flowers, it will be a point gained. The country needs a corps of well instructed floriculturists and gardeners, and there is plenty of employment for such, with good wages.

Of the interior workings of the college we are hardly prepared to express opinions, as owing to want of time, no careful observations were made in that direction. Enough, however, was noticed to show that the arrangement of classes, and methods of instruction are excellent. The lecture system is adopted in the various branches of instruction; a system to be commended, provided the text-book and class recitations are not neglected. The professor of military tactics is also teacher of mathematics, and is regarded as a highly accomplished gentleman. In respect to discipline, we judge a plan bordering upon the "free and easy" is in vogue, and that the students, in the observance of rules, and in personal conduct, are thrown upon their honor and self-respect in a large measure. Perhaps this is best, as the institution is presumed to have connected with it a class of young men, differing in age and character from the usual run of college boys. If in authority at the college, we should venture to suggest that "pipes," if smoked at all, had better be smoked in the rooms or in some dark corner, rather than outside the building, on the piazzas, and about the grounds.

With a corps of enthusiastic competent instructors, and with every convenience and appliance for teaching the sciences, the college, as an *educational institution*, bids fair to prove a success. How decided will be its influence upon our agricultural interests remains to be seen. Undoubtedly a class of worthy young men will be graduated, and they will make themselves useful and influential members of society, as do the graduates of other colleges. But that many of them will become practical farmers, following the plow, and engaging in the active labors of the farm, is hardly probable. It remains to be proved whether any such institution as an "Agricultural College" is *possible*. It is easy to establish and endow an institution called by that name, but that does not prove that the idea, as popularly or generally understood, is a practicable one. It is extremely difficult to define what is meant by an agricultural college. However, it is certain that the experiment which the State is making at Amherst, is a magnificent one; and if the ends desired are not met, if it proves a failure in its direct and positive influence upon our husbandry, no other attempt must be made upon a similar basis. The experiment will be conclusive in its results, whatever they may be. With a considerable number of years' experience in conducting an experimental farm and endeavoring to bring the facts of science to the aid of agriculture, we are satisfied that a plan of instruction can be devised which would prove highly serviceable to the farming interests. The plan we would suggest is much less comprehensive and grand than is embraced in our State college. It is economical of time, inexpensive, and would have a direct bearing upon the soil cultivator himself, without regard to age or condition. At a future time we may venture to present the outlines of this plan.

A HEAVY CROP OF CORN. — Notwithstanding the unpromising appearance of our corn-fields at Lakeside in June, we have just harvested a crop, which must be regarded as extraordinary, even by those who most successfully cultivate the cereal. The field and crop have been carefully measured, and the result shows that *two hundred and nine bushels of ears* have been produced to the acre. This gives at least *one hundred and five bushels* of shelled corn to the acre. We have never heard of a larger yield in this section. If any of our farmer friends have done better, we shall be happy to record their success.

The corn in the bin is a splendid sight. The magnificent ears are of a brilliant yellow, and many of them 14 and 15 inches in length. In size and fulness of kernel, they could not be more satisfactory. Two and three ears grew upon a stalk, and so thick and luxuriant were the plants, it was difficult to penetrate into the field. Owing to this luxuriance, it was not touched with the hoe or cultivator *but once* from the time of planting. The field was a green sward turned over in the autumn of 1868, occupying a position midway between hills and lowland. In the spring, upon the furrows, were spread four cords of barnyard manure to the acre, and this was harrowed in and the soil finely pulverized with a Geddes harrow. The hills were three feet apart, and into them at planting was placed a handful of "bone and ashes" mixture; this was covered with a film of earth, and upon it five kernels of corn were dropped.

We attribute the success of the crop to *fall plowing, manure which held the liquid excrement of the animals, thorough spring pulverization of the soil, applying the manure to the surface, and to the use of the bone and ash mixture in the hills.* We believe the influence of this fertilizer was very essential in the production of the crop. The cost of the corn per bushel, including in the estimate one-half the cost of the fertilizers, is forty-five cents. This does not take into account the fodder, which, in our view, has a high value. The market price of corn of this quality is now one dollar and twenty-five cents per bushel.

MILK AND MILCH COWS.

THE following extract relating to milk and milch cows is taken from the address delivered before the Franklin County Agricultural Society by the editor of this JOURNAL. In response to the many requests made for copies of the address, we would say that it will appear in full in the Transactions of the Society, to be published in December. A few copies will be furnished us, printed separate from the volume; these we shall be happy to distribute among our friends who may apply for them. We shall make such extracts from the address, as we think will be of interest to our readers, and they will appear in future issues of the JOURNAL.

Among all the products of the farm there is nothing so interesting or wonderful as milk. Notwithstanding all that has been written regarding its chemical and physical properties, it is but imperfectly understood by those most directly interested in its production. That there is a want of knowledge of its properties even among intelligent men, is shown in the fact that a party of impudent adventurers can establish themselves in our cities, and by advertising, find plenty of customers ready to purchase a so-called invention, whereby a pound of good butter is alleged to be made from a pint of milk. If this were accomplished, it would of course be a miracle, equally wonderful with that of our Saviour who turned water into wine. It is certainly as much a supernatural act to change water into butter as to change that liquid into wine. Farmers, clergymen, lawyers have been made the victims of this audacious fraud. A pint of good milk weighs about sixteen ounces. If this were placed in a retort and gently distilled, we should obtain about fourteen and a half ounces of pure water; the solid matter remaining in the retort, weighing one and a half ounces, holds all the constituents in a pint of milk from which butter can be formed. Milk upon a fair average contains eighty-eight per cent of water; and consequently the farmer who carries to market one hundred gallons of honest milk has in his wagon eighty-eight gallons of honest water, which he honestly sells to his customers, at fair rates per gallon. It seems hardly necessary to carry the attenuation further, by resorting to the pump for more water. There is a popular impression that the water naturally existing in milk, vegetables, fruits, and grasses, in some way differs from that drawn from our wells and springs, but it is essentially the same. The water obtained from the sources named is pure water; that drawn from springs, etc., usually contains a few grains in the gallon of organic and inorganic matter, derived from the soil through which it percolates. This is all the difference. From whence comes the water found in milk? Manifestly it is derived from the grasses of the pasture, the hay from the mow, and the water drank by the animal. This all passes into the economy, and serves to dilute the various active principles upon which its value as food depends. Without calling your attention to those interesting points which relate to the chemistry of milk, I will remark upon the various forms of food best calculated to promote a copious secretion of the fluid in the animal.

During the past two years I have been led to make some careful and interesting experiments upon a herd of ten cows, which are kept upon my farm. The results of these experiments go to show what a vast difference exists in the value of the feed of pastures apparently similar in soil and situation, and also the difference in the green or succulent plants which are grown as food for cows, to be used in the late summer

and early autumn months. By changing my herd of animals, in the month of June, from one hill pasture to another, only a half mile apart, where the grasses were equally abundant, I found that the falling off of milk amounted in four days to fifteen quarts per day in the aggregrate. Upon changing them to the first field, the flow gradually increased until in about four days it was back again to its original quantity. The experiment of changing the animals was repeated three or four times with corresponding results. The explanation is afforded in the difference which existed in the grasses, in the amount of sweet nutriment which the water held in solution in the circulatory vessels of the plants. The quantity of food was abundant in both fields, and also the clover and the June grasses were produced in both; but in the one the juices were thin and watery, in the other they were richly laden with saccharine and nitrogenous products. The field giving the best results had been under the plow five years ago, the sod of the other had not been broken for a period of twenty years. We do not give sufficient attention to our pastures in Massachusetts, and by withholding fertilizing agents, and allowing the sod to become compact and cold, the growths are sadly deficient in milk-forming and flesh-forming constituents. I believe that it pays well to cultivate and give attention to pastures in all the thickly settled parts of the Commonwealth. One acre maintained in good tilth, so that nutritious and healthy grasses are produced, is worth to the farmer more than three which are suffering from neglect and exhaustion. This matter of securing or providing rich, healthy green food for milch cows, is certainly one of much importance, and should be fully understood by dairy farmers everywhere. We should learn that all edible plants which are green and juicy, and which animals consume with apparent relish, are not necessarily nutritious or profitable as food. We should learn that the richest variety of grasses and stalks of the cereal grains, are dwarfed and even become diseased under imperfect cultivation. The product of a field of clover or timothy grown in deficient sunlight, or under circumstances where there is an excess of soil moisture, or where the plants are crowded, has really a very low money value, compared with that of another produced under different conditions of light, moisture, and space. It is a common practice in Eastern Massachusetts, and perhaps in this section, to grow the corn plant in drills, or in a mass from broadcast sowing, to feed to milch cows late in summer when the pasture grasses fail. This is a kind of food for animals not profitable to raise. It is not so because the maize plant is not rich and succulent, but because the conditions under which it is grown are unfavorable to its perfect and healthy development. The natural juices of the plant are richly saccharine at maturity, when grown in hills in open space, with plenty of air and light; but grown in mass, in close contiguity, this principle is almost wholly wanting. To test its comparative value with the green stalks taken from the cornfield, I fed to my herd of cows in August a weighed quantity of the "corn fodder," so-called, night and morning for one week; they were then changed to the field cornstalks, and the gain in the milk product at the end of the week was a little more than eight per cent, and there was also a manifest improvement in quality. As a rule, all vegetable productions, grown under conditions where the chlorophyl, the green coloring principle of plants, cannot be produced in all its richness of tint, are abnormal, immature, worthless. The absence of this principle in the whole of the lower portion of the corn plant grown in drills, or from broadcast sowing, indicates its watery, half developed character.

As fodder for milch cows in summer, the sweet millet, green oats, and clover are much to be preferred to corn, and one or more of them should take its place upon all dairy farms. The water supplied to milch cows has an important bearing upon the lacteal secretion, and a few considerations demand our attention. With a knowledge of the large percentage normally present in milk, it is natural to conclude that a full supply should be always accessible both in pastures and in yards, and that the quality should be unexceptionable. Muddy, stagnant pools in pastures do not furnish the liquid in proper condition; and as milch cows are generally very fastidious regarding the sweetness and purity of water, they will remain for hours parched with thirst, before drinking at such sources of supply. This protracted thirst is fatal to the formation of milk, inasmuch as the animal is rendered nervous and fretful, and water is actually needed to enter into the secretion.

It is a curious fact that cows are often too lazy to go far from feeding grounds to drink, even when the water is pure and fresh. My pasture borders for a half mile upon the beautiful Kenosa Lake, a body of water of unsurpassed purity and excellence; and notwithstanding this, my herd will frequently come to the yard at night in mid-summer, actually suffering from thirst. To reach the lake it is necessary to go a few rods through a wooded portion of the pasture, and rather than travel that distance, they are willing to suffer the inconvenience of thirst. The annoyance is so serious, that I have determined to open a spring directly in the path leading to the yard.

The location of farmers' wells upon their premises is an important point. How often do you see them located within or upon the margin of the barn-yard, near huge manure heaps, reeking with ammoniacal and other gases, the prolific source of soluble salts which find access to the water, and render it unfit as a beverage for man or beast? It is well known that in the gradual decomposition of animal and vegetable substances at or near the surface of the earth, under certain conditions, nitrogenous compounds are formed. The nitre earths found under old buildings result from these changes. It is, however, quite difficult to understand the precise nature of the chemical transformations which produce them. In the waters of a large number of wells in towns and cities, and also in the country, the nitrates are found in considerable quantities. The salts form at the surface in warm weather, and being quite soluble, are carried with the percolating rain-water into the wells. Hence it will be understood how important it is to locate wells away from all contaminating influences.

It has long been a matter of surprise to me that instances of impure water are so often found in the rural districts, among those who are not confined to the narrow limits of city lots. In an experience of many years as consulting physician, I have had a larger percentage of examinations to make of water brought from country homes, than from any other source. The result of these examinations has proved that great carelessness is manifested in allowing sink drains, cesspools, and excrementitious deposits to exist in close proximity to the water supply, and serious illnesses have been caused thereby. I beg of you, gentlemen, to look carefully after your wells and springs, and permit no possible source of contamination to exist within a broad circle around the spot where they are located.

Management of Hyacinth and Tulip Bulbs. — The flower or flower-spike is wrapped up within the bulb, and only needs to be enticed from its prison-house in such a manner that it shall not appear in dishabille. Now, to do this cleverly, the free formation of roots must be induced before the growth of the leaves or flower-stem is excited.

The following rules will be useful to parlor florists:

In choosing bulbs, look for weight as well as size, and be sure that the base of the bulb is sound. Use single kinds only; they are earlier and hardier. Set the bulb in the glass so that the lower end is almost, but not quite, in contact with the water. Use rain or pond water. Do not change the water, but keep a small lump of charcoal at the bottom of the glass. Fill the glass up from time to time. When the bulb is placed, put the glass in a cool dark cupboard or other place where light is excluded. When the roots are fully developed, and the flower-spike is pushing into life (which will be in about six weeks,) remove by degrees to full light and air. The more light given from the time the flowers show color, the shorter will be the leaves and spike, and the brighter the color.

Boston Journal of Chemistry.

BOSTON, DECEMBER 1, 1869.

SPONTANEOUS COMBUSTION OF THE HUMAN BODY.

In a former number of the Journal we spoke of the belief in the spontaneous combustion of the human body as "a vulgar superstition." A correspondent calls our attention to articles in cyclopædias, which refer to "well authenticated instances" of such combustion. Let us examine this matter in the light of what is actually known.

We must, in the first place, carefully distinguish between the notion of "a *preternatural combustibility*" of the body under certain abnormal conditions, and that of its *spontaneous combustion*. The former is not impossible; indeed, there are tolerably "well authenticated instances" of the kind. The latter, if not absolutely inconceivable, is in the highest degree improbable, and eminent physiologists who have carefully investigated all the cases in which it is alleged to have occurred, do not find a single one established beyond a doubt.

The earliest case of the kind which has a semblance of authority to sustain it, is said to have happened in 1725, and from that time down to the year 1847, when the last alleged case occurred, some fifty instances are recorded. Liebig made an analysis of all these cases in 1851, and found that they nearly all agree in the following points:

1. They took place in winter. 2. The victims were hard drinkers, and were drunk at the time. 3. They happened where the rooms were heated with fires in open fire-places or pans of glowing charcoal. Cases where rooms are heated by means of closed stoves are exceedingly rare. 4. It is admitted that no one has ever been present during the combustion. 5. No one of the physicians who collected the cases, or attempted to explain them, has ever observed the process, or ascertained what preceded the combustion. 6. No one has known how much time had elapsed from the beginning of the combustion to the moment when the consumed body was found.

Out of forty-five cases collected by Frank, of Berlin, in 1843, there are only three in which it is assumed that the combustion occurred when there was no fire in the neighborhood; and Liebig clearly shows that these three

cases are totally unworthy of belief. The conclusion to which he comes is that "spontaneous combustion in a living body is *absolutely impossible.*" Flesh which has been saturated with alcohol for a great length of time, as anatomical preparations, is not combustible; if ignited, the alcohol burns off, scarcely charring the flesh. The corpses of drunkards have never been found to be combustible.

M. Duvergie has opposed Liebig's views, and has expressed the opinion that molecular changes may take place in the living body by which it becomes more combustible from the absorption of alcohol, or from its conversion into more inflammable compounds; but he admits that the combustion is probably never spontaneous. Dr. Marc has suggested that inflammable gases, and possibly even phosphoretted hydrogen, which, under certain circumstances, inflames on contact with the air, may be generated in the living body, and may thus give rise to its spontaneous combustion; but this is merely a theory to account for such cases of combustion, *if* they *have* occurred.

On the whole, this idea of spontaneous combustion appears to be one of those old medical delusions which, having once gained a sort of credence, are not readily given up. It is easy to see, as Liebig observes, that it arose at a time when men entertained entirely false views on the subject of combustion, its essence, and its cause. It is only since the time of Davy, or for about half a century, that combustion has come to be thoroughly understood. After people had once got it into their heads that the body might take fire of itself, it is not singular that when a man happened to be burned up, the case was explained in that way if it could not readily be accounted for in any other way; just as hundreds of fires caused by carelessness, not easily detected, are charged to the mysterious "incendiary." Then again, other things being equal, the more marvellous explanation of strange phenomena is usually the more popular one. The Latin proverb *omni ignotum pro magnifico est* might be read *omni ignotum pro mirifico est*, with everybody whatever is unknown passes for a marvel. We need not be surprised, therefore, that this idea of human combustibility, which was not inconsistent with the scientific knowledge of the age in which it had its origin and which consequently came to be accepted by the scientific men of the time, should still live as a popular superstition and even find an occasional defender among the *savants* of this more enlightened day.

MARY SOMERVILLE.

A notice of this eminent woman in the *Scientific American* states that she was born in Scotland about the year 1796, and that her first husband was Samuel Gray, Esq. According to *Chambers' Cyclopædia*, which is excellent authority, she was born "about the year 1780," and married Capt. Samuel *Greig* in 1804. Capt. Greig died in 1806, and in 1812 his widow married Dr. William Somerville, of Edinboro', who died in 1860, at the advanced age of 91. The *Edinburgh Review* for July, speaks of Mrs. Somerville as being *in her eightieth year* when her work on "Molecular and Microscopic Science," was published, in 1868. It will be seen that this is inconsistent with both the dates of her birth just mentioned.

The following extract from the article in the *Edinburgh* will interest our readers:

"The world is not unfrequently called upon to admire the keen interest and powerful grasp which veterans foremost in the ranks of science retain in their various pursuits up to the latest moments of an advanced age. It is, however, we believe, a case without a parallel in the annals of science, that a lady in her eightieth year should publish a work containing a complete review of some of the most recent and abstruse researches of modern science, describing not only the discoveries in physics and chemistry, but especially the revelations of the microscope in the vegetable and animal worlds. Before many distinguished cultivators of the sciences she loves so well were born, Mrs. Somerville had taken a place among original investigators of nature, as in 1826 she presented to the Royal Society a paper on the magnetizing power of the more refrangible solar rays. This communication is printed in the 'Philosophical Transactions,' and led to much discussion on a difficult point of experimental inquiry, which was only set at rest some years later by the researches of Riess and Moser, two distinguished German electricians, in which the action upon the magnetic needle was shown not to have been caused by the violet rays. In 1832 she published her 'Mechanism of the Heavens,' and in 1834 she became still more widely known by the appearance of her 'Connection of the Physical Sciences,' and the 'Physical Geography.' These works have passed through many editions, and have been translated into several foreign languages; whilst in this country her services to geographical science have been recognized by the award of the Victoria medal for 1869 of the Royal Geographical Society. In her work on 'Molecular and Microscopic Science,' the gift of lucid description, so characteristic of the distinguished authoress of the 'Connection of the Physical Sciences,' is as conspicuous as ever; but that which most forcibly strikes the reader of these pages is the extraordinary power of mental assimilation of scientific facts and theories which Mrs. Somerville displays."

FOREIGN NOTES.

At the annual meeting of the French Institute this year, M. Charles Blanc read an "Essay on the Æsthetics of Lines," in which he protested against English landscape gardening, which has so properly dethroned the French gardening all over the world. He said: "When one wishes to make the plan of an English garden, one has but to make his gardener drunk and to follow his reelings."

The French government sends annually a man-of-war with the graduating pupils of the Naval School on a long voyage, to perfect them in the practical part of their studies. It has been decided to send hereafter on board this ship several scientific men, amply equipped with the necessary books and instruments. The Academy of Sciences will give them instructions upon the researches to be made. A committee, including Faye, Becquerel, Boussingault, and Milne-Edwards, has been appointed to prepare these instructions. The leading subjects of investigation will be the marine fauna at great depths; the conditions in which endemic diseases are developed; the temperature of the sea at its surface and at different depths, in mid-ocean, near land, at the centre and edges of currents; the nature of the zodiacal light, etc.

Prof. Boehm, one of the most eminent medical men of Berlin, died a few days since under fearful circumstances. While dissecting before a class of students, he pricked a finger. He thought it a mere abrasion of the skin, and failed to cauterize it. Two days afterwards his hand began to swell, and became enormous. The poison pervaded his whole system and killed him. He retained his consciousness nearly to the last, and saw his end approach with undisturbed firmness.

It is said that the Swedish government requires that every passenger train on railways shall be furnished with a competent medical officer, with all the medical and surgical appliances necessary. It would be well if some of our railways were similarly equipped.

Twenty-five years ago, Claude Bernard, the eminent physiologist, who has lately been made a Senator and Academician, was an apothecary's assistant in a country town in France.

A New Asteroid.—On the 9th of October a new minor planet was discovered by Dr. C. H. F. Peters, at the observatory of Hamilton College, N. Y. It is the 109th member of the group, and has just passed its opposition. It shines as a star of the tenth magnitude. This is the ninth planetoid discovered by Dr. Peters. Nine have been detected by another American astronomer—Prof. Watson, of Ann Arbor, Michigan. Among European observers, Hind has discovered ten, and Luther no less than seventeen. It is but fair to state, however, that Luther has been engaged in the search for the last twenty years, while Peters began his discoveries in 1861, and Watson in 1863. Last year, Watson was lucky enough to pick up *three planets within ten days*, namely, on September 7th, 13th and 16th. In 1867 he found one on the 24th of August, and another on the 6th of September. In one instance, Goldschmidt, a European observer, caught a couple of them on the same day, September 19, 1857.

Morphine.—*The Boston Medical and Surgical Journal* of November 11, copies from a New York Druggist's Price Current, a most slanderous article in which "parties in Boston" are charged with the *crime* of smuggling *morphine* into this city and selling it to the trade.

We do not believe there is, or ever has been a single ounce of "Scotch smuggled morphine" in this city, and we have no hesitation in pronouncing the statements false and malicious.

To "smuggle morphine" or any other dutiable commodity into the United States, is a *high crime*, and every good citizen is, or should be, interested in bringing parties thus offending to punishment. The very respectable *Boston Medical and Surgical Journal*, by copying the statements of an *irresponsible* New York Price Current, has indorsed them, and has thus become a party to the assault on "some parties in Boston." Therefore, there is a *responsible* party introduced into the arena. We fear that the editor and publisher of the *Boston Medical and Surgical Journal* may suffer from publishing statements of a libellous character

The yellow slip upon the margin of each Journal gives the date to which payments have been made. Those who are not credited as having paid to July, 1870, will please inclose to us the amount due without delay.

Buds and Blossoms out of Season.—A correspondent calls attention to the fact, that many of the fruit and ornamental trees along the New England coast are in blossom this autumn, and suggests that this may be due to the great gale of September 8th. It is well-known that, during the last of August and the first of September, trees and shrubs are making their second growth, and there is a large flow of sap to support this growth, and that the elaboration of this sap takes place in the leaves. The gale removed the leaves, and this vigorous flow of sap, turned from its natural course,

forced the dormant buds to burst and put forth leaves and flowers. The fruit buds of deciduous trees, as well as the leaf buds, are *formed* in August and *matured* in September; and although their covering is sufficient to withstand the winter's cold and storms, the powerful wrenching they received before they were ripe may have broken the envelope, so that these buds also were forced into premature development by the active circulation. If this explanation is correct, it is not unreasonable to suppose, as our correspondent does, that the fruit crop of 1870 will be lessened.

MAKING A NEW SEA. — The *Italie*, of Florence, says that M. de Lesseps, after having connected two seas, is now proposing to create a new one. It has been suggested that the Sahara is the bed of an old sea displaced by some natural convulsion. This has led M. de Lesseps to send engineers to examine the region, and their report has satisfied him that the Sahara at the point nearest to the Red Sea is twenty-seven metres below the level of that sea, and that the depression increases towards the interior. He believes, therefore, that a canal seventy-five miles long would suffice to flood the Sahara from the Red Sea, and thus restore the desert to its primeval destination.

It would be rash to assert that this project is impracticable; but it is not likely to be entered upon without a careful consideration of the influence it might have upon the climate of neighboring regions, and especially upon that of the Mediterranean and Southern Europe. We will not venture to say precisely how the substitution of a great sea for a great desert would affect the meteorology of large portions of both Africa and Europe, but we doubt whether the parties interested will decide to risk the tremendous experiment.

WHAT BECOMES OF OLD SHOES? — *Cosmos* answers this question by stating that they are cut up in small pieces, and these are put for a couple of days in chloride of sulphur, which makes the leather very hard and brittle. After this is effected, the material is washed with water, dried, ground to powder, and mixed with some substance which makes the particles adhere together, as shellac, good glue, or thick solution of gum. It is then pressed into moulds, and shaped into combs, buttons, knife-handles, and many other articles.

OXYGEN FOR ILLUMINATION. — We have explained to the readers of the JOURNAL the new and cheap method invented in France for preparing oxygen on a large scale by the *de*oxidizing and *re*oxidizing of the manganate of soda. The New York Oxygen Gas Company has been incorporated for the manufacture of oxygen by this process, with a view to its use for purposes of illumination. Their works cover eight lots of ground, and consist of extensive buildings of brick and corrugated iron, powerful blowing and compressing engines, an ample gas-holder, and a large French furnace, with twelve retorts, each large enough to contain eight hundred pounds of the manganate. These retorts are now producing oxygen at the rate of 25,000 cubic feet per day.

In Paris, oxygen has already been used as an aid to lighting, in the Court of the Tuileries, the Hotel de Ville, and in the Gaiété and Alcazar Theatres. The whiteness and brilliancy of the light are far superior to that of ordinary gas-burners, and it is no slight additional merit of the system that it does not rob the air of its oxygen.

MERCATOR THE MAP-MAKER. — In most atlases is a map of "The World after Mercator's projection." Very few know who Gerard Mercator was. This geographer was born at Ruremonde, in Holland, in 1512, and died at Doesburg in 1594. He obtained the favor of the Emperor Charles V. by presenting him with some well-executed terrestrial globes. In 1559, he settled at Doesburg, as cosmographist to the Grand Duke of Cleves. He was the best map-maker of his time, and is said to have invented the plan of laying down maps and charts by a projection of the earth *in plano*. It is incorrectly believed by many persons that Mercator did not acknowledge that the earth was globular. After having been neglected for a long time, honor to Mercator has just been rendered by laying, with great solemnity, the first stone of a monument to him at Doesburg.

QUESTIONS AND ANSWERS. — A year or two ago when the circulation of the JOURNAL was comparatively small, we gave each month a series of answers to questions propounded. As the circulation increased, the questions poured in upon us so freely, it was found impossible to reply to a fiftieth part of those asked, and therefore, not to be partial, we discontinued answering any of those received. This feature of the paper was popular, and many requests have been made to have it resumed. It is probable that it will be in the next volume, if not before. We can, however, pay no attention to questions asked to promote private interests, or if the answers will not prove useful and instructive to our readers.

ERRATA. — On page 52, for "*Preservation* of Copal Varnish," read "Preparation." On the same page, in the article on "Great Laboratories," the P from "Prussian" got shifted to the other end of the line, where it appears in Dr. A. W. Hofmann's name. The printer then changed "russian" to "Russian," improving the orthography at the expense of the geography. All this happened after the proofs had passed out of our hands.

LITERARY NOTES.

MESSRS. Macmillan & Co., of London, have established a branch house in New York, at 63 Bleecker street, where they furnish their large list of scientific and other works at prices considerably below those which an importer of English books would have to charge. Among their latest issues is a revised and enlarged edition of Roscoe's "Chemistry." In its present form it is much to be preferred to the American reprint of the earlier edition, while its cost is no higher. The most important additions are in the chapter on spectrum analysis, a subject on which Prof. Roscoe has published an elaborate work, already noticed in our columns.

Another book of great interest to the chemist is Wurtz's "History of Chemical Theory," translated by Watts. It gives a concise sketch of the development of chemical philosophy from the day of Lavoisier down to our own. We shall refer to it again, and may have occasion to draw some material from its pages.

Macmillan & Co. have published several elementary books of natural science which belong to the same series with Roscoe's "Chemistry"; as Huxley's "Elementary Physiology," which has also been revised and enlarged in the third edition, Lockyer's "Elementary Astronomy," and Oliver's "Elementary Botany."

We are ashamed to say that, with very rare exceptions, (some of which have been made the subject of notices in the JOURNAL) our American text-books on science, for school use, are greatly inferior to these English manuals. In England, the natural sciences are either not taught at all — and this is too frequently the case, even in schools of the same grade as our high-schools — or they are taught better than is done in this country.

Of the books just mentioned, the most elementary one is the "Botany," which is partly based upon material, left in manuscript by the late Professor Henslow, whose method of teaching botany in village schools attracted great attention in England several years ago. It is essentially an "object lesson" method, with some novel features, which cannot well be described in a brief notice like this.

What we have said of foreign text-books as compared with our own is equally true of popular books on science. We have very few really good things of the kind published here, which are not reprints or translations. Two or three of our publishers are now reproducing volumes from the "Library of Wonders," which has been so popular in France and England. Messrs. Scribner & Co. have issued five of these books: "The Wonders of Optics," "The Wonders of Heat," "Thunder and Lightning," "Intelligence of Animals," and "Great Hunts." The first two of the series are model books of their class, giving all the recent discoveries in Light and Heat in a clear and attractive style. They are hardly books for children, unless it be as collateral reading for children studying these subjects at school. The other three may be ranked as "juveniles," though many children of larger growth will read them with interest. We should be glad to see such books taking the place of the sensational stories — juvenile *novels*, for they are nothing else — with which the press is flooding the country.

The Appletons have also begun a "Library of Wonders." The first volumes are "Meteors and Atmospheric Phenomena," a well-written and well-illustrated manual of meteorology for popular reading; and "Arms and Armour," which describes, with the aid of many excellent cuts, all the arms and weapons of all the ages from the antediluvian down to the present. Both these books are from the French, the latter with additions made by the English editor.

A copy of the *seventh edition* of the "Elements of Chemistry," by W. J. Rolfe and J. A. Gillet, of Cambridge, Mass., has been sent us by the publishers, Woolworth, Ainsworth & Co., of Boston. The speedy call for a seventh edition of this most valuable and accurate elementary treatise upon chemistry, affords gratifying evidence of the just appreciation of the work by school committees, teachers, and others. In this edition the authors have gone over the entire book, and have made important additions, together with such changes as progress in the science demanded. It is a work worthy the confidence of all interested in the education of the youth of our country.

We find on our table "Medical Education: an Oration delivered before the New Hampshire Medical Society, at the annual Meeting at Concord, June 15, 1869, by W. D. Buck, A. M., M. D." It is lively and readable, giving a good deal of "sound doctrine" in a pleasant, free-and-easy way.

"The Reconstructed Farmer" is a monthly magazine, devoted to the farm, the garden, and the household, which comes to us from Tarboro, North Carolina. We hope it is properly appreciated by the farmers of that region, for it well deserves their patronage.

☞ We cannot undertake to preserve or return communications not published in the JOURNAL.

Medicine and Pharmacy.

M. VELPEAU.

We find in the August number of the *Nineteenth Century*, an able literary magazine, published at Charleston, S. C., a most interesting sketch of the great French surgeon, *M. Velpeau.* A very large number of our medical readers, who have often followed the distinguished savant through the wards of *La Charité*, and listened to his brilliant lectures, will attest the faithfulness of the portrait drawn by the writer. Probably no man ever lived who *caused* or *relieved* more human misery than Velpeau. His operations were always performed with great celerity, and apparently with entire forgetfulness of the fact that his knife or probe was incising or perforating living tissues. He was a kind man, and yet seemingly insensible to suffering. No one who has ever seen Velpeau will forget the spare, modest, *busy* man, whose fame as a surgeon can never die. When ether was brought to his notice as an anæsthetic twenty years ago, he condemned its use, and would have nothing to do with it, until others had proved its usefulness and safety. His comparatively recent death has left a void in the ranks of surgeons not easily filled. The writer of the sketch which we present below, after describing the scenes in the hospital, continues as follows:

Far from where you enter, stand a throng of men, some crowding around a particular bed, some with hats on, others uncovered. From out their number moves an individual whom you did not, at first, observe, but whom every one seems to follow, as he passes rapidly from one bed to another, squeezing his way in among those encircling him. He is a person with a sharp, greyish eye, of middle height, more tall than short, inclined to be thin, and moves unobservingly by, unless when he stops, occasionally, as the inclination seizes him, to ask some question of a favorite chef-de-clinique, or of a sister. He will sometimes not speak or smile for a half hour, unless on the subject of medicine, or the case before him; at other times he smiles and even makes a little dry fun with the sick man, though he never laughs; often, if induced to relax at something particularly ludicrous, he soon recovers himself, becomes grave, or rather I should say earnest, and his eye looks as piercing as before. Neither his voice nor manner is soft or winning, although they show, when he speaks to a boy, or when the gravity of the case is imminent, that his heart is full of feeling, and that even habit, time, and the knife have not made him entirely callous to the sufferings of the unfortunate. I have heard him quiz a little *Interne* with white hair, upon the color of his moustache; but it was not done in a genial way; it was as a surgeon would quiz, and you only laughed because the great man laughed. He also wears a white apron with pockets, from which dangles a pin-cushion, and on his head is a purple velvet skull-cap, with tassel. Thin grey hair escapes from beneath, and you are quite surprised when, upon inquiry, you are told that is the great surgical Amphitryon of La Charité and of France, M. Velpeau.

Here is a true veteran for you; here is a surgeon with the three requisites — a lady's hand, an eagle's eye and a lion's heart; here is the man who enjoys the "*digitis monstror prætereuntium*"; you see, at last, one that you have been hearing of all your life, and before you ever thought of medicine; you have, perhaps, heard your cousin or your friend, who was in Paris years before you, speak of seeing Velpeau cut off an arm, or a hand, on such and such a morning, and you yourself also watch him do the same thing, on the same spot, fifty times; in fact, you may see him perform two or three operations almost every morning if you will take the trouble to be at his amphitheatre at La Charité. He will cut for stone, operate two or three times for cross-eye, take out tumors from the breasts of two or three women, amputate a finger, a thumb, or a leg, almost any morning you choose to name, after he has visited these long lines of beds up stairs and down stairs, in male and female wards, and after he has lectured an hour, and all before breakfast. Heaven knows at what hour he has risen, or what he has not written in one of the works he is publishing, the "*Nouveaux Eléments de Médécine Opératoire*," or some other. But I do know that he has not yet finished, because, before his carriage and pair leave the Rue Jacob, in front of La Charité, and when you have gone to the Café de Paris, to Madam Dijon's, to 66 Rue de Seine, or with me to my rooms on the garden of the Luxembourg, *he* has remained to prescribe for a score of what are called out-door patients, whom he examines as fast as they can be marshalled in the room on the ground floor. Then M. Velpeau's private consultations at his own residence, and his visits, have not yet commenced. But notwithstanding, you will sometimes meet him on the *Pont Neuf*, or the *Pont du Carrousel*, with a young lady on his arm, as like as father and daughter can be, while they walk to the Louvre or the garden of the Tuileries. And you ask again, is this man, strolling quietly by, the hero of a hundred bloody operations, the creator of bold systems, and originator of new modes of practice — the bold generalizer, who has laid a master hand on almost every department of medicine; who has written a hundred volumes; whom everybody quotes, even men who study specialties, and who recognize that, during a life of ceaseless toil and exertion, *he* has made a specialty of every department of his profession, and has rendered himself as competent to pronounce upon their respective merits as any enthusiast of a single one — whether it be in surgery, materia medica, obstetrics, physiology, diseases of the eye, or anything you please to name? M. Velpeau is a bold, successful innovator in each and every one, and he has stamped his name in every text-book that the student uses. He has written, and now writes, tomes filled with costly illustrations, which the medical world reads and consults, and swears at sometimes, but always quotes or follows. There are none so dauntless as not to do him reverence; none so bold but do not ask what Velpeau said this morning at a clinique. Does he discover anything, he seeks to have Velpeau test it. With Velpeau's sanction, he is confident against the world in arms, and goes forth with redoubled zeal. Does Velpeau damn the new project, it is like a dash of cold water, and the thermometer of his ardor falls instantly. I think that, generally, M. Velpeau, after his very large and most enlightened experience and observation, has a right to pronounce, and that he does so cautiously and with discrimination. He has, at times, been quick, and, perhaps, wrong, and I think now the microscopists will make him rue the day that he decided too dogmatically against their true and false cancers; for, already MM. Lebert and Robin will show him that the glass is surer and more unerring than the unaided experience of even *his* eye and finger, and he will confess, or what is worse, posterity will do it for him, that true cancer and the unmalignant fibro-plastic growths reveal themselves by signs, more certain than those gained by observation and sight simply. Perhaps, too, M. Ricord, or his successors, will demonstrate, that in proclaiming his doctrine of syphilization, a true advance has been made which time will sanction and enforce, and that its cardinal points are *real*, which M. Velpeau utterly repudiates and rejects *ab ovo*, root and branch. Velpeau must recollect that Ricord, though young and vigorous, resembles him in one respect — *he* does not take vacation either.* An old man, however great, is apt to remember triumphs won in youth from giants, and he grows too confident thereby. He is apt to forget that the tables turn, as age advances and years roll by, and when the conflict lies between the old and the youthful, but, at the same time, the vigorous, the cautious, and the observant.

[TO BE CONTINUED.]

* M. Ricord informed me that, with the exception of the last, he had not indulged in the ordinary *vacance* of the Paris doctor for twenty years. He was at the *Hopital du Midi* the year round.

FOR RINGWORM.

℞. Washed Sulphur, 22 grains.
Carbonate of Potash, 8 grains.
Lard, 1 ounce.

Mix. Continue the application some time after the apparent cure, in order to prevent a return. — *L'Union Medicale.*

MEDICAL MEMORANDA.

The Insurance Times urges that companies should guarantee medical attendance to all whose lives they insure. It would accomplish this by having one or more physicians, with fixed salary, attached to each company and charged with the duty of attending the sick among the policy-holders. The plan might be feasible in communities where the number of the insured is large, but it strikes us that it would be inconvenient and costly to extend it to the more scattered patrons of the company. There are other practical difficulties which will readily suggest themselves to one who gives the subject a little consideration, but we will not say that they are insurmountable. The plan is at least worthy of attention and discussion.

A solution of common salt has been recommended as an antidote in cases of strychnia poisoning. It is said that it has been tried repeatedly with dogs, and that it has invariably proved successful.

Sulphuretted hydrogen is found to be a direct antidote to the poisonous effects produced by inhaling chlorine.

It is said that delirium tremens is unknown among negroes. Dr. Autry, in a communication to the Medical and Surgical Reporter, adds the fact that he has never seen a case of the disease in the Indian race, in twelve years' practice of medicine in Mexico, where three-fourths of the inhabitants are Indians, and addicted to excessive use of the very worst kinds of liquor.

In a later number of the Reporter, Dr. Chittenden, of Binghamton, N. Y., states that he has had one negro under treatment for delirium tremens, and that the diagnosis was unmistakable.

A Noble List of Names. — Our printer, after three months' labor, has just completed the task of putting the names of all our subscribers in type, the printed names to be used in the mailing department of the Journal. Some idea of the magnitude of the work may be obtained from the statement, that it has taken *over one ton of type*, or as much as one horse could draw in a cart through the streets of the city.

The names printed as close together as possible, upon a ribbon of paper, would require a length nearly twice the height of Bunker Hill Monument.

Upon looking over this list of names, we find those of men and women distinguished in every department of art, science, and literature — Professors in Colleges, Schools, etc., Teachers, Physicians, Druggists, Chemists, Artisans, Farmers, etc. These are scattered all over the country, in every State and Territory of the Union. Of physicians we have nearly *ten thousand* subscribers. We have reason to be proud of the patrons of our little Journal. There is among these a very large number of enthusiastic friends, who send us often the kindest words of encouragement. Success to them in all their undertakings.

Test for Adulterations of Chloroform. — Chloroform is not unfrequently adulterated with alcohol and ether. To test it for these substances, treat it first with fused chloride of calcium to eliminate any water which it may contain, and then add iodine. If no alcohol or ether is present, the color produced is *bright red;* if either alcohol or ether is present, it will be *brown.* To distinguish alcohol and ether, add a small piece of crystal of fuchsine. The slightest trace of alcohol gives a deep red. Pure chloroform yields with fuchsine a solution of slightly pinkish tinge.

TREATMENT OF DANDRUFF. — HARDY. — Nitric acid 12 minims; Distilled water 3 ounces. Mix and apply once a day. — *L'Union Medicale.*

RAT POISON. — Recent experiments have shown that squills is an excellent poison for rats. The powder should be mixed with some fatty substance, and spread upon slices of bread. The pulp of onions is also good. Rats are very fond of either. — *Journal de Chimie.*

HAIR-OIL FOR HORSES. — The following recipe for making hair-oil for horses is "going the rounds." Of its efficacy we entertain the highest opinion, and, as it is perfectly safe, take pleasure in recommending it.

R. (take.) Brushus et curricombus — ad libitum; elbow grasus — quantum sufficius; blanketisus — first ratus; stablus (in winter) — warmus; fodderus — never say dietus, but mealus et oatus; exercisus — non compromisus. The effect will be: coatus shinus; appetitus wolfitus; muscularitus, two-forty-itus. — *Horse's Friend.*

Messrs. Besson and Kneider, professors in the Lyceums at Strasburg and Mulhausen, have invented an "electric warmer" to aid in regulating the temperature of hot-houses and other buildings in which it is desirable to maintain a nearly uniform heat. Whenever the temperature rises to a certain maximum or falls to a certain minimum, a set of electric bells ring and attract the attention of the guardians or workmen.

Sir Robert Peel once presented a farmers' club in England with two iron plows of the best build. On his next visit, he found the old plows with wooden mould-boards again at work. "Sir," said a member of the club, "we tried the iron, and we be all of one mind that they do make the weeds grow."

A Chicago physician, much devoted to real estate speculations, and rather absent-minded, replied to the question of a lady how his prescription was to be taken: "One-quarter down; balance in one, two and three years."

JET BLACK VARNISH FOR SHOES. — Dissolve 10 parts by weight of shellac and 5 of turpentine in 40 of strong alcohol, in which fluid should be previously dissolved 1 part of extract of logwood, with some neutral chromate of potassa and sulphate of indigo. The varnish is to be kept in well-stoppered bottles.

VARNISH IN BURNS. — Paris is much interested in a remedy discovered by a workman, who, to relieve the pain from a severe burn, thrust his hand into a pot of varnish which happened to be at his side. The relief was so sudden, and the healing of the wound so rapid, that the news spread, with the result of bringing to him every one in the neighborhood who had a burn. Many wonderful cures are said to have been performed at the time of the great explosion in Metz, last September, and the discoverer has been summoned to Paris, to make some public experiments. — *Journal de Chimie.*

TO ARREST THE DECAY OF TEETH. — Mix nitric ether and the phosphate of aluminum in proportions such as to make a paste. Fill the cavity of the decayed tooth with this, which is perfectly harmless, and the toothache, however violent, is generally relieved at once. By repeating it each time that the pain returns, the tooth is rendered insensible. — *Journal de Chimie.*

A MODEL DOCUMENT. — The following is a literal transcript of a document written by a practising physician in this city and offered as evidence in a case in the Police Court recently. If the writer's knowledge of medicine is as extended as his orthographical acquirements, the profession would do well to hunt him out.

"I was called on to go and see Samel snapinsca on the 11 september i found him in bead and was brused vary bad his ribs on the left side varey badly brused and the left lung apeers to be ingered from the bruses and there was severil bruses on his body besides." — *Detroit Free Press.*

CINCHO QUININE.

Hundreds of letters have been received from physicians in every State and territory of the United States, in which most favorable statements are made regarding the cincho quinine. Extracts from a few are here presented.

From William Cooper, M. D., New Albany, Indiana.

I am happy to state that the results of the use of cincho quinine have been eminently satisfactory; not a single instance of its failure to produce the expected effects has come to my knowledge.

Many of my patients, after using it, have specially requested that the cincho quinine be given them instead of the sulphate. No complaint has been made of nervous disturbance. I have used it in all cases where the sulphate of quinine was indicated, and with equally good results. I think when physicians have given it a fair and impartial trial, they will use it in preference to all other preparations of the barks, in our autumnal fevers.

From James Lamb, M. D., Aurora, Indiana.

I have been using the cincho quinine considerably of late, and I prefer it to the sulphate of quinine, in most cases. I think it affects the head less; but it requires a somewhat larger dose. I think it a better tonic than the sulphate, but do not regard its anti-periodical powers as equal to it. It is a very valuable addition to our list of tonics; and as it is cheaper and more readily taken than quinine, I shall continue to use it, and recommend it to my medical brethren.

From H. H. Beebe, M. D., Marshall, Wisconsin.

I have not fully tested the anti-periodic powers of the cincho quinine, but have prescribed it as a tonic with uniformly good effects. The stomach seems to tolerate it well, and it is pleasant to take; and as far as I have observed, it produces no cerebral distress.

From Ira R. Wells, M. D., Genesee, Illinois.

I have used nine ounces of cincho quinine; and in cases of intermittent fever, I find it fully as efficacious as sulphate of quinine. A favorite prescription of mine is as follows:

Cincho Quinine, xii. gra.
Leptandrin, xxv. "

Mix and divide into vi. doses, one of these to be taken every three hours. This in all cases has promptly arrested intermittents, and my patients do not complain of the unpleasant head effects which follow from the use of the sulphate of quinine. The cincho quinine will frequently be borne by the stomach when the sulphate will not, and I regard it as a better tonic. In some cases of congestive fever, I prefer the action of the sulphate to the cincho quinine.

From E. W. Knepper, M. D., Ligouier, Indiana.

I am happy to say that the cincho quinine is all that you claim for it, and indeed it is more. I have used it largely in my practice this season, in intermittents, and it has not failed to accomplish all that I expected of it in a single instance. I have used the cincho with success in several cases where I could not the sulphate, on account of the stomach rejecting it. I find it produces much less constitutional disturbance; and in the same doses, the therapeutical effects are fully equal to the sulphate.

From J. J. H. Love, M. D., Montclair, New Jersey.

I have used this summer three ounces of the cincho quinine, and while I will say that it does not fulfil all my expectations, I must regard it as a valuable addition to our list of remedial agents. It will break up intermittent fever just as quickly as sulphate of quinine, and produces no headache or ringing in the ears. It is a splendid tonic in building up debilitated constitutions.

From McKisson & Robbins, Importers and Wholesale Druggists, New York, Oct. 2, 1869.

Messrs. J. R. NICHOLS & Co.:

Gents, — We have just received an order from one of our customers in Texas, for fifty ounces of your cincho quinine. We are requested by the parties ordering it to state to you, that the cincho quinine has proved its superiority over the sulphate in all febrile diseases, and that the physicians of their neighborhood are now prescribing it to the exclusion of the sulphate. We beg leave to add that this comes from parties whom we know to be first-class physicians and druggists.

From G. B. Bishop, M. D., Sheridan, New York.

I have used the cincho quinine and regard it as a valuable tonic, preferable to the sulphate of quinine. I think it to be a good agent in malarial diseases. Patients do not complain of the taste as they do of quinine, which is an important point.

From J. M. Aldrich, M. D., Fall River, Mass.

I have used one and a half ounces of the cincho quinine, and I think very favorably of its effects. In a case of intermittent fever (the patient from Tennessee), I found it to operate as well and as promptly as sulphate of quinine, without any unpleasant head symptoms. In no case have I discovered any unpleasant cerebral disturbance, as is often found in the use of the quinine.

From J. H. Frey, M. D., Perry, Iowa.

I have used several ounces of cincho quinine with the most complete success. I prefer it to the sulphate of quinine in intermittents, especially with children. I can strongly recommend it to the profession generally.

From Samuel W. Coons, M. D., Madison, Alabama.

The cincho quinine which I have used gave entire satisfaction. It has all the advantages you claim for it, and doubtless it will in time supersede the use of sulphate of quinine entirely.

From J. C. Ross, M. D., Lincoln, Illinois.

I have been using the cincho quinine in my practice in intermittents and remittents, and I think well of it. I believe it to be quite equal to the sulphate, with all the advantages which you claim for it.

From D. Shelby, M. D., Huntsville, Alabama.

I am delighted with the specimen of cincho quinine you sent me. I have used it successfully in cases of remittent fever, and shall soon order a good supply.

From J. C. Downing, M. D., Wapping Falls, New York.

I have used cincho quinine in eight or ten cases, and have reason to think well of the results. I give it as I do the sulphate, ten grains in five doses during the intermission, and five grains one or two hours before a paroxysm is due, and continue to give five grains once a week for three weeks. I shall continue to use it, and wish you to send me one ounce by mail.

From S. A. Butterfield, M. D., Indianapolis, Ind.

I have tried cincho quinine pretty thoroughly, and, for children especially, I think it of the greatest value as an anti-periodic and tonic. It has a comparatively pleasant taste when mixed with sugar, which is a point of much importance. I am not prepared to speak positively regarding its anti-periodic power when compared with sulph. quinine, but will do so at a future time.

From J. H. Beech, M. D., Coldwater, Mich.

I have used an ounce of cincho quinine in some obstinate cases of intermittent neuralgias and ague, and am happy to state that it has thus far sustained in full the anticipations raised by what you have claimed for it. Dr. S. S. Cutter, of this city, has an extensive general practice, and he informed me a few days ago that the cincho quinine was giving satisfaction.

From I. E. Swan, M. D., Mount Vernon, Ohio.

I find the cincho quinine a success. Children much prefer it to the sulphate. Inclosed is an order for a supply to be sent by mail.

☞ Druggists and physicians should remember that the salts of morphia are sold by *avoirdupois* weight in this country and England. The vials in which sulphate of morphia is usually sold, hold one eighth *of an ounce*, or a fraction less than fifty-five grains, *not a drachm*, or *sixty grains.* All drugs and chemicals, in commerce, are bought and sold by avoirdupois weight. Many druggists make a mistake in this regard, and hence we call attention to the matter.

BOSTON JOURNAL

OF

CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. IV.—No. 7. BOSTON, JANUARY 1, 1870. [FIFTY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, FIFTY CENTS PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.

RECEIPTS.—A receipted bill will be sent by return mail to any subscriber who will enclose with his subscription a three-cent postage stamp, for return postage.

A list of premiums is offered to those who obtain subscribers.

Contents.

☞ Subscribers will remember that the volumes of the *Journal* commence and end upon the 1st of *July*, not January.

☞ Mr. GEORGE W. HEWES is Travelling Agent for the *Journal*.

Familiar Science.

THE DISTANCE OF THE DOG-STAR.

IN the November JOURNAL, under the head of "The Worlds in Space," we spoke of the distance of the Dog-star as so immense that its light takes twenty-three years to reach our earth. A correspondent finds a statement in a school manual of astronomy, that the time is "three years and eighty-two days," instead of twenty-three years, and he wishes to know "how the two authorities can be reconciled, or if there are typographical errors in either case."

The book which our correspondent quotes is often inaccurate in its statements, and entirely behind the times.

It is a fact, however, that even the best of recent authorities are sometimes found to disagree concerning the distances of the fixed stars. We have nowhere seen the distance of Sirius put so low as our correspondent states it, but Loomis ("Treatise on Astronomy," 1865) gives it as 896,803 times the sun's distance, equivalent to a "light interval" of 14.16 years; while Chambers ("Descriptive Astronomy," 1867) and Lockyer ("Elementary Astronomy," 1868) and several other recent writers give it as 1,375,000 times the sun's distance, equivalent to a "light interval" of 21.56 years. Now, the discrepancy between these two measurements is enormous, being more than 478,000 times the distance of the sun from the earth, or, in round numbers, more than forty-three *millions of millions* of miles — an interval that light, which can fly eight times round the earth in a *second*, must take more than *seven years* to traverse. Our first thought is, that if astronomers cannot make their measurements agree better than *that*, they must be either very careless or very stupid fellows. But let us look into the problem a little, before we pass judgment upon their solution of it.

How is the distance of a star measured? We shall not give a detailed account of the process, but simply attempt to show its general nature, and thus to convey some idea of the difficulties attending it. The distance of the star is found by *trigonometry:* in other words, astronomers use the same methods employed by land surveyors, and these methods are based on the measurement of angles. In any triangle, if we have two angles and one side given, we can, by means of trigonometry, find the other sides of the triangle. If, then, we wish to find the distance of a tower or a mountain-top which we cannot reach, we can do it by measuring accurately a line as a "base line," and then measuring the angles which lines drawn from its ends in the direction of the object make with the base line, or with each other. Knowing then one side of the triangle made by these three lines, as well as the angles of the triangle, we can calculate the length of the other sides, or the distance of the object from the ends of the base line. Beginning in this way, astronomers measured from point to point on the earth, until the shape and size of the earth had been determined; then, taking the diameter of the earth as a base line, the distance of the planet Mars was determined, and then that of the sun. Having obtained the distance of the sun (91,500,000 miles), we are in possession of a base line of enormous length, since the positions of the earth in opposite points of its orbit will be 183,000,000 miles apart. This is the base line used in measuring the distance of the stars, but their distance is so inconceivably great when compared with the base line, that the measurement of the angles of the triangle is a task of extreme delicacy and difficulty. The largest angle made at any fixed star, by lines drawn from the ends of this base line of 183,000,000 miles, is *less than two seconds*. If you wish to get an idea how small an angle of two seconds is, draw a triangle, one of whose sides is *one-tenth of an inch* long, and each of the others 860 feet long: the longer sides will make with each other an angle of two seconds. Or, if you wish to know what such an angle is upon the circle of the starry heavens, take the distance between the two "Pointers" in "the Dipper" (about five degrees), divide it into *nine thousand* parts, and one of those parts is equal to two seconds.

The angle formed in this way by lines drawn to the star from the ends of this base line of 183,000,000 miles, is called the *parallax* of the star. For certain reasons, however, the *half* of this angle (or that made by using the *radius*, instead of the *diameter*, of the earth's orbit as the base of the triangle), is usually taken as the parallax; and it is in this latter sense that we shall hereafter use the term.

Now, such is the nicety of astronomical measurements, that if a star has a parallax of *one second*, it can be accurately determined. By a somewhat different method a parallax of even the tenth of a second may be measured with tolerable precision; but it is only after a comparison of the results of repeated measurements that these infinitesimal angles can be determined beyond a doubt.

After thirty years or more of labor in this field of investigation, astronomers have found the distances of two stars pretty accurately, and have approximated to the distances of eight or ten others. The two whose distances we may say we *know*, are *Alpha Centauri* (a bright star in the southern heavens, which does not rise in the latitude of Boston), whose parallax is about .9 of a second, its distance 224,000 times the sun's, and its "light interval" 3.52 years; and 61 *Cygni* (a very small star in the constellation of the Swan), with a parallax of about .56 of a second, a distance 366,000 times the sun's, and a "light interval" of 5.77 years.

Among the stars whose distance is approximately known, is Sirius; and now let us recur to the enormous difference between the distances obtained by different observers, and see upon how minute an *angular* difference it depends. If the parallax is .23 of a second, as one authority makes it, the star is 896,803 times as far off as the sun, and its light takes only 14.16 years to

reach us; but if its parallax is .15 of a second, it is 1,375,000 times as distant as the sun, and its light must travel 21.56 years before it arrives at our earth. The inconceivably great difference in the results is due, as will be seen, to a difference of .08 of a second in the measurement of an angle! How small this difference actually *is*, the reader can figure out for himself, taking as a basis of his calculation what we have told him of the size of an angle of *two seconds*. It is an angular difference which would be represented by *the breadth of a human hair viewed at the distance of about 625 feet!*

We may add another illustration of the effect of a small error in the measurement of an angle upon the solution of an astronomical problem. It is well known to most of our readers, we presume, that the distance of the sun used to be reckoned as 95,000,000 of miles; but within a few years astronomers have quite generally agreed that this number is about 3,500,000 miles too large. This correction is based upon a correction of the value of the solar parallax, amounting to only about .4 of a second.

These things show that the astronomer deals with microscopic as well as with telescopic distances, and that the measurement of the latter is accomplished only by the most careful observation of the former. The subdivisions of the graduated scales which he uses are so minute that he actually has to read them by the aid of a microscope; while with his telescope he penetrates to regions of space so remote that the rays of light which he gathers up with his lenses must have left their source thousands of years ago. And so, also, in his measurement of *time*, he divides a second into a hundred parts, and, on the other hand, he computes cycles so vast that the completion of a single one exceeds sevenfold the entire period that man has lived on the earth.

THE CHEMISTRY OF LUMINOUS FLAMES.

Flame is burning gas. If a solid body appears to burn with flame, it can be proved that it has been first converted into a gas, and that it is the latter which produces the flame. If a solid substance, like anthracite coal, cannot be volatilized, it may become white hot in burning, but there will be no flame.

But some flames are pale and dim, yielding scarcely any light, while others are more or less brilliant. Why is this? Does it depend on the *heat* of the flame, as we might infer from the analogy of solid bodies; does the flame become brighter and brighter as it grows hotter — just as a piece of iron when heated up to a certain point begins to give out a dim red light, which grows whiter and more brilliant with the increase of temperature, until it almost dazzles the eye? On the contrary, we find that a flame, as in the case of a common spirit lamp, may be very pale, and yet very hot. If we burn a mixture of oxygen and hydrogen, we get but little light, while the heat is intense enough to melt almost every known substance. Iron and many other metals will burn in it, like wax in the flame of a candle.

But this same oxy-hydrogen flame, as it is called, may help us in solving our problem. If we hold a piece of lime in the midst of the burning gases, the flame, which had been so pale, becomes dazzlingly bright. A slight examination will satisfy us that the flame itself is really no brighter than before, and that the sudden increase of light is wholly due to the *lime*, which, instead of burning away in the fierce heat, merely becomes white hot and glows with a steady radiance so long as it is kept at that high temperature.

In this case, then, the flame becomes luminous because a *solid* is *heated white hot* within it. Have we here the key to all cases of the kind? Until a very recent day all scientific men were ready to answer this question in the affirmative. They laid it down as a rule, without exceptions, that the light of flames is due to solid bodies or solid particles intensely heated. The light of all the substances commonly used for illumination was explained in the very same way. Indeed, there is no essential difference in the flames of a candle, an oil lamp, and a gas-burner, or in the way in which they are produced. All are alike *gas* flames, since only gases burn with flame; and the gases are all essentially the same, being *hydrocarbons*, or compounds of hydrogen and carbon. The main point of difference is that, in the candle and the lamp, the gas is made *where it is burned*, by the volatilization of the tallow, wax, or oil; while in the case of the gas-burner it is made in the retorts of the gas-works, from bituminous coal, by a very similar process. In every case, the illuminating property of the gas depends upon the simple fact that *the hydrogen and carbon do not burn at the same time, but in succession.* The hydrogen burns first, and the particles of carbon thus set free delay for an instant in the flame and become white hot, before they burn away into a transparent, invisible gas, carbonic acid. The interval is almost infinitesimally brief, but as fast as the carbon particles burn away and their evanescent glow ceases, fresh ones take their place, and thus the light is continuous.

In this way, as we said above, it has been supposed that all luminous flames must be explained. Frankland, however, has recently shown that there may be very bright flames in which no solid particles are present. He burned a jet of hydrogen in a tube of oxygen, and, gradually increasing the pressure upon the gas to twenty atmospheres, he found the brilliancy of the flame to increase with the pressure. At a pressure of ten atmospheres, a burning jet of hydrogen an inch in length gave light enough for reading a newspaper at a distance of two feet from the flame. He also found that carbonic oxide, which usually burns with a very pale flame, burned very brightly under great pressure. In the first case, the product of the combustion was *water*, which must have existed in a gaseous state in the flame; in the second case, the product was *carbonic acid*, which must also have been a gas. In both cases, the gas in the flame was rendered more dense by the pressure. If metallic arsenic be burnt in a stream of oxygen gas, it yields a dazzling white flame, though neither the metal itself nor the product of its combination with oxygen can remain solid at the temperature of the flame. The same is true of sulphur and phosphorus when burned in oxygen. The latter burns with a brightness which is almost blinding, and yet the phosphoric anhydride (or phosphoric acid) which is produced is so readily volatilized that it can hardly exist as a solid, even at the extreme outer surface of the flame.

These facts, and many others of the same sort, have compelled scientific men to modify their former theory of the luminosity of flames, and to say that the light may sometimes be due, not to the presence of solid particles, but to that of *dense gases or vapors*, intensely heated. Frankland's experiments appear to show that, as a rule, the denser the vapor, the brighter will be the flame. It is a confirmation of this view that a flame becomes more luminous if the pressure of the air upon it is increased, and less luminous if that pressure is diminished. The flame of a common spirit lamp grows bright in condensed air; and a candle gives much more light at the foot of a high mountain than at its top, though the rate of combustion is nearly the same in both cases.

Are we to explain the light of an ordinary gas-flame in this way? Frankland believes that we should do so. Under the combined influence of heat and oxygen, the hydrogen gradually separates from the carbon, whose atoms, so to speak, shrink more closely together. The compounds thus formed are perfectly volatile, and their vapors are necessarily very dense. "To the presence of such compounds," he says, "I am inclined to ascribe the luminosity of the gas-flame. I believe that the lighter hydrocarbons when exposed to the intense heat of the flame are transformed into dense vapors which have the luminiferous character of arsenic-vapor or phosphorus-vapor." He does not presume to assert that the decomposition of hydrocarbons in the flame is never complete — in other words, that particles of elementary carbon are never separated — but he is fully satisfied that "the incandescence of solid particles is not the chief condition of luminosity," but that the light is "mainly due to the ignition of dense hydrocarbon vapors."

Certain obvious facts connected with gas-flames are perfectly consistent with this new theory, while they are not easily explained under the old one. The flame from a common fish-tail burner is so transparent that the smallest print can be read through any part of it without the least difficulty. We find, too, that the edge of such a flame gives just as much light as its flat side does. If the light proceeded from solid particles, the most luminous part of the flame ought to be more or less opaque; and as such particles would obstruct the light of those behind them, the edge of the flame ought to be less bright than the side.

On the whole, we must admit that some of the phenomena of luminous flames can be satisfactorily explained only by Frankland's theory, and that probably it furnishes the correct explanation of nearly all such phenomena.

CORAL ISLANDS.

The Rev. Charles Kingsley, well-known as a novelist, poet, and preacher, is likewise an enthusiastic naturalist. His little book entitled "Glaucus" is a delightful seaside companion for those who are interested in zoölogical study. The following extract is from one of his papers in "Good Words for the Young," and will be found entertaining by the young folks, if not by their elders:—

But how does the coral ever rise above the surface of the water and turn into hard stone? Of course the coral polypes cannot build above the high tide mark; but the surf which beats upon them piles up their broken fragments just as a sea beach is piled up, and hammers them together with that water hammer which is heavier and stronger than any you have ever seen in a smith's forge. And then, as is the fashion of lime, the whole mass sets and becomes hard, as you may see mortar set; and so you have a low island a few feet above the sea. Then sea birds come to it, and rest and build; and seeds are floated thither from far lands; and among them almost always the cocoa-nut, which loves to grow by the sea-shore, and groves of cocoa palms grow up from the lonely isle. Then, perhaps trees or bushes are drifted thither before the trade wind; and entangled in their roots are the seeds of other plants, and eggs or cocoons of insects; and so a few flowers and a few butterflies and beetles set up for themselves upon the new land. And then a bird or two, caught in a storm and blown away to sea, finds shelter in the cocoa-grove; and so a little new world is set up; in which (you must remember always) there are no four-footed beasts, nor snakes, nor lizards, nor frogs, nor any animals that cannot cross the sea. And on some of those islands they may live (indeed there is reason to believe they have lived) so long, that some of them have

changed their forms, according to the laws of Madame How, who sooner or later fits each thing exactly for the place in which it is meant to live, till upon some of them you may find such strange and unique forms as the famous cocoa-nut crab, which learned men call *Bergus latro.* A great crab he is, and walks upon the tips of his toes a foot high above the ground. And because he has often nothing to eat but cocoa-nuts, or at least they are the best things he can find, cocoa-nuts he has learnt to eat, and after a fashion which it would puzzle you to imitate. The sailors used to say that he climbed up the stems of the cocoa-nut trees, and pulled the fruit down for himself; but that, it seems, is not quite true. What he really does is this: when he finds a fallen cocoa-nut, he begins tearing away the thick husk and fibre with his strong claws; and he knows perfectly well which end to tear it from, namely, from the end where the three eye-holes are, which you call the monkey's face, out of one of which, you know, the young cocoa-nut tree would burst forth. And when he has got to the eye-holes he hammers through one of them with the point of his heavy claw. So far, so good; but how is our friend to get the meat out? He cannot put his claw in. He has no proboscis like a butterfly to insert and suck with. He is as far off from his dinner as the fox was when the stork offered him a feast in a long-necked jar. What, then, do you think he does? He turns himself round, he puts in a pair of his hind pincers, which are very thin, and with them scoops the meat of the cocoa-nut, and so puts his dinner into his mouth with his hind feet. And even the cocoa-nut husk he does not waste; for he lives in deep burrows which he makes like a rabbit, and being a luxurious crab, and liking to sleep soft in spite of his hard shell, he lines them with a quantity of cocoa-nut fibre, picked out clean and fine, just as if he was going to make cocoa-nut matting of it. And being also a clean crab, as I hope you are a clean little boy, he goes down to the sea every night to have his bath and moisten his gills, and so lives happy all his days, and gets so fat in his old age that he carries about his body nearly a quart of pure oil.

BAROMETRIC SPRING.

J. H. Temple of Framingham, Mass., sends us the following account of a singular spring in that town:—

There is a never failing spring of pure water upon our farm, which has the peculiarity of overflowing with a sudden rush just before a rainfall. It matters not what the season of the year may be; summer and winter, in wet weather, and in the time of severest drought—all at once the water comes pouring from this spring, often flooding the intervale through which it is discharged; and within thirty-six hours thereafter a rainfall comes.

The hidden arteries which supply this spring have been traced to some rocky highlands, with swampy depressions, a fourth of a mile from the place of outflow. The main artery has been tapped by a well thirty rods from the spring, and is there twenty-four feet below the surface.

In wet seasons, the spring sends forth a stream sufficient to fill an eight-inch pipe. After running about one hundred rods this stream loses itself in a swamp. In the dry season this stream loses itself in a course of fifty rods. It diminishes in volume regularly, as other neighboring springs do, with the progress of the summer, or a drought, except as already indicated.

In this region the springs failed steadily through July and August; and I was led to watch my prophet spring with a good deal of interest. On Sunday, September 5th, the discharge was unusually sluggish, scarcely enough water flowing to fill a two-inch pipe, and reaching only about forty rods from the spring. Monday morning, the 6th, it was pouring forth a little torrent, having more than doubled in volume, and filling its channel for a distance of not less than eighty rods. But the sky was brassy, and the heat intense, with no atmospheric indications of a change of weather. Tuesday morning the overflow continued; the clouds had overcast the sky, and at 11 A. M. rain began to fall, which continued till 3 P. M. Wednesday morning, the spring was discharging about the same quantity of water as on Monday, showing that it is not immediately affected by a copious shower.

Arts.

CHEMISTRY OF THE EXPOSITION OF 1867.

The display of chemical products at the Paris Exposition, was large and fine, not excelled in importance by any other department. It was noticeable that, while not many *new* processes or products were exhibited, there had been a steady improvement in the old. The United States, of course, made comparatively little show, but the rivalry among the English, French, and German manufacturers was quite brisk. We, however, are as much interested in the subject as any nation, since we are largely dependent upon Europe for many important articles, which we can, and some time probably shall, make for ourselves. We have lying upon the table before us, the Report on the Industrial Chemistry of the Paris Universal Exposition, drawn up by Dr. J. Lawrence Smith, one of the United States Commissioners. We know of no one better fitted than Dr. Smith, to write such a report, and we have taken great pleasure in reading the very interesting book of one hundred and forty-six pages, that embodies the result of his observations. Dr. Smith seems to have aimed rather at a resumé of the present condition of the chemical manufactures, than at a description of what was actually exhibited at the Exposition. Consequently, it is of general interest, and we shall, therefore, in the following paragraphs, give our readers a brief summary of its most important points, arranging them under such heads as best suit our purpose.

MANUFACTURE OF SULPHURIC ACID.

In his introduction, Dr. Smith says that the acids and the alkalies constitute the substructure of the chemical arts, and that of this substructure sulphuric acid is the corner stone; so, in his report, he devotes considerable space to considering its manufacture. There has been no essential change in the process of making oil of vitriol for the last ten years. The well-known method of burning sulphur to sulphurous acid, and then completing its oxidation with the aid of nitrous compounds, is still the only one in extensive use. The sulphur for conversion into sulphurous acid is obtained from several sources, mostly from Sicily sulphur and pyrites. Sulphur has been and is mined extensively in Sicily; formerly, very nearly all the sulphuric acid made was derived from it. But from various causes, the price has been kept so high, that manufacturers have been obliged to seek other material from which to obtain the cheap acid, so necessary in the arts, and "now not more than one-tenth of this acid is made directly from sulphur." Within fifteen or twenty years, in France and England, pyrites has very largely taken its place. In the United States, Sicily sulphur is still in ordinary use; attempts have been made to employ pyrites, but with what success we are unable to say. Other sources of sulphur are from coal gas and soda waste; both are of importance, not only from the value of the sulphur obtained, but, also, because in each case waste products of other manufactures are utilized.

It will hardly be desirable for us to enter into any description of the chambers, furnaces, etc. We will only remark, that if pyrites is burned, larger chambers and more nitrous gases are required, and of course, a peculiar furnace. Dr. Smith appends to his report full plans of vitriol works. Concentration of the weak acid of the chambers to 1.70 sp. gr. is still carried on in the ordinary leaden pans; but we notice that, in England and Belgium, glass vessels are to a large extent replacing platinum stills for the final concentration. This is due to the high price of platinum, and, also, to the better quality of the glass retorts now made. In France, platinum stills are almost altogether used. The Report makes particular mention of those manufactured by Johnson and Matthey, of London. This firm seem to have surpassed all their rivals in working platinum. Their work is peculiar from the fact that they do not solder the seams or joints with gold, as do the others, but burn the sheets together with the oxy-hydrogen blow pipe.

SODA MANUFACTURE.

No essential change has ever been made in Leblanc's original process. The most important recent improvement in connection with it, is the utilization of the waste. This waste has always been a very serious annoyance. It collects in great quantity, is so acted upon by air and moisture that it emits noxious gases, and at the same time large amounts of sulphur are thrown away in it. A great part of the sulphur in this waste is now extracted by a process contrived by a German chemist, named Mond. Air is blown through the moist mass; oxidation at once commences, by which the insoluble sulphide of calcium is changed into soluble compounds; lixiviation with water extracts these; and from the solution sulphur is precipitated by an acid. The residue has considerable value as a fertilizer. All the soda of commerce is made by Leblanc's process, excepting the comparatively small amount prepared from cryolite.

Cryolite is a fluoride of aluminium and sodium. It is decomposed by heating its powder with six equivalents of caustic lime; caustic soda, aluminate of soda, and fluoride of calcium being formed. The first two are dissolved in water, and the alumina precipitated from the solution by carbonic acid, leaving carbonate of soda in solution. The alumina is worked up into salts (sulphate and acetate) for the use of the dyer. By boiling with fifteen equivalents of lime and water, the alumina combines with part of the lime, to form an insoluble compound, leaving only caustic soda in solution.

Though soda and its compounds are made in enormous quantities, yet, as every chemist knows, it is difficult to obtain even at an exorbitant price *pure* carbonate of soda, and especially hard to get *pure caustic* soda. Perfectly pure caustic soda is, however, now prepared from metallic sodium at a cheaper rate than by any other method.

This is a singular fact, but it goes to show how largely sodium is now manufactured. Johnson and Matthey of London, make this soda. It is sold at one dollar and seventy-five cents, gold, per pound, including bottle and packing case.

We expected to find in Dr. Smith's Report something about the preparation of both sodium and potassium, but he does not allude to it.

POTASH MANUFACTURE.

Dr. Smith describes at some length Balard's process for obtaining potash from the mother liquors of sea-salt works. The process is a beautiful one, but hardly of general interest, and therefore we will not enter into any account of it. Of more interest are his remarks upon the Stassfurt deposits, from which great quantities of potash salts are now obtained. In our November number, however, we laid before our readers a more extended account of them than we could give here.

FATS; SOAP AND CANDLE MAKING.

Stearine candles and candle stuff were exhibited in great variety at the Exposition. The principal differ-

ence in candle stuffs noticed by the reporter, was that some were a little more mottled than others. This he considers to be due, in part, to the method of saponification followed. Saponification by lime gives a smaller yield of the best candle stuff with a high melting-point, and a large quantity of oleic acid of superior quality; while the saponification by sulphuric acid and distillation furnishes a larger amount of candle stuff of second quality, and a smaller amount of a poorer liquid oil. One or the other of these processes is employed, according as the demand is for a candle of the finest kind at a high price, or for a cheaper one of inferior quality. Therefore, in France, Germany, Russia, Italy, Spain, and Portugal, the lime saponification is in general use, while in Holland, England, and America, the sulphuric acid is the commonest. Both these processes are described in books on technical chemistry. Palm oil is successfully decomposed by simple distillation with water. This process is largely carried on at the well-known Price Candle Works.

De Milly has contrived a method of saponification by sulphuric acid, without distillation. He makes a very fine quality of beautifully white candle stuff. There is no tarry matter formed, but the liquid oleic acid is of a brown color. From the latter can be made a good brown soap, or it can be rendered white by distillation. The operation is as follows: — The fat is melted and heated to 120° C. (248° F.) and then agitated with six per cent of strong sulphuric acid. In two or three minutes, the mixture is poured into boiling water, which dissolves the sulphuric acid and glycerine, and the fatty acids, of a dark color, float on the surface. The peculiar advantage of this method lies in the fact that the coloring matter of the fatty acids is entirely soluble in the liquid portion; so that by cold and hot pressure the solid acids are obtained perfectly white. Three-fourths of the solid fat acid present is thus obtained, and the remaining fourth can be distilled, but is, of course, of inferior quality.

This very simple process is much preferable to either the lime or the sulphuric acid saponification; for since there is no carbonization, the yield is greater, and at the same time but comparatively little apparatus is required. De Milly has patented his process in this country, but it has not yet been put into practice here, though it promises to be very successful. Under the head of Soap, Dr. Smith says he has nothing new to mention, except the use, for making soap, of the brown liquid fat resulting from the above-described method of De Milly. This soap has a very dark color, but possesses as much detergent power as any other.

[TO BE CONTINUED.]

CURIOUS FACTS ABOUT COPPER.

A REPORT has lately been made to the French Academy of Sciences upon the exemption from cholera of men engaged in working with copper. Statistics obtained under the supervision of the commissaries of police, and therefore to be relied upon as accurate, show that wherever the manipulation of copper was carried on, the workmen have almost invariably escaped unharmed; and, moreover, that the exemption was in exact proportion to the degree in which the metal was handled by the men. During the epidemics of 1865 and 1866, the number of deaths was only 3 out of every 10,000 adults employed in the working of copper. Of goldsmiths, silversmiths, and watchmakers, the mortality was 1 to every 719 employed; among founders, lamp-makers, and workers in bronze, imitation jewelry, and copper utensils, it was 1 to 2,000; while among opticians, makers of mathematical and musical instruments, dry polishers, stampers, and turners, there was not a single death among the whole number of 5,650 persons.

Further testimony in favor of the preservative action of copper was supplied by the society known as the Bon Accord, which was founded in 1819, and entirely composed of workers in bronze, and the medical registers of which are thoroughly well kept. During the whole of the five visitations of cholera, this society, the members of which were scattered in quarters where the epidemic raged with the greatest virulence, had not only not had a single death, but had been called upon to pay only for 106 days of sickness, divided among ten members of the society. Facts supporting the theory were also supplied from other sources. The conclusion drawn from this statement was, that if further inquiries established the truth of the theory, exceedingly valuable results, from a hygienic point of view, would follow.

Since the publication of these facts, a M. Adeline has invented what he calls an "anti-cholera tissue," a woven fabric in which a certain quantity of copper wire is introduced for the purpose of serving as a prophylactic. The contrivance appears to be indorsed by respectable scientific and medical authorities in France.

A writer in *Cosmos* gives some facts in regard to the preservation of wood by solutions of salts of copper. He has in his possession wooden water-wheels which have been in use for more than 1,500 years for removing water from a copper mine. These wheels are about eighteen feet in diameter; and an analysis by M. Payen of a portion of the wood shows that it is perfectly sound and is partly converted into a compound of cellulose and copper.

It appears, moreover, that the decay of stone may be prevented by the black oxide or the salts of copper. M. Robert has proved that the decay of granite, marble, limestone, sandstone, and other building stones, is largely due to a very minute lichen (*Lepra antiquitatis*); and that this cryptogamic plant does not grow upon the stone pedestals of bronze statues, or those parts of buildings to which bronze or copper ornaments are fastened. In such cases, the stone is protected by the salts of copper, which are gradually formed under the influence of the weather, and are washed down by the rain; these compounds being poisonous to the plants. Abundant illustrations of these facts were found among the old buildings of Paris, and they are very important on account of the length of time which has elapsed since the protective action of the copper compounds began.

BRICKS FROM GAS-COAL ASHES. — Walls of remarkable lightness, porosity, and dryness may be built cheaply of bricks made from the ashes of the coke derived from gas-works. The ashes, after being taken from the retorts, are spread on the surface of a clean floor; they are then finely pulverized, and ten per cent of slaked lime, together with a small proportion of water is intimately stirred and incorporated with them. After a rest of twenty-four hours, the mixture is made into bricks by the ordinary process. These bricks are immediately transferred to the drying-sheds, where a few days of exposure renders them fit for use.

WATER-PROOF CLOTH. — To make water-proof cloth take two pounds and four ounces of alum, and dissolve it in ten gallons of water; in like manner dissolve the same quantity of sugar of lead in a similar quantity of water, and mix the two together. The cloth is immersed for one hour in the solution, and stirred occasionally, when it is taken out, dried in the shade, washed in clean water and dried again. This preparation enables the cloth to repel water like the feathers of a duck's back, and yet allows the perspiration to pass somewhat freely through it, which is not the case with gutta-percha or India-rubber cloth.

USE OF ZINC-WHITE AS A PAINT. — No substance containing lead should be used in connection with zinc-white. Instead of the ordinary *boiled oil*, an oil should be used which is prepared in the following manner: 200 pounds of linseed oil are gently boiled, first for some five or six hours alone, and, next, boiled again along with 24 pounds of coarsely broken-up peroxide of manganese for at least twelve hours; in this manner, a very quickly-drying linseed oil is obtained, which is eminently fit for the purpose of being used with zinc-white and other zinc colors. The inventor of this process lays stress upon the use of old linseed oil, and also upon the care to be taken with the boiled oil, which, unless carefully kept from access of air, becomes thick in a very short time. The boiled oil so prepared ought not to be used in painting with zinc-white by itself alone, but should be mixed, in quantities of from 3 to 5 per cent, with the raw linseed oil used to mix up the paint.

WOOD STAINING. — White woods become dark, like walnut, if they are painted over with a concentrated aqueous solution of permanganate of potassa, which should be tepid at the time. The wood of pear and cherry trees is rapidly stained; white woods, as for instance, the acacia (*Robinia pseudo-acacia*), resist a longer time; and resinous woods, like fir, are more difficultly acted on. The rationale is that the permanganate of potassa is decomposed by the woody fibre; brown peroxide of manganese is precipitated and fixed by the potassa, which is afterward removed by washing with water. The wood, after having become dry, is varnished, and is then not readily distinguished from naturally dark woods.

THE END OF THE HORSE. — When the horse falls, he is bled, and his blood is preserved for the use of the dyer. The mane and tail are next cut off for the manufacture of sieves, hair cloths, and bow-strings for the violin; the shoes are taken off for the nailer; the hoofs are cut off for combs and various other kinds of horn-work, and a portion of the feet goes to the glue-maker; the skin is stripped off for the tanner, who converts it into excellent leather for boots, harness, etc., and the collar-maker finds it, in its rough state, the best material for cart harness. The flesh is then cut up for carnivorous beasts in menageries, or for dogs, and, though without knowing that they are hippophagi (a club of horse-eaters, who regularly advertise their club days), some of our fellow creatures are regaled in the cheap eating-houses of great cities with delicate bits of carcass in the form of *patés*, pretended beef-steaks, or soup. When the flesh and fat have been removed, the stomach and intestines are laid aside for machine straps and strings for musical instruments, and are often sold, for the last purpose, as the best Naples cords: the ribs are turned into buttons and children's toys; the large round bones serve for tweezers, whistles, ferrules, knife-handles, cups and balls, dominoes, etc.; the large, flat bones are of use to the toymen for many things; even the teeth are useful, when polished, to the dentist, and for many purposes for which ivory is required. The bones of the head are either consumed in heating furnaces or crushed for manure. The remainder of the carcass is burnt, and by this process produces ivory-black, soot-black, and valuable manure. And from the fat is extracted a coarse oil which is used by mechanics. — *Manufacturer and Builder.*

Agriculture.

UNDERDRAINING.

[*From Dr. Nichols's Address at Greenfield, Mass.*]

WATER and sunlight are the great agencies upon which the farmer depends for the success of his crops. What a vast amount of anxiety and despondency is caused by these agencies, and yet they are among the greatest blessings vouchsafed to the race! The excessive heats of summer will parch our fields, and wring out from every tree and shrub the last drop of moisture, and the persistent penetrating rains will drown our cereals, and soak our fields until they are saturated like a sponge. We can do something to mitigate the evils of excessive heat or drought, but we can do much to avert those caused by water. We can drain our soil, and thus carry away in hidden channels the excess of water which, if allowed to remain, would chill or suffocate every root, fibre and tendril upon which plant life depends.

I can hardly manifest too great earnestness upon a subject of so much importance to farmers as underdraining. In this country we are not sufficiently awake to the great benefits which flow from it: our faith is not strong enough to lead to the adoption of a system of land-drainage which would overcome one-half the losses occasioned by late springs and wet seasons, and which would bring into high tilth thousands of acres now lying waste and valueless. I have tested upon my farm the value of underdrains, not only upon low lands, but upon high lands. Two years ago I resolved to experiment upon a hill or elevation, thirty feet above my meadow, and I placed in position tiles, so as to afford a full and free outlet for the water which is so lavishly poured upon us in Spring months. Some of my farmer friends predicted the worst possible consequences to the crop upon that field, and confidently looked for wilted leaves upon the corn stalks during the dry months of July and August. But in this expectation they were disappointed. No wilting came, although the heat was fervid and the clouds gave no rain. The corn planted the first year withstood the drought better than the crops situated upon lower land, and very much better that those upon other fields of equal elevation. It was earlier in starting, grew more vigorously, the product was heavier, and it was harvested much sooner in the autumn than other crops. The second year the same results were observed in the growth and maturation of wheat; and I have no doubt that the improvement is a permanent one, that in a series of years the cash value of the improved crops will greatly outweigh the expense incurred in draining. It is certain that even our uplands can be greatly improved by drainage.

What is the philosophy of such apparently paradoxical experiments? It is easily understood. The first great benefit, of course, comes from conveying away superfluous water at the season when the seeds are placed in the soil. All soils, high and low, are then filled with water struggling to escape by percolation and evaporation, and the farmer must wait until it slowly disappears before putting in his seed. In this there is not only a loss of time, but often it carries crops so late into Autumn that early frosts nip and destroy them. This form of benefit is readily comprehended; but the inquiry comes up, "If drains carry away the *unnecessary* water in the *Spring*, why will they not carry off the *necessary* water of *Summer?* Why do they not leach the soil at the very time when every atom of moisture is needed to feed the growing grains and grasses?" It may be said, in reply, that drains are incapable of removing water which is of service to plants; it is only when it is in *excess* and detrimental, that the work of removal goes on. They are active only in wet summers upon elevated lands; their useful services only then come in play. In dry summers they keep dry soils moist. There is in such seasons reversed action going on. Instead of water coming out, air is passing in, and as even the hottest air holds a vast amount of water, it only needs to be brought in contact with refrigerating substances to produce a copious precipitation of water. All of us have observed large drops of water form upon and trickle down the sides of our ice-pitchers in the hot days of summer. This water is condensed from the warm and apparently dry air, which comes in contact with the ice-cold surface of the vessel. This will illustrate the way in which the soil is moistened through the agency of drain pipes. The earth, at a distance of one foot from the surface, is several degrees cooler than the air above, and consequently when air passes in through the open ducts, it parts with its hidden moisture, and the vapor is diffused through the soil. Water readily travels through burnt clay, when unglazed. This we know from the fact that if we build a water cistern of bricks, and omit to cover the inside with hydraulic cement, the water will run out as fast as it runs in. The best possible water filter that can be devised, is constructed by building inside of a rain-water cistern, lined with cement, a brick chamber, which will rapidly fill with water by passing through the bricks. In its passage it is deprived of all impurities and becomes pure and excellent — suitable for all household purposes. A pump passing into the chamber will bring this pure water to the desired point above, and the supply will prove abundant for all ordinary wants. This form of filtration will continue in action for years. I have spoken of the device here for a two-fold purpose: first, to call your attention to a most excellent and convenient way of filtering cistern water; and second, to illustrate the method of action of the ordinary drain tiles. The water passes through the pores in the tiles, and drops are constantly falling from the top arch, and passing up from the bottom through the whole length of the tubes, while resting in wet soils. The minute orifices do not become obstructed as we naturally suppose they would. I have known a brick filtering chamber to supply pure water copiously for a period of fifteen years, and doubtless they will continue in satisfactory action for fifty years.

TEA CULTURE IN TENNESSEE.

THE tea plant is in successful cultivation some ten miles from Knoxville, Tenn., where it has been raised for the past ten years. The plants were originally obtained through the Agricultural Department at Washington, in the year 1858.

The plant is an evergreen shrub, growing to the height of some five feet. It is perfectly hardy, and needs no protection from frosts. It bears an abundant crop, with beautiful, fragrant flowers, in October. The seed is not matured until the following season.

Captain James Campbell, who has made the experiment of raising the plant, has not attempted its cultivation on a large scale, but, as he expresses it, "just enough to keep the family in tea." Good judges, who have tried the Captain's tea, pronounce it to be not inferior in fragrance and flavor to the imported Young Hyson. It seems quite probable, then, that "Young America" may yet live to see Young Hyson thoroughly naturalized on Uncle Samuel's plantation.

IMPROVEMENT OF GRAIN BY NATURAL SELECTION.

AT the Exeter meeting of the British Association, Mr. Hallet, of Brighton, read a paper giving an account of his experiments upon the improvement of grain by applying the principles of "natural selection." By this method he succeeded in obtaining a grain of wheat, which, when sown, produced a whole multitude of stalks, each of which bore a magnificent ear well filled with grain. The quality is maintained by the descendant seeds, and the produce is thus increased more than a hundred fold.

Mr. Hallet lays down the following principles as the result of his observations:—

1. Every fully developed plant, whether of wheat, oats, or barley, has an ear superior in productive power to any of the rest on that plant.
2. Every such plant contains one grain which proves more productive than any other.
3. The best grain in any plant is found in its best ear.
4. The superior vigor of this grain is transmissible in different degrees to its progeny.
5. By repeated careful selection the superiority is accumulated.
6. The improvement, after a long series of years, reaches a limit.
7. By still continuing to select, the improvement is maintained, and practically a fixed type is the result.

SUNFLOWERS AS DISINFECTANTS.

EXPERIMENTS in France and Holland have shown that sunflowers, when planted on an extensive scale, will neutralize the pernicious effects of exhalations from marshes. This plan has been tried with great success in the ferny districts near Rochefort, France; and the authorities of Holland assert that intermittent fever has wholly disappeared from districts where the sunflowers have been planted. It is not yet determined what effect the flower produces on the atmosphere; whether it generates oxygen, like other plants of rapid growth, or whether, like the *coniferæ*, it emits ozone, and thus destroys the organic germs of miasms that produce fever.

PROGRESS OF FRUIT CULTURE.

THE following is an extract from the admirable address of Hon. Marshall P. Wilder, President of the Pomological Society, at the recent session of that Society in Philadelphia: —

Mark the amazing increase of the small fruits. Take, for instance, the strawberry. Within the memory of many of this assembly, we were dependent almost wholly upon the wild species of the field, or the few which had been transplanted to our gardens. It is only about thirty years since the first attempt, we believe, was made on this continent to raise from seed a new and improved variety — thanks to the enterprise of Mr. Hovey, which gave us a fruit that has stood the test for a whole generation of men. Compare the small, dry, seedy, red and white wood-strawberries of our youth with the numerous larger luscious varieties which have come to notice in our day. Not only have the latter increased to hundreds of varieties within this time, but the quantity produced is in a still greater ratio. What would our fathers have said at the despatch from a single railroad station in the Western States, where fifty years ago the emigrant had scarcely set his foot, of one thousand bushels of strawberries daily to market, or from another depot on the unoccupied lands of New Jersey taken up within fifteen years, a similar quantity sent to the New York market daily; or, still more remarkable, from Norfolk, in Virginia, where seventeen years ago, the cultivation of this fruit had not commenced, and from whence during the present season three millions of quarts have been sent to the Northern markets!

Thirty years ago we possessed only two good varieties of the raspberry, the red and white Antwerp; now we have numerous fine kinds; and where a man thought himself fortunate to gather a saucerful, it is raised, as by our friend William Parry, of New Jersey, by hundreds or thousands of bushels for the market. So of the currant and blackberry. Of the latter not a single variety had then been introduced into our gardens or catalogues; now we have many new kinds, and the product is equally great.

The ingenious methods of gathering, preserving, and packing of fruits, and the improved means of safe transmission to distant markets, are among the most important advances in this new era. To such perfection have these been brought, that not only our small, tender fruits come to us a hundred or a thousand miles, in good order, but the grape and the pear travel from the Pacific to the Atlantic coast. While penning this address, pears and other fruits have come to our own hands from California, in perfect condition; and, to add to our surprise, the pears of that State are finding a market in Japan. Our cheap and convenient postal facilities for the transmission of seeds, scions, and plants, promoting the introduction of new fruits into the remotest parts of the land, are such as no other nation has ever enjoyed, yet not more than commensurate with the demands of our extensive territory; and we trust the day is not distant when we shall have equal facilities for such reciprocal advantages with the whole world.

THE GROWTH OF TREE-TRUNKS.—A paragraph has been round the scientific papers stating that a French naturalist has been measuring the tree-trunks in a forest, and has found them all broader in the east-west than in the north-south direction; the causes of the unsymmetry being ascribed, not very obviously, to the rotation of the earth. Well, another French arborist has been similarly gauging the trees in the neighborhood of Toulouse, and he finds that the greatest swelling of their trunks is toward the east-south-east point of the compass. The explanation offered by this second investigator is more philosophical than that of his predecessor. He refers the deformation to the early morning sun, which warms the easterly parts of the tree more suddenly than the rest, stimulates the flow of the sap, which grows sluggish during the cool of the night, and draws up the nourishing moisture from the soil in greater abundance on the excited side than on those portions of the trunk where the warming is more gradual and its effects less active. Naturally, increased vitality of one side, be it animal or plant, results in development, or larger growth of that side. There are traditions of some plants turning their flowers toward the sun; the truth may be that the sun only promotes the growth of those blossoms upon which it sheds its direct warmth. As Dulong said, every degree of the thermometer entails a law of Nature. —*Every Saturday.*

A GOOD IDEA.—In Iowa the planting of trees is encouraged by law. Every acre of forest trees planted releases taxation for ten years on one hundred dollars valuation, and for each acre of fruit trees planted tax is exempted on fifty dollars valuation for five years; the same for shade trees and hedges along the highways. There are now maple forests in several counties, and sugar is made where fifteen years since was nothing but prairie grass and hazel shrubs.

Boston Journal of Chemistry.

BOSTON, JANUARY 1, 1870.

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☞ We have no complete files of either Vols. 1, 2, or 3; of Vol. I. (originally issued bi-monthly), we have only Nos. 4, 5 and 6 (January, March and May, 1867); of Vol. II. (monthly), we have Nos. 2, 4, 5, 7, 8, 9, 10, 11 (August, October, November, 1867, January, February, March, April and May, 1868); of Vol. III. we have all the numbers *except* 11 and 12 (May and June, 1869). All the other numbers are out of print, and it is impossible for us to furnish them.

Of the numbers mentioned we have a few copies left, which we will forward to our friends, at the following prices, viz: Vol. I., three numbers, twenty-five cents; Vol. II., eight numbers, fifty cents; Vol. III., ten numbers, fifty cents. Vol. IV. has been stereotyped as issued, and we are able to furnish back numbers since July 1869, to any extent. Price, single copies, six cents, six copies for twenty-five cents.

THE NEXT VOLUME OF THE JOURNAL.

AT the commencement of the next volume (Vol. V.) of the JOURNAL in July, it will be enlarged to sixteen pages, with twelve pages of reading matter. Several important improvements will be made in the arrangement and style of the paper, and a new department, that of *microscopy*, will be introduced. Several of the best observers and most accomplished makers of microscopes in the country will contribute to this department. Arrangements have been made with gentlemen well known in the scientific world, to furnish articles upon science, of a practical, familiar character, and no effort will be spared to make the JOURNAL even more useful and acceptable to all classes of readers than it has been. These additions and improvements will involve no radical change in the tone or general conduct of the paper. It will remain the same wide-awake, reliable, practical, useful journal of familiar science, which has become so popular all over the country. *It is the journal of science for the million, the people's journal, the journal for the family*, and it must always remain so. The price will be one dollar per year, payable in advance.

All our friends who now stand upon our books as paid at the old rate beyond the commencement of Vol. V., will receive their journals till the date already given in their printed addresses, as we shall make no alteration in their accounts with us; but hereafter to all persons remitting only fifty cents for a year's subscription we shall send the back numbers of the present volume, and credit them as paid to July, 1870.

THE JOURNAL FREE FOR SIX MONTHS.—To all new subscribers to Vol. V. of the JOURNAL, commencing next July, we offer as a gratuity the remaining numbers of the present volume. Upon the receipt of *one dollar*, the price of Vol. V., we will enter the name of the subscriber from January 1870, thus making the subscription equal to one and a half years. We hope this liberal offer will induce large numbers to become our patrons. For nearly four years we have published the JOURNAL without any remuneration, the low price of subscription hardly allowing us to meet expenses. Now, the thousands of readers who have been and are our fast friends, who have received the JOURNAL at a price less than it could be afforded for, can do us a great favor by making an effort to extend its circulation. If each of our present readers will obtain *one new subscriber* for the present volume, or for the next, they will confer a great favor. How easily and readily this can be done! Every one has some neighbor or friend, who would be benefited by reading the JOURNAL, and who would become its patron if his attention was only called to it. Will you not put this number in your pocket and show it to a friend, obtain his name, and forward it to us?

KILLING BY KEROSENE.

THIS enlightened form of slaughter goes bravely on throughout the length and breadth of the land. Kerosene may soon boast that it has killed, not merely its thousands, but its tens of thousands. It is a kind of murder which appears somehow to be rather popular than otherwise, for though there are laws against it, nobody takes the trouble to see them enforced. Burning fluids, which might be *warranted* to take fire or explode at temperatures to which they are almost sure to be exposed in ordinary household management, are sold in almost as many shops as spirituous liquors are, and with far greater impunity. Indeed, if our State Constabulary were half as active in ferreting out the venders of illegal kerosene and kindred fluids as in finding where contraband beverages are retailed, they would soon put an end to the nefarious traffic, and possibly be doing quite as good service to the community—even if we take a teetotaller's view of the value of what they are *now* doing.

If we lived under a monarchical government, we might expect that a law of this kind would be enforced; but in a "free country" like ours any interference with the inalienable right of burning ourselves to death in horrible ways is viewed as inconsistent with republican principles. We wonder that somebody has not questioned the "constitutionality" of this law; perhaps it is merely because the law is a dead letter, and therefore not worth the trouble of such a protest.

In England there appears to be a disposition to enforce the law against the storage and sale of oils which give off inflammable vapor at a temperature of less than 100° F. The *Pharmaceutist* for November, 1869, says:

"We call the special attention of those engaged in the sale or use of petroleum to the regulations which the law requires to be observed in reference thereto. The serious accidents which have recently occurred, including the extensive destruction of shipping at Bordeaux, have caused the authorities to put the provisions of the law into operation with more than usual strictness, and it behooves those who are in any way subject to the operation of the law to consider the nature and extent of their liabilities. . . .

At a recent meeting of the Court of Aldermen in the City of London, Alderman Wilson stated that a considerable quantity of the more volatile petroleum spirit was being sold, the vapor of which ignited much below that specified in the Act, and he wished it to be understood that those dealing in such spirit were liable to a fine of £20, which fine would be rigidly enforced. He had just had such a case brought under his judicial notice, and, the defendant being a widow, he mitigated the fine; but it was the intention of the magistrates in future, in all cases, to inflict the full penalty."

In France, the temperature of minimum inflammability is fixed by law at 43° C. (110° F.); but M. Garnier, in *Les Mondes* for November 11, 1869, argues that experience has sufficiently shown that this temperature is too low. He urges that it should be raised to 82° C. (180° F.) This is possible in France, but it would never be tolerated here. What reasonable chance of blowing or burning ourselves up, with oils whose vapor would not take fire below 180°? The benighted victims of an imperial government may submit to this despotic restriction of the right of suicide by fire, but free-born Yankees would never bear such arbitrary infringement of their personal liberty. If we want to offer up human sacrifices to the Moloch of Kerosene, shall officious philanthropists be allowed to prevent it? Sanitary reform is diminishing the causes of mortality quite fast enough: shall not naphtha and petroleum be left us a little longer?

LIGHT AND LIFE.

IT has been proved by recent researches in France that the *red* rays of the spectrum are those to which the important physiological function exercised by the sun on plants is exclusively to be ascribed. The leaves act as analyzers of the white light which falls upon them; they reject and reflect the green rays, and thus get their natural color. If plants were exposed to green illumination only, they would be virtually in the dark. The light which the vegetable world thus refuses to absorb is precisely that which is coveted by animals. Red, the complementary color of green, is that which, owing to the blood, tinges the skin of the healthy human subject, just as the green color of plants is the complement of that which they absorb.

These facts have been fully stated and illustrated in a paper read by M. Dubrunfaut before the French Academy of Science; and from them he deduces certain practical suggestions. All kinds of red should be avoided in our furniture, except curtains. Our clothes, which play the part of screens, should never be green. This color should predominate in our furniture, while the complementary red should be reserved for our raiment. He also dwells upon the salubrious influences of sunshine. He mentions cases of patients whose broken constitutions were restored by continued exposure to the sun in gardens where there were no trees; and gives an account of four children that had become weak and sickly by living in a narrow street in Paris, but regained their health under the influence of the solar rays on a sandy sea-coast.

KENOSA LAKE AND LAKESIDE FARM.

"Kenosa! o'er no sweeter lake
Shall morning break or noon cloud sail;
No lighter wave than thine shall take
The sunset's golden veil."—*Whittier*.

THE poet Whittier, in his beautiful poem "Kenosa Lake," justly describes this charming sheet of water, and the picturesque surroundings. The lake is situated in the suburbs of the city of Haverhill, Mass., and is distant from Boston thirty-two miles. "Lakeside" farm, consisting of about one hundred acres, is upon the margin of the lake, and embraces very much of the delightful scenery in wood, hill, and dale, which renders the lake so famous.

Very many of our readers in this city and vicinity will be pleased to know that they can look upon this beautiful scenery without leaving the city limits. During the past autumn, our friend Thos. Hill, the artist, well known as the painter of the great picture, "The Yosemite," visited Lakeside and took sketches of the scenery; and these he has combined in one large and

magnificent painting, which presents a charming view of the lake and farm.

This painting, with its dress of autumn foliage and autumn sky, is one of the most successful attempts to place upon canvas the quiet, picturesque scenery of New England, ever made by an American artist. It will remain upon exhibition at Childs & Co.'s, Tremont street, a few weeks, where our many friends and readers, if they desire, can see it.

EDITORIAL NOTES.

A Big Bridge. — A French engineer has made plans for a bridge across the British channel, from Dover to Calais. The distance is about eighteen miles, and there are to be ten spans of nearly two miles each. The piers are to be built on shore, and floated to the appointed spot by means of buoys, and then sunk and firmly fastened. The piers are so constructed that the water flows through them with little resistance, and they are also to be provided with staircases, up which, should a vessel run foul of the structure, the mariners can ascend and take the first train home. The plan of the proposed bridge has been approved by the best engineers, both in France and England, and a model of it is to be erected over the lake in the Bois de Boulogne at Paris.

A Nice Cargo for Rough Weather. — On Saturday, September 11th, the steamship "Lady Wodehouse," on her way from London to Dublin, encountered a heavy gale. Part of the cargo consisted of petroleum and lucifer matches. The lashings of the petroleum casks gave way, and the casks being dashed against the chests of matches, immediately ignited and then, rolling toward the centre of the vessel, set fire to the sides of the saloon, and two of the lifeboats, the flames rising with fearful rapidity above the deck. The scene, it is said, lasted three hours; but happily, by the judgment of the captain and the untiring exertions of the crew, the fire was subdued. But the flames broke out a second time, when the petroleum casks and the lucifer matches were thrown overboard, and the ship, after contending fruitlessly with the storm for twelve hours, put into Dungeness, where most of the passengers were landed.

Hygienic Theory and Practice. — The *Hartford Post* states that "four students have died from disease contracted in the damp and unwholesome dormitories of Yale College." If this be true, it is a sad satire on the practical bearings of our college system. We ourselves have seen a college with a good gymnasium, and unventilated recitation rooms; with lectures on physiology, and dormitories that are merely small closets without a window. We have no doubt that the description will apply to more than one of our "seats of learning."

Zinc for Water Tanks. — A writer in a foreign scientific journal says that water kept in zinc tanks or vessels, or collected from roofs covered with zinc, is invariably contaminated with that metal, and that the use of such water for culinary purposes is highly injurious to health. Zinc vessels, for such purposes, should be coated with asphalt varnish or some iron pigment.

On the Track of the Cholera. — The French Academy of Medicine has sent an embassy to the shores of the Caspian Sea, to find out, if possible, why the malignant cholera takes that route in its travel from east to west.

Vegetable Extracts. — A happy idea has occurred to a Frenchman; namely, to apply to the vegetables in ordinary use for culinary purposes a process which has long been successfully employed for vegetables used in pharmacy. He extracts the juices of the vegetables by strong hydraulic presses, and concentrates the same by evaporation in vacuum pans. An extract is thus obtained which is suitable for making soups and sauces. It is said that the process has been fairly tested, and that it is perfectly successful. We see no reason to doubt it.

Bronzing of Copper. — Immerse articles made of copper in melted sulphur, wherein lamp-black is kept suspended, and they get the appearance of bronze. They can be polished, if desired, after the process.

Is there Heat in Moonlight? — Lord Rosse decided that there *is*, but M. Marié-Davy came to a different conclusion, as we stated in the last Journal. It appears now that, on repeating his experiments, with some variations, M. Davy finds that the moon gives out a perceptible amount of heat. He therefore retracts his former statements. M. Volpicelli, and several other *savants*, have arrived at similar results by independent experiments. We may then consider it settled that moonbeams are not "*all* moonshine," but that there is a certain mixture of calorific rays with the luminous ones.

Arsenic in Soda. — The chemists have a pleasant way of finding poisons in all sorts of things in everyday use. Fresenius has discovered that the crystallized carbonate of soda, as manufactured at the alkali works, often contains a perceptible amount of arseniate or arsenite of soda. The arsenic undoubtedly comes from the sulphuric acid used in converting the common salt into sulphate of soda (which is one stage in the soda manufacture), and the sulphuric acid gets it from the *pyrites* out of which it is made. Few specimens of native pyrites are free from arsenic, and some contain a considerable quantity.

Galvanic Education. — The applications of electricity are daily increasing, and it would be rash to say what it may *not* be made to do "one of these days." The medical galvanists — mostly quacks, of course, — are claiming to have made new discoveries of late. One of them, in France, declares that he can make weakly and idiotic children bodily and mentally strong. The dull boy may thus be brightened by having his brain stirred with electricity. Galvanism is said to be better than whipping to quicken the aptitude for learning; or, if we may indulge in an atrocious pun, *a salt and battery* are better than *assault and battery* as an educational stimulant. Schoolmasters will do well to make a note of this. It is proposed to light railway tunnels with the electric light: why should not the road to learning be illuminated by the same means?

The Self-sacrifice of Scientific Experimenters. — A man engaged in scientific researches often has to do very dirty and very disagreeable work. Dr. Flint, whose investigations on the excretory function of the liver have been honored with a favorable report by a committee of the French Academy of Sciences, remarks in the preface to the third volume of his "Physiology" (just published by the Appletons), that the experiments connected with these investigations "are so repulsive and difficult that there is little likelihood of their being extensively verified." It is said that certain ardent students of physiology are now engaged on "experimental helminthology," which, in plain English, is the cultivation of parasites in the human body, and in other animals, for the purpose of tracing their habits and the effects they produce. It is hardly probable that *these* experiments will be voluntarily verified by many scientific students.

Bavarian Schools for Brewing. — The superior quality of the Bavarian beer is well known. It appears that at Munich and Augsburg there are schools in which everything that relates to the brewing of beer is taught, practically and theoretically; and the value of the training given may be inferred from the fact that among the students are natives of almost every European country, as well as of the United States. It is safe to say that these institutions are *not* managed after the fashion of some of our scientific schools and agricultural colleges, where the proportion of practical to theoretical teaching is pretty much like Falstaff's "half-penny-worth of bread" to an "intolerable deal of sack."

New Things that are Old. — Is there anything new under the sun? The bicycle seems to have been known in China two centuries ago, and some forms of the velocipede were probably seen even earlier in Europe. In the ancient painted glass of the church of Stoke Pogis (the churchyard of which, by the by, was the scene of Gray's famous "Elegy") may be seen a youth riding the wheeled horse amid a throng of admiring spectators. The paddle-wheel for boats is seen on the Assyrian marbles; and it is now suggested that the pyramids of Egypt may be built of artificial stone, made in the same way as that which the French have used on the Suez canal. It is well known that no stone like that of the pyramids is to be found anywhere in the vicinity, and this fact lends plausibility to the supposition that it is a manufactured material.

Sulphur in Louisiana. — Deposits of pure sulphur have been found in Louisiana. If they are extensive, the discovery is of more importance to the State than that of rich gold fields would be. All the branches of chemical manufacture which depend on sulphur will follow in the train of the discovery; and the making of sulphuric acid, soda ash, muriatic acid, bleaching powders, and a hundred other compounds largely used in the arts will directly and indirectly give employment to thousands of workmen, and add greatly to the commerce and the wealth of the region. It will also be the means of developing other mineral resources of the South, which at present are comparatively worthless. The deposits of manganese and saltpetre will become more valuable; and the increasing demand for artificial fertilizers may more readily and more cheaply be met.

Venom of Toads. — Shakespeare says that "the toad, ugly and venomous, wears yet a precious jewel in his head." In our day we have come to believe that the venom is as mythical as the jewel; but several foreign *savants* have been looking into the subject and assert that the matter exuding from the parotid region of the toad acts as a poison. Some of the savages of South America use this toad poison instead of the *curara*.

A Brief Solace for the Decapitated. — Claude Bernard has found that, if oxygenized blood be injected into the arteries of the neck immediately after decapitation, warmth and sensibility return, the eyes become animated, and display such perception that, if an object be shaken before them, they will wink, as if to avoid injury.

A Gigantic Gun. — A twenty-inch gun, to carry a ball of 1100 pounds, with a charge of one hundred and forty pounds of powder, has been made in Russia. It is destined for a two-turreted monitor, now building under the direction of Rear Admiral Popoff (an appropriate name!) of the Emperor's suite.

The Faraday and Graham Medals. — The Faraday medal of the Chemical Society is to be struck in palladium, and a quantity of this rare metal, sufficient for the medals of at least ten years to come, has been

presented to the society by a metallurgical firm in England.

A medal of the alloy of palladium and hydrogenium was struck, not long before the death of Graham, to commemorate his discovery of the latter metal. It bears on one side the effigy of Queen Victoria, and on the other the name of Graham and the words "Palladium — Hydrogenium, 1869." The medal contains 900 times its own bulk of hydrogenium, and since the thickness of the medal is 1 millimetre, a layer of hydrogen of a height of nearly 1 metre is condensed in that thickness of metal.

Saccharimetrical Congress at Berlin. — The modern tendency to organized action in every department of science, art, and — everything else, is curiously illustrated by a meeting which lately took place at Berlin. Some twenty-five chemists, whose chief business is the investigation and analysis of raw sugars, did there convene, and appoint special committees, — one to prepare a standard sample of pure sugar, another on the manufacture of perfect and uniform optical saccharometers, and so on, — and this is to be the beginning of a series of such sweet meetings. It is not stated whether the congress wound up with a dinner. If it did, no doubt there was plenty of confectionery and *bonbons*, and *eau sucrée* was probably the favorite beverage.

LITERARY NOTES.

When we recollect the "Annuals" that used to be the only handsome gift-books for the holidays, we have to admit that in this line of literature, if in no other, there has been a decided advance in our day and generation. Instead of sentimental trash, unworthy of even the meanest type and paper, we now see the best things of the best authors honored with the most exquisite art and taste of the printer and the engraver. And this year, it is a significant fact that one or two of the most beautiful books issued for the holiday season are of a scientific character. It is hardly possible in a brief notice to do justice to a work like "The Universe; *or the Infinitely Great and the Infinitely Little*," translated from the French of Pouchet, and published by Scribner & Co., of New York. We can do little more than call the attention of our readers to it, as a popular treatise on natural science which, even in the plainest typographical dress, would be of the highest value for the matter it contains; and which superadds to this intrinsic merit the very perfection of mechanical execution and pictorial embellishment. It gives you "apples of gold in pictures of silver," — a panorama of the animal and vegetable worlds, of the earth, sea, air, and sky, which is no unworthy reflection of the beauty of Nature herself. As an able critic has remarked, the book might well be entitled "Science Made Fascinating," since one cannot turn its leaves without longing to know more of the subjects of which it treats — the artists have so managed to captivate the eye and enlist the attention. We shall have occasion to refer to it again, and to draw some material from its rich and varied contents.

Another beautiful book, from the same publishers, is "*Bible Animals*," by the Rev. J. G. Wood, well known as a popular writer on natural history. In this large and admirably illustrated volume, we have "a description of every living creature mentioned in the Scriptures, from the ape to the coral." It has an equal interest for the student of zoölogy and of the Bible. The young and those of maturer years will alike find it attractive and instructive. The illustrations are not merely exquisite specimens of wood engraving; they are accurate pictures of the animals they represent taken from drawings by the best artists or from photographs brought home by travellers. But we must leave this book, like the other, to tell its own story to the eye; our limits do not allow us to describe them adequately.

Hours at Home, the excellent monthly published by Scribner & Co., deserves well the success it has won. The article on "Comfort in its Relations to Physical Culture" is of itself worth the price of the December number. "Twenty Minutes under the Knife" is a vivid picture of a surgical operation, both objectively and subjectively considered. "Bible Animals" and "Birds of Passage" are likewise excellent.

Messrs. W. A. Townsend & Adams, of New York, deserve much credit for their reprint of the *Chemical News*, the best paper of its class in England. They give all that is in the English edition, and add an American supplement, which has a value of its own. They are also the publishers of the "uniform American edition" of *Braithwaite's Retrospect*, which, by an arrangement with the eminent editors, they issue simultaneously with its appearance in London. That the work is invaluable to the physician, it is superfluous to state: it needs no indorsement from us at this late day. And we may say the same of the *Physician's Handbook* for 1870, edited by Drs. W. and A. D. Elmer, published by the same house. Its convenience and utility as a *vade mecum* for the medical practitioner are too well known to make any commendation from us necessary. *The "American Journal of Obstetrics*," though little more than a year old, has been so ably edited, that its reputation is established and its success insured. It is, moreover, one of the handsomest of our medical magazines.

"*Nature*" is the title of a weekly illustrated journal of science, published by Macmillan & Co. Its object is "first, to place before the general public the grand results of scientific work and scientific discovery, and to urge the claims of science to a more general recognition in education and in daily life; and, secondly, to aid scientific men themselves, by giving early information of all advances made in any branch of natural knowledge throughout the world, and by affording them an opportunity of discussing the various scientific questions which arise from time to time." The list of contributors includes almost every scientific man of eminence in Great Britain, and the opening numbers are all that we should expect from such a corps of writers. The paper is furnished in this country at the New York agency of the publishers, 63 Bleecker street.

"*Cyclopædic Science Simplified*" is the title of a handsome volume by Prof. Pepper, published by Scribner, Welford & Co. As a popular presentation of the leading facts and theories of physics, including all the latest discoveries, together with all the more important practical applications of the science, it is a model book. Chemistry also has a fair share of attention; and in both divisions of the book there is a profusion of experimental illustration, and of pictorial illustrations as well. "The Boy's Playbook of Science," and "Playbook of Metals," by the same author, have long been favorites with the young, and we have known decidedly old boys to read them with interest; but now they are unfortunately behind the times. This new book will more than fill the place of both, and deserves to be more than twice as popular.

Haydn's "*Dictionary of Dates*" is one of the most valuable books of reference ever published. Even if you have a dozen cyclopædias, you cannot do without it. There are things which you may search for in vain everywhere else, and yet find them here; and many things which you might find elsewhere are got far more readily and conveniently in Haydn. An item which it would take you half an hour to dig out from a volume on physics, or chemistry, or history, you find in half a minute in its alphabetical place here. If you want to know when the great earthquake at Lisbon occurred, turn to the word *Earthquake*, and you have a list of all the famous ones from B. C. 425, when Eubœa was made an island by one, down to those of 1868. If you are curious about the Cock-Lane Ghost, or Cod-liver Oil, or Coffee, you will find the leading facts and dates concerning each in their proper pigeon-holes on a single page. Under Photography, or any branch of science or art, you have every important process or discovery concisely recorded and dated; and so with all facts pertaining to the civil, military, and religious history of every race and country on the earth. The work has gone through thirteen editions in England, and the Harpers have now reprinted it here, with much new matter pertaining to the United States, which adds to its value for the American reader.

The same house has issued Hartwig's "*Polar World*," a popular description of man and nature in the arctic and antarctic regions. It contains all the original work, with additional chapters, and one hundred and sixty illustrations. It is every way preferable to the foreign edition — which can rarely be said of an American reprint.

Greenwood's "*Wild Sports of the World*," is another of the Harpers' recent issues — a book which will be in great demand with the boys about this time, and one which we can cordially recommend for them. And we may say the same of Du Chaillu's "*Lost in the Jungle*," which is just out. Both as a writer and a lecturer, the noted "gorilla hunter" is justly popular with the young.

Home Printing. — If a man wishes to be his own printer, he can learn how to do it in our advertising columns. The "Novelty Press" will not enable him to dispense with the Journal; but it will prove all that it claims to be, whether for work or play.

Medicine and Pharmacy.

M. VELPEAU.

(Continued.)

As a lecturer, Velpeau is not remarkable, though he is sufficiently fluent and pleasant. Some new comers find his French easy to understand; but though he does not mumble his words and splutter, as M. Roux did, yet there are several in Paris who speak very much plainer and better than he. I could cite Trousseau and Maisonneuve for examples. His tone is somewhat monotonous, and however enlivened by an occasional dry jest, there is neither much eloquence nor any brilliancy. But Velpeau's attraction is his fame, his knowledge, and the perfect flood of light which his vast experience enables him to throw on every subject. You feel that he utters opinions which you can set down as rules and axioms for your guidance in practice. He speaks *ex cathedra* upon every topic; his words are golden, for they flow refined from a vast mass of material collected during years of earnest toil, — a toil directed by an enlightened understanding, and guided by an acquaintance and comparison, with not simply the stores of the past, but with the improvement of modern research.

Old and antiquated notions, and an adherence to early impressions, however false, cling to some who are only distinguished by age, arrogance, and imbecility. But Velpeau, clothed in the ancient heavy armor of the veteran, still bears about him the keen and trenchant sword, as sharp and polished as that of any youthful

champion around him. He may hedge himself in with precedent and experience, but he is constantly re-examining his precedent, and weighing and comparing his experience with that of others, whilst none contribute more fresh additions to them than himself. As his English compeer across the channel, old Liston, said: "Age is not the test of experience; the possession of the greatest number of well assorted facts on any particular subject, whether they be got in five years or in fifty, constitutes experience."

Though Velpeau has a finger quite awry and misshapen, from some wound gained during the pursuit of his profession, I believe, yet this does not at all interfere with his manual dexterity. Not priding himself on it, he is yet ambidextrous. I shall be excused for saying that however skilful in this respect, he cannot surpass our countryman, Mott, who uses either hand, sinister or dexter, with the most perfect indifference to himself. I have seen Mott dissect out a tumor over the wrist of a patient, at a surgical clinique in New York, when he employed his left hand alone; the individual did not lose an ounce of blood, and there were the vessels flowing just beneath, which had been evaded with a nicety surprising to the beholder. We know that, with a few rare exceptions, including some operations on the eye, the surgeon had always better avoid display, and manipulate with the usual and most natural member.

Verily, there is a charm and an attraction about surgery, which deceives and captivates the young, the inexperienced, and the unwary. It operates directly upon the senses. There is a brilliancy and a decision about the movements of the glittering knife, which is entirely irresistible. It does its work so directly, suddenly, and without appeal. The sight of the sudden gush of life-blood welling up from the heart itself, has something about it which stimulates and excites; so that most men start to be surgeons as they do to be metaphysicians, but when they are past thirty they find they have been guilty of an expensive blunder, for the proportion of their medical to their surgical cases are as ten to one, and time and years are wasted in the attempt to make a Velpeau or a Malgaigne, when they might have been much more respectable and distinguished as a Trousseau, Bouillaud, or a Louis.

It neither requires talent nor genius to wield the knife, for the heavy and the phlegmatic, the stolid and the dull, operate when they cannot prescribe, and excise and amputate when they cannot cure. Traumatic injuries and morbid growths are rare in number and slow in formation, whilst medical cases are frequent and come thick and fast, at the same time they demand more time and care for their relief. To be a great *surgeon*, however, in the enlarged application of the term, requires all the qualities of the mere operator, as well as those of the judicious medical man; but there must also be the material to give experience, which only falls to the lot of a very few, even in the largest and most populous cities.

Among his peers, if peer he has, Velpeau is *facile princeps*. See him standing amid his gowned associates, as for example, when Orfila died, and his body was brought by them into the Church of Saint Sulpice, or when he walks into the Academy of Medicine, or sits around the table at the Ecole de Medicine, when they are examining by *concour* that fine band of talented young Frenchmen contending for places. Hear how many of them will quote him, Malgaigne, Nelaton, and Roux, and see how queer and characteristic he looks all the while. I always smile when I watch Velpeau!

His hand was sick last year, and it was curious to observe how the Internes flocked around it of a morning,—how the sisters, in white caps, brought flaxseed, and the nurses flew for laudanum, and everybody offered their services, whilst old Velpeau disdained them all, and quietly dressed it himself. He never had it done at home, as everybody else would, by some member of his household; but, like a surgeon, he kept it to be taken care of by men in the midst of that theatre, where it had daily, for so many years, been performing such feats. I often looked on and smiled at the fun. I think, on one occasion, he did let one of them tie it up when he got through, and I presume it will be traditional, or like an heirloom in the man's family.

Singular to relate, this ambitious acquirer of professional lore does not speak English. Like most of his countrymen, he is content with the French, which they think everybody either does or should understand, and if they do not that is simply their loss. One morning, winter before the last, he stopped two or three of us on the stairs, to assist in translating what a raw Irishman said, who was attempting to obtain a certificate of six weeks' attendance upon the surgical clinique.

Velpeau has received a notice in the "*Biographie Universelle des Contemporains*," published as far back as 1834, from which I gather and translate a few particulars (see fifth and supplementary volume).

"Alfred Armand Louis Marie Velpeau, Chevalier of the Legion of Honor, etc., is one of the most striking examples of what can be effected by energy of character, particularly when united to a happy natural facility. He was born in 1795, at Bréche, a small hamlet, eight leagues from Tours. His parents were poor but honest. After some medical studies in his native place, and in the hospital at Tours, he came to Paris soon after 1818, with four hundred francs, minus his travelling expenses. He lodged at seven francs per month, and expended ten sous (half-franc) daily for his meals. He was soon crowned at the *Ecole Pratique*, and nominated aid in anatomy. He gave private courses in anatomy, surgery, and obstetrics. Before 1830, he had triumphed six times at the *concour*, out of ten essays, and he was nominated surgeon to the Hospital La Pitié."

It would be needless for me to mention in detail his subsequent successes, or the list of works which he has written. Justly admired by the civilized world, with which his fame as a surgeon and physician was coëxtensive, when he died one of the great lights of the age was extinguished, and he is lamented by thousands in every land, who were guided by his precept or taught by his example. His genius, his aptitude for scientific investigations, the practical cast of his mind, coupled with his capacity for labor, placed Velpeau at the very summit of his profession in the most enlightened capital of Europe. There, for a great number of years, he was the chief centre of attraction for every one who visited France with a view to medical improvement.

CHLORAL.

In the October number of the Journal, a brief description was given of a new hypnotic, or anæsthetic, suggested by Dr. Liebreich, of Berlin. Since that time, we have patiently waited to learn what we could by observation and experiment regarding the nature and value of the new claimant to notice in the medical world. From a chemical point of view, what is chloral? Chloral is trichloromethylhydrocarbonoxyd, according to the German chemists, and if this name is not sufficiently long, they have another, which contains a few more letters. Chloral is one of the numerous bodies discovered by the great chemist Liebig many years ago, and is prepared by passing well dried chlorine gas through *perfectly pure* alcohol, for many hours, or as long as it is absorbed. The crude product is subsequently mixed with three times its bulk of oil of vitriol, and distilled at a gentle heat, and the distillate is required to be again distilled over quicklime. This process is the original one, but since the demand for chloral has become large, two new processes have been discovered by which the agent is manufactured much more readily and cheaply. Chloral is an oily, colorless liquid, which, when brought in contact with the sense of smell, is so acrid as to cause the tears to flow freely. It has a specific gravity of 1.502, and it boils at 95° C. It mixes in all proportions with water, and also with ether and alcohol. Chloral in itself is so unstable or liable to spontaneous change, that it is not suited to medical uses. When it is brought in contact with water or aqueous vapor, star-shaped crystals are formed, which are the hydrate of chloral. The hydrate is the form in which the agent is now in the hands of medical men for trial.

Chloral hydrate forms a hard, white, crystalline mass, quite soluble in water, and when pure has no smell of chloride of carbon, hydrochloric acid, or other odor foreign to the penetrating, acrid odor of chloral itself.

Hydrate of chloral is a very dangerous agent to employ in an *impure* state, as the usual or natural contaminating bodies are all deleterious or poisonous in their influence upon the animal economy. Among them may be named chloride of carbon, chlorous acetylene, etc. Some specimens which have come under our notice, gotten up by *enterprising* pharmaceutists without requisite chemical knowledge, are of a very dubious character, and in no sense represent the agent in its integrity.

Chloral belongs to that class of bodies of which chloroform is a member. The variation in chemical constitution is apparently slight, as the comparison of formulas show.

Chloroform, C_2HCl_3
Chloral, $C^4Cl_3HO_2$

It is apparent that chloral, when brought in contact with alkaline bodies, must suffer decomposition and split up, forming new bodies, prominent among which is chloroform. A theory like that of Liebreich, which led him to experiment with chloral and trichloracetic acid, was a natural but a bold one. If chloroform was the only product of the chemical change resulting, when these agents were introduced into the circulation, the experiments would have been less hazardous; but in addition to this body, formiates and carbonates of the alkalies must be liberated or formed. The researches are, in every respect, interesting in animal chemistry, and the results certainly demonstrate one important fact,—that very strange and anomalous bodies may have their birth and exist in the vital current, without serious disturbance to its normal condition.

The question whether the human organization, when made to subserve the purposes of the alembic in the laboratory, is capable of splitting up bodies, and of appropriating the new compounds as therapeutic agents, was a novel one; and although we cannot regard it as having been positively answered, yet some new ideas have been awakened, and valuable results must follow. We do not yet know how chloral produces its remarkable hypnotic effects upon the system, although the weight of testimony preponderates in favor of the theory, that the resultant agent, chloroform, does the work. The number of careful and well conducted trials with chloral, abroad and at home, have not been numerous enough to warrant the expression of any opinions regarding its positive value, but it is safe to say that it promises to be a great accession to materia medica. If it proves to be an unsafe agent, or inefficient, or of little practical use, still this will not in the least tend to dissipate the conviction that we are very near to some important discoveries in the department of therapeutical chemistry. These discoveries bear especially upon a class of agents which must stand to the race as do ether and chloroform, in conferring blessings beyond our powers of estimation. Suffering humanity needs a certain and safe remedy for producing sleep, and relieving pain. The want of healthful, restful sleep is causing so great mental distress to thousands that death itself is coveted as a relief. Oh, what a boon to the world would be the agent which had power to *force* the worn and jaded brain of the nervous and watchful to calm repose! The blessing would be even greater than anæsthesia has conferred. To the discoverer, we will build a monument higher than any that has hitherto been reared upon our earth.

The hydrate of chloral is given, dissolved in water, in

doses of ten, twenty, or sixty grains. It is also used hypodermically with safety and success. At present the price is somewhat a bar to its free employment, but soon we shall be able to furnish it at such low prices as will place it within the reach of all.

SOME NEW TESTS.

FOR IRON AND COPPER. — An alcoholic tincture of logwood constitutes a test for these metals of unrivalled sensibility. The hæmatoxylin combines with either iron or copper, immediately producing a pure blue color resembling that of the iodide of starch. The tincture is best prepared by macerating 12 or 15 parts of fresh thin shavings of logwood in 100 parts of alcohol. The alcohol should be previously purified by digestion on quicklime, and distillation from a glass retort. On adding a score of drops of this tincture to 200 cubic centimetres of water, free from iron and copper, the liquid becomes yellow if carbonic acid predominates, or rose-violet if the earthy or alkaline bicarbonates are present. If a clean iron wire be then introduced, the color will be seen to change in the space of one or two minutes, blue striæ forming round the metal and passing to the bottom.

FOR ARSENIC AND ANTIMONY. — When arsenetted and antimonetted hydrogen are made to pass over iodine, they form iodides of arsenic and antimony. This reaction may be made use of in toxicological investigations. For this purpose, when Marsh's apparatus is used, a small quantity of iodine should be placed in that portion of the tube where, commonly, the metallic mirror is made apparent; that part of the tube is gently warmed, so that the iodine coats the tube; and the gas is then made to pass, care being taken to keep the tube somewhat warm. Should the gas contain arsenic, a yellow-colored mirror will be at once observed; when the gas contains antimony, an orange-colored iodide of that metal is formed. The iodide of arsenic yields, when volatilized, yellow-colored vapors, while the vapors of iodide of antimony are of a deep red hue.

FOR IODINE. — Mix 100 grammes of water with 1 of starch and 1 of nitrite of potassa. Boil the mixture for five minutes, and, after cooling, pour it into a bottle. It can be kept thus for years. When required for use, take 10 c. c., add one single drop of hydrochloric acid. Take as much as a pin's head in size of the dry salt to be tested for iodine, place it in a clean porcelain capsule, and add one drop of the test-fluid last mentioned. When no iodine is present, no coloration ensues; but the least trace of iodine gives rise to a well-defined blue color. The liquid test-fluid, after addition of the acid, keeps quite well in a properly-stoppered small bottle.

UNDER THE KNIFE.

THE doctor continues rapidly deepening the gash, which was made from four to five inches long and two or three inches deep at the very first cut of his scalpel. As he cuts, he continues his clinical lecture, and explains why I feel so little pain. He says that "the nerves of sensation are most closely distributed all over the surface of the body, and that, therefore, the skin is the most sensitive part; in cases like this, when once the skin is cut through, the patient feels little pain from the deeper cuts of the knife; this is one reason why a good surgeon always makes a long slash, or a 'free incision,' at the very first touch of his instrument, that the pain may be, as much as possible, over at once, and that there may be no necessity for any after hacking and haggling; a clean cut heals very kindly, and an inch or two of it, more or less, is generally of not much matter. Once get through the outer envelope of the body, and the patient, while you are cutting through the subjacent tissues, feels little or no pain, except when —"

What! *What!!* WHAT!!! IS THIS?

A sensation as if a gallon of melted lead had been poured into my wound, and instantly permeated every artery and vein in all my body; as if I were out naked in a rain of boiling liquid caustic; as if I were in a shower-bath of melted brass; as if boiling pitch had been dashed upon my quivering skin, and were being peeled off, bringing with it each and every hair from all my body, and as if a million of fine cambric needles at a white heat had now been inserted to fill up the places where the hairs came out; as if I were stung by a million bees at once; as if every drop of blood left in me had been suddenly transformed into an aching tooth — then as if all these teeth were drawn simultaneously, and the hollows filled with melted gold; as if I had been turned inside out, as Munchausen served the wolf, and then flung on a hot sand-heap; as if I had been flayed alive, and then set to wade up Vesuvius knee-deep in liquid lava, and in a shower of red-hot cinders, without boots on, and with no umbrella; as if all my nails had been dragged off with blacksmith's pincers, and my finger-tips dipped in liquid sealing-wax; as if — Well, if you have ever enjoyed the luxury of having a dentist file a tooth with "a nerve exposed," and if you will imagine that delightful sensation multiplied by twenty-two thousand and eleven, and then complicated with neuralgia, tic douloureux, and cramps in the stomach, you may be able to get the ghost of a shadow of a faint approach to a remote comprehension of what I suffered in this one agonizing instant.

I again say "instant," for, though it leaves each fleshly particle of my body quivering with a sensation near akin to that feeling commonly known as having the "teeth set on an edge," the intense acuteness of the pain lasts but an instant — no mortal could endure it longer and remain conscious; in fact, fleeting as it is, I am only saved from a second faint by another timely dash of ice-water.

And what has happened is only one of those "exceptions" of which the doctor is about to speak, when the glass of water becomes necessary. *The scalpel has severed a nerve.* Though this exquisitely sensitive fibrilla, or remote offshoot of the brain itself, is probably not larger than a slender silken thread, the comparisons above written can convey but feebly an idea of the sickening pain occasioned by the cutting of the nerve-fibre. — *Mortimer Thomson, in Hours at Home for December.*

PHYSICAL CULTURE. — Perhaps I should say something here of that other physical culture which has become a mania in the Northern States; of those wonderful base-ball players who break their fingers and sprain their ankles; of college-boys who "train down" for boat-races, get heart disease by hard tugging at the oar, and die innocently young with startling suddenness; of "walkists" who esteem a leg as better than a locomotive; and of fancy navigators *qui trans mare currunt* in small boats, and get drowned. But all these are violations of what is the pivotal idea of whatever of value there may be in this article — COMFORT. Athletism is not the end and aim. It is only the means to a high Christian culture — the development of the sound mind in its necessary congener, the sound body. When we see a pack of school-boys in their wild play, exercising in the gymnasium, roaming fields and woods, or subjected to military drill, we can understand it. All they do lies in the channel of enjoyment, of amusement, happiness, and gratification of an honest pride. It is *comfort*, and that within proper bounds: not the false enjoyment which attends a debauch and is atoned for by a headache; not the pride which glories over a victory won by boat or ball at the cost of mutilated limbs or overstrained hearts. Good health, sound mind, pure hearts, true religion — these are the essentials of comfort. — *Dr. S. B. Hunt in Hours at Home for December.*

TO KEEP PURE AIR IN A SICK ROOM. — To avoid the foul gas produced by burning a kerosene lamp in a sick room or nursery, put the lamp in a wooden box (a raisin box will do) outside the window, with the open side of the box facing the room. The box can be fastened in its place in any convenient way. In ordinary weather the lamp will burn full as well outside, and the air in the room will be much purer.

A NEW STYPTIC COLLODION. — M. Carlo Paresi gives, in the *Gazette de Turin*, the following recipe: — Collodion, 100 parts; carbolic acid, 10 parts; tannin, 5 parts; benzoic acid, 3 parts. Agitate until a perfect solution is formed. It is of a brownish color, gives a pellicle similar to ordinary collodion, and instantly coagulates blood.

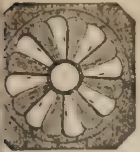
CINCHO-QUININE. — The large number of letters we are receiving by every mail from physicians residing in all parts of the United States, affords additional and strong corroborative evidence that we were not mistaken in our estimate of the value of a combination of all the bark alkaloids, in febrile and atonic diseases. Extracts from a few of these letters were given in our last number. It has long been known to a few physicians, that a mixture of the two sulphates, the sulphate of quinine and cinchona, supplied a more prompt and effective febrifuge and anti-periodic than either of the used singly; and now it must be generally admitted th the other alkaloids in combination diminish the un pleasant and increase the good effects of the drug. W do not expect that the cincho-quinine will prove equall satisfactory in every case, or that in every instance disease it will prove better than, or even equal to, su phate of quinine. It would be absurd to expect this. Bu that it is a very useful, and excellent, and cheap toni and febrifuge, cannot admit of a doubt. Its cost much less than sulphate of quinine, which is an im portant consideration.

VERMILION. — It is a fact, well known to artists, tha the splendidly bright color of vermilion (sulphide of mer cury) has a tendency, especially if it has been mixe with white lead, to become blackish brown and ver dark colored in a comparatively short time. This ten dency of the vermilion is altogether obviated if, previou to being mixed with oil, it is thoroughly mingled wit about one-eighth of its weight of flour of sulphur.

MEDICATED VAPORS. — Experiments are now in pro gress at the Neckar Hospital (Paris), and also at th Asylum for Convalescents, at Vincennes (France), upon the application of the vapor of water which has been caused to pass over various non-volatile salts, carrying with it a portion of them, to the treatment of disease Concerning the Convalescent Asylum at Vincennes, th *Gazette des Hôpitaux* reports, upon the authority of M Dionis, that of forty thousand convalescents admitted there during the past ten years, but one hundred and fifty-one have died, or in the proportion of one to five hundred and twenty-six.

TO GET RID OF COCKROACHES. — Under this head a Canadian paper gives the following, which would proba bly be improved for practical purposes by the substitu tion of *carbolic* acid for carbonic: — The *N. Y. Evening Post* says "take carbonic acid and powdered camphor, in equal parts, put them in a bottle, when they will become fluid. With a small paint-brush put the mixture on the cracks in places where the 'critters' hide, and they will come out at once, to certain death."

GARRATT'S



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This highly electrical *disk* (of *magnesite-zinc alloy* and *silver*) ields a minute but *constant primary current*, that can pene-ate the weakened underlying nerves and muscles, or deeper ated organs and tissues, so as to impart strength and tone, et is felt only as a pleasant, lively warmth. It is in effect ery efficient.

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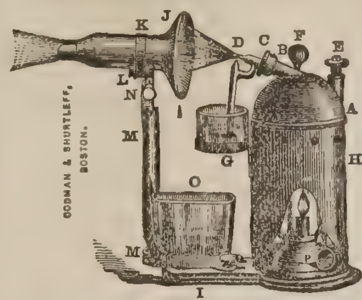

Fig. 15. The Complete Steam Atomizer. Pat. Mar. 24, 1868, and Mar. 16, 1869.

It consists of the sphere-shaped brass boiler A, steam outlet tube B, with packing box C formed to receive rubber packing through which the atomizing tube D passes, steam tight, and by means of which tubes of various sizes may be tightly held against any force of steam, by screwing down its cover while the packing is warm; the safety valve E, capable of graduation for high or low pressure by the spring or screw in its top, the non-conducting handle F, by which the boiler may be lifted while hot, the medicament cup and cup-holder G, the support H, iron base I I, the glass face-shield J, with oval mouth-piece connected by the elastic band K with the cradle L, whose slotted staff passes into a slot in the shield-stand M M, where it may be fixed at any height or angle required by the milled screw N.

The waste-cup, medicament-cup, and lamp are held in their places in such a manner that they cannot fall out when the apparatus is carried or used over a bed or otherwise.

All its joints are hard soldered.

It cannot be injured by exhaustion of water, or any attainable pressure of steam.

It does not throw spirts of hot water, to frighten or scald the patient.

Is compact and portable, occupies space of one-sixth cubic foot only, can be carried from place to place without removing the atomizing tubes or the water, can be unpacked and repacked without loss of time.

Will render the best of service for many years, and is cheap in the best sense of the word.

Price, $6. Neatly made, strong, Black Walnut Box, with convenient handle, additional $2.50.

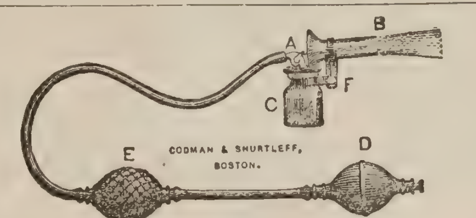

Fig. 5. Shurtleff's Atomizing Apparatus.
(Patented March 24, 1868.)

The most desirable Hand Apparatus.

Rubber warranted of very best quality. Valves of hard rubber, every one carefully fitted to its seat, and works perfectly in all positions.

The Bulbs are adapted to all the Tubes made by us for Local Anæsthesia in Surgical Operations, Teeth Extraction, and for Inhalation.

PRICE, $4.50.

Each of the above Apparatus is supplied with two carefully made annealed glass Atomizing Tubes, and accompanied with directions for use. The Steam Apparatus are tested with steam, at very high pressure. Each Apparatus is carefully packed for transportation, and warranted perfect.

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NASAL DOUCHE, for Treating Diseases of the Nasal Cavity, six different varieties, each with two Nozzles, packed . . . . $1.25, 1.50, 2.00, 2.50 and 3.50

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[For complete Illustrated Price-List of Apparatus, Tubes, etc., see Pamphlet.]

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Also an article by Dr. J. L. W. THUDICHUM, M.R.C.P., on

"A New Mode of Treating Diseases of the Nasal Cavity,"

WITH HIS FORMULÆ.

Also, an illustrated description of the *best apparatus* for the above purposes, and for producing Local Anæsthesia by Atomization with Ether, by the method of Dr. RICHARDSON, of London; or with Rhigolene, as described by Dr. HENRY J. BIGELOW in the *Boston Medical and Surgical Journal*, of April 19, 1866.

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"The Committee have no hesitation in awarding for this superb exhibition the highest premium. * * * * * The various other instruments for Inhalation of Atomized Liquids, and for Local Anæsthesia, were all apparently faultless, both in design and workmanship. The exhibitors are regarded as more especially deserving of the highest token of merit for having produced nothing except of their own manufacture.—**Gold Medal.**

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EDITED BY JAS. R. NICHOLS, M.D.

VOL. IV.—No. 8. BOSTON, FEBRUARY 1, 1870. [FIFTY CENTS PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE

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Contents.

Familiar Science.

THE STEREOSCOPE.

THE stereoscope is comparatively a new invention, dating back only some twenty years. A form of the instrument in which *mirrors* were used to produce the effect was devised by Wheatstone in 1838; but the stereoscope, as we are familiar with it, was invented by Sir David Brewster in 1849. The former is known as the *reflecting* stereoscope; and the latter, in which *lenses* take the place of Wheatstone's mirrors, is called the *refracting* or *lenticular* stereoscope.

We had taken it for granted that the philosophy of the stereoscope was generally understood, but a little inquiry among our friends—including some of the better informed among them—has satisfied us that this is not the case. Even some of our leading teachers know nothing about it. A few months ago, at a little gathering of gentlemen interested in physical science, the fact that the pictures formed in the two eyes are different was referred to by one of the company, together with the related fact that the two pictures of the stereograph differ in the very same way, when, much to the surprise of most persons present, both facts were squarely denied by a gentleman who had for many years been at the head of one of our best high schools, and for the greater part of the time a teacher of mathematics and physics. It was only after a long and rather lively discussion that he became convinced of his error. He had never before understood either the stereoscope, or the eye, so far as its action is like that of the stereoscope.

Why do we have two eyes, when we see but one image with them, and apparently one eye would serve to form that image? There may be other reasons for the arrangement, but the most obvious one is *that we may see objects solid*, or in relief, and not merely as pictures on a plane surface. It was not until Wheatstone made his experiments on binocular vision in 1838 that this matter came to be thoroughly understood even by scientific men. He showed that the pictures in the two eyes are not exactly alike, and that it is the blending of these two pictures which causes objects to appear solid.

A moment's reflection ought to satisfy the reader that the pictures in the two eyes cannot be exactly alike, since the eyes are not in precisely the same position with reference to the object. But if he "don't see it," a simple experiment will enable him to see it. Let him hold a book, or any other solid object, about a foot from the eyes, and look at it first with one eye and then with the other. He will find that with the right eye he sees a little more of the right side of the object, and with the left eye a little more of the left side. The same will be true, of course, whatever may be the distance of the object from the eye; though when the distance exceeds 250 or 300 feet the difference is too small to be appreciable, and objects beyond that distance are *not* really *seen* to be solid.

Now the stereoscope is simply a contrivance for blending two pictures which differ from each other as the images in the two eyes differ. When thus blended the pictures produce the same impression of solidity as the object itself does when viewed with both eyes. Hence the name of the instrument, which is from two Greek words, meaning *to see solid*.

How is this blending of the pictures effected? If we look at an object through the centre of a convex lens, it will be seen exactly in front of the eye; if we move the lens a little to the left, the object will appear to move to the right; if we move the lens to the right, the object appears to move to the left. If now we cut the lens into two semi-circular pieces, and place them side by side in a reversed position—that is, so that their thin or curved edges are adjacent, and their thick or straight edges are turned outward and parallel—the right eye will then look through the left half of the lens, and the left eye through the right half. If two pictures, like those of a stereograph, be placed at the proper distance behind the lens as thus divided and arranged, they will be seen, not in their actual places, but in a position midway between the two. The figure illustrates this: *m* and *n* are the halves of the lens; and A and B are the two pictures, which appear as one at C.

How are the two pictures obtained? They are photographs of the object taken from slightly different points of view. Theoretically, they should be taken from points separated by a distance equal to that between the two eyes, or about two and a half inches; and for all objects within short distances, this is just what is done. For objects farther off—as large buildings, or landscapes of considerable extent—photographers usually take the pictures from points farther apart; the distance ranging from a few feet up to a quarter of a mile. In this way, objects which are so distant that they are not really seen as solid with the unaided eye, are brought out into clear relief by the stereoscope. Even the moon may be made to show her rotundity of figure by means of this instrument. Although she always turns the same side towards the earth, she swings a little at times so that we get a view of a little more of her eastern or western side; and by taking advantage of this swinging (or *libration*, as the astronomers call it), photographs can be taken corresponding to the images in the two eyes—or rather, as Sir John Herschel has remarked, "it is as though the moon were seen with the eyes of a giant, placed thousands of miles apart." It has been suggested that similar photographs might be taken of the planet Saturn, with his system of rings. In this case, an interval of two or three years would be allowed between the times

of taking the pictures, in order that the position of the rings might change enough to answer the purpose.

A curious effect may be produced by tinting the pictures of a stereograph with different transparent colors. If, for example, one be colored blue and the other red, their blended image will appear purple; if blue and yellow be used, it will appear green; and so on. The colors are mixed *in the eye*, and the resultant color is precisely the same as if they had been mixed by a painter and applied to the picture outside the eye. We have seen French stereographs of statuary which illustrate this principle. One of the pictures is colored green and the other yellow, and the mixture of the two in the eye produces the exact tint of bronze.

Quite an amusing story is told of the first introduction of the stereoscope to the *savants* of France. The Abbé Moigno took the instrument to Arago, and tried to interest him in it; but Arago unluckily had a defect of vision which made him see double, so that, on looking into the stereoscope, he saw only a medley of four pictures. The Abbé then went to Savart, but he was quite as incapable of appreciating the thing, for he had but one eye. Becquerel was next visited, but he was nearly blind, and consequently cared little for the new optical toy. The Abbé, not discouraged, called next upon Pouillet, of the Conservatoire des Arts et Métiers. He was a good deal interested in the description of the apparatus, but unfortunately he squinted, and therefore could see nothing in it but a blurred mixture of images. Lastly Biot was tried, but Biot was an earnest advocate of the corpuscular theory of light, and until he could be assured that the new contrivance did not contradict that theory, he *would* not see anything in it. Under the circumstances, the wonder is that the stereoscope ever got fairly into France; but if you have any doubts on that point, a short walk under the arcades of the Rue de Rivoli, in Paris, will soon settle them. We question whether you will see anywhere else on earth more stereoscopes and stereographs than are displayed in the windows of the picture-shops of that noted thoroughfare.

HOUSEHOLD WARMTH.

In some observations regarding the evaporation of water in connection with stoves and furnaces, made in the Journal for December, it was stated that by heating air its capacity for holding moisture was increased; and the question is asked, if, in consequence of this elevation of temperature, it will not abstract moisture from our bodies, and thus rob us of that which is essential to health and comfort? This is a question very natural to arise in the mind of every one who reflects upon the important subject, and therefore we will give it a brief consideration. Undoubtedly warm air seeks moisture from all substances capable of supplying it. Air at a temperature of 65° F. is comparatively slow to abstract moisture; but, if it is heated beyond that point, its greediness increases at a rapid rate. The human body, as affected by warm air, is not like the walls of a room, and other substances with which it is brought in contact. It does not relinquish its aqueous constituents under the same laws; and we must regard it as a wise provision of Providence that the human organization is capable of resisting, to a very great extent, the influence of moisture-abstracting agents. We can live and enjoy the highest health in air so warm and dry that articles of furniture and books will warp and crack, greatly to their injury. These inanimate substances are forced, in obedience to general laws, to part with all of their contained moisture, when immersed in highly heated air. It has been said that the human body, physically considered, is made up of about a half dozen buckets of water, thickened with a few pounds of solid material. This is certainly a most homely way of stating a general truth. A man of ordinary size exhales or throws off from skin and lungs every day nearly a quart of water. Six adult occupants of a room will, during each hour, supply to the air nearly one half pint of water in the form of invisible vapor. This amount can be largely increased, under ordinary conditions, by elevating the temperature to a high point, and the increase will be mainly through the perspiratory functions. The stimulation of the functions of the skin so as to cause perspiration produces no sensation of *dryness*; excessive heat from furnaces seldom produces much perspiration. The peculiar air of a furnace, raised to a high temperature, affects the system through the nerves, rather than by stimulating the excretory organs. Neither warm dry air, nor cold dry air, robs the body of moisture, as they do fabrics of wood, cotton, or wool. The cold zero air of December contains scarcely a single grain of moisture to the cubic foot, and yet it is conducive to the highest health. A moist cotton garment will dry in it much quicker than in the hot air of a summer's day. It is evident we must seek some other explanation of the peculiar dry feeling of furnace heat, than that which attributes it to the abstraction of moisture from our bodies. The evaporation of large quantities of water in and upon furnaces and stoves affords after all but little, if any, real amelioration of our condition. The imagination has much to do with the supposed relief. A heated moisture-impregnated atmosphere is in no respect a comfortable one in which to reside. Do we not all dread the "dog days" of August, when the heat and moisture come upon us simultaneously? A dry air, whether it be cold and condensed, or warm and expanded, is, we are confident, more conducive to health, and better suited to the comfort or relief of invalids, unless in some special cases, than moist hot air. In the past three or four years we have advised invalids to remove water vessels from their stoves and furnaces, and give more attention to regulating the temperature of their rooms; and by following this advice, most striking benefits have resulted in every case. We wish distinctly to be understood as not attributing all the evil effects of anthracite stoves and furnaces to fitful temperatures, or to constant undue heat. There are other causes operating of a very serious nature, and these we will consider at a future time. We have now in hand a series of experiments in connection with furnaces, steam apparatus, &c., which will cover the whole ground of the comparative healthfulness of the various modes of securing household warmth, and we hope to be able to point out the real cause of the ill effects of anthracite coal fires upon the human organization.

PETRIFACTION.

A correspondent in the Onondaga Valley, where the "stone giant" has made such a sensation of late, writes to inquire whether earthy substances, as alumina, silex, etc., "will so combine with flesh as to become of stony hardness, or a petrifaction."

Every one who has read even an elementary manual of geology knows that the remains of plants and animals are found in the crust of the earth more or less *petrified*, or converted into stony matter. They are commonly known as *fossils*, a term which etymologically means nothing more than *dug up*. To the men of old time, and even to the earlier geologists, their occurrence was a riddle, and few considered them as other than mere accidents or *lusus naturæ;* but to the geologist of our day they are pictures in the great stone-book of the earth's history, illustrating the life that peopled the lands and the waters in pre-Adamite epochs, and indirectly the geographical conditions under which they flourished and became extinct.

A distinction is sometimes made between *fossils* and *sub-fossils*, as they are called. The latter are usually of more recent origin, and are only partially altered in texture; the former, as a rule, date back to earlier epochs, and the conversion into stone is complete. In the one case, the more volatile substances have been driven off from the plant, and the softer and more perishable tissues have disappeared from the animal, while mineral ingredients have been absorbed, to a greater or less extent, in place of the organic matter lost. In the other case, the vegetable, if not converted into coal, has been thoroughly changed by a slow process into stone, merely retaining its original organic form; and animal remains have undergone a similar metamorphosis, and are recognizable only through their forms and textures, which are unaltered.

What is the nature of this marvellous transformation from the organic to the inorganic state? It is not the result of a *combination* or *chemical union* of earthy matter with the organic matter, as the question of our correspondent implies, but rather a gradual *replacement* of the latter by the former. Particle by particle the organic matter disappears, and particle by particle the mineral matter takes its place; and so delicately is the substitution effected that scarcely a cell or a fibre is ever broken or displaced! The nature of the petrifaction will depend, not so much upon the composition of the plant or animal (though this will have its bearing on the result), as upon that of the mineral solutions which percolate the earth, the fossil being calcareous, silicious, ferruginous, and the like, according as the water contains lime, flint, or iron. In all cases, the process seems to be essentially the same; a gradual decay and dissipation of the organic atoms, and a gradual substitution, through permeation, of the mineral or inorganic.

In many cases the fossil itself is petrified anew, so to speak; that is, the mineral matter which was at first deposited is gradually dissolved out, and a new substance takes its place; or no new matter may be substituted, and merely the hollow mould may be left to prove that the organism was once there. Thus a shell or a coral, which consists of organized carbonate of lime, may be converted into the sparry mineral carbonate; and this may be dissolved and washed away, leaving a hollow mould marked with every ridge and line of the vanished organism; or this mould may be filled up again with silicious matter, so that the shell or coral seems to have been transmuted into flint, without losing the most delicate line traced on its original surface. The perfection with which the finest lineaments are thus preserved, after every particle of matter in the fossil has been twice changed, is almost incredible. As a writer on the subject remarks: "We have seen the faceted eyes of trilobites as perfect in form as when they received the rays of light through Silurian waters; carboniferous univalves with their color-bands still unobliterated; internal casts of *productæ* with their muscular apparatus displayed in a style of legibility to which no anatomical preparation could approach; and ink-bags of cuttle fishes so little changed as to furnish the pigments for their own portraiture."

Of course, all plants and animals are not preserved alike, nor are the same organisms always found in the

same state of preservation. Those that have partially decayed in the air before being imbedded in the earth will be less perfect than those that were buried by some sudden convulsion before decay had begun. The harder parts of plants, as roots, stems, and nuts, are more likely to be preserved than the soft and succulent portions. The shells, bones, teeth, and scales of animals will be found when all the fleshy parts have perished; and the larger and harder bones of a skeleton may be the only ones that escape destruction.

But the general nature of this process of petrifaction was all that we intended to discuss at this time. The subject is an interesting one in many of its details, and we may take it up again hereafter.

BATHING CHILDREN.

ORDINARY BATH.

Take some water, neither too warm nor too cold; pour it into a wooden tub or a large earthen vessel, such as a hand-basin; which should be of about the same temperature as the intended water. It is better not to use a metallic vessel unless it is a regular bath-tub. The water should *never* be so cold as to make the child *shiver* when put into it; and be very careful not to let the child strike the cold edge of the vessel, which is apt to frighten it and give future trouble when you attempt to bathe it at another time. See that the doors and windows are closed to keep little currents of air out of the room, which are apt to give it cold. The soap, towels and clean clothing for dressing the child again, should be got in complete order, and placed conveniently for use. Remove the child's clothing as you would at night, and be careful not to alarm it by anything you do. Place it sitting in the water, and then gently and rapidly wash the entire body, using some soap. The length of time the child should remain in the water must be left to the judgment of the mother; but in *no case* should it be continued until its lips and fingers become blue, or its teeth begin to chatter. Take it quietly out, and with a soft, dry, or even warmed towel, begin at the face and gently dry the entire surface of the body. Do not *scour* the skin with a single fold of the towel, but have it doubled. If you wish you may use a coarser towel afterwards. Dress the child as soon as possible, and be careful not to move it about the room too much before it is clothed, as you must remember a person moving about undressed becomes chilled much sooner than one who is kept quiet.

In the hot weather of summer, such a bath may be given once every day, unless there is some good reason for not doing so.

When a *bath* is ordered, a bath of *water* with soap is always meant, and in no case should mustard or anything else be used, unless you are told to do so.

SALT BATH.

This is given like the one just described, only you add as much common salt to the water as may be necessary. It is well to remember, that "salt cools water," as the saying is; so you must have the water rather warmer before the salt goes in than you wish the bath to be after the salt dissolves.

For the purpose of bathing, it will be found that the ordinary coarse salt is quite as good as what is called "rock salt."

HOT BATH.

This bath is not often necessary for infants or children, and when given, it should be by the advice of some competent person. Physicians frequently order it in certain affections of the chest, which usually occur in the cold weather; and, when ordered, do it as follows, unless a different plan is told you:—

Take an ordinary hand-basin, or, if it is not large enough, use a small, wooden tub, and stand it in front of a fire until the inside becomes quite warm. Then pour into it the water, which should be as hot as the child can bear without inconvenience. The skin of an infant is much more sensitive to heat and cold than a grown person's hand; so it is well not to forget that what may appear quite warm to you, will prove too hot to the child. As in the "Ordinary Bath," just described, see that every door and window has been closed, and let no one come into the room until the child has been bathed and dressed. The clothing should be carefully removed, and, while doing this, do not let the child become frightened, as it often will at your preparations. Then stand it in the tub, and, with a towel which has been dipped into the water of the tub, wash its limbs and the lower part of the body. The child should now be made to sit down in the water; then with the towel, wash the other parts of the body, neck, and face which are not under the water. Do it quickly, but *never* forget to be gentle. A little castile soap may be also used.

The length of time which the child should remain in the bath, must, as in other cases, be left a great deal to the intelligence of the mother; but usually it should not exceed two minutes. A good general rule, in the absence of a better one, is, to take it out as soon as the perspiration breaks out on the skin. Where the skin is wet this is hard to tell; but if you will look at the forehead, close to the hair little beads of moisture can be seen coming out on the reddened skin.

The child has now had the bath; but the more important things are yet to be done. The first of these is to have an old soft towel, which has been made quite warm at the fire; then begin to dry the face, neck, shoulders and downwards as far as you can. After this, lift the child from the tub and finish the gentle but rapid use of the towel. The clothing which is to be next put on should have been all arranged for use before the child's garments were taken off for the bath; and the linen, flannel, and whatever else is to be put on, all nicely warmed before the fire. Lastly, have a small blanket (the one used for the cradle will do), and after it has been warmed, wrap it around the child, secure it at the neck with a pin and the little one is ready for the bed. If all of these things have been done, and in this way the child feels quite comfortable, it would be a pity to put it into a cold bed; so, while you are dressing it, let some one take a hot iron, and with it go over the place in the bed where the child is to lie.

Arts.

CHEMISTRY OF THE EXPOSITION OF '67.

(Concluded.)

ARTICLES USED IN DYEING AND BLEACHING.

Aluminate of soda is obtained from cryolite in the manner already described. A better source is a mineral called beauxite, which contains sixty to seventy-five per cent of alumina. Aluminate of soda is used as a mordant, being preferred to alum in certain cases and for preparing alumina. A current of carbonic acid gas, passed through a concentrated solution of aluminate of soda, throws down all its alumina as a dense powder. From this precipitate are easily prepared the sulphate and acetate of alumina. The sulphate is a salt of considerable importance, for it can be sold cheaper and is purer than alum, and contains more alumina, weight for weight. It has also the great advantage of being entirely free from excess of acids, and therefore, for these reasons, will largely take the place of alum. To prepare the sulphate, the alumina precipitated by carbonic acid is simply dissolved in a little less than the equivalent quantity of sulphuric acid; but to make the acetate, the alumina must be thrown down by hydrochloric acid, else it will retain some carbonate of soda, which lessens its solubility in acetic acid. Where alum is used, the ammonia salt is often employed instead of the potash from its greater cheapness.

The use of bisulphite of soda for bleaching wool and vegetable fibres, is increasing. It produces a silky whiteness, that the hypochlorites will not give. The uses of hyposulphite of soda (as an antichlore) are also extending.

Dr. Smith gives details of several proposed methods for making chlorine, some of which may hereafter be of value, if the price of oxide of manganese should be enhanced, but at present they do not supersede the latter. He has no improvement to chronicle in connection with the manufacture of that important bleaching agent, chloride of lime or bleaching powder. The residue, after making chloride of lime, contains chloride of manganese and some free hydrochloric acid. This residue is utilized in various ways. By one process, peroxide of manganese is recovered from it, but it is rather an expensive operation, and, while the native oxide is so cheap, will hardly find general application. By another, it is made to assist in the recovery of sulphur from soda waste.

Another bleaching agent which is destined to be of great value to bleachers, if what is claimed for it is true, is permanganate of soda. Green manganate of soda, mixed with a certain amount of sulphate of magnesia, when treated with water, dissolves to a red solution,—the permanganate. The substance to be bleached is placed in this liquid for a short time, and taken out with binoxide of manganese precipitated upon it. This is removed by a weak solution of sulphurous acid. One or two repetitions of this operation are said to produce perfect bleaching. This, it will be at once seen, is a very expeditious process. Where it has been practically tested, it seems to work with great success. In order that it should succeed, it is necessary that manganate of soda should be cheaply made. This is done by a method to be mentioned further on.

COAL GAS AND UTILIZATION OF THE WASTE PRODUCTS OF ITS MANUFACTURE.

The exhibition of retorts and furnaces was very complete. Excellent clay retorts from both France and Germany were shown. The Reporter especially praises the establishment and productions of this kind of the Paris Gas Co. For heating the retorts, Siemens's furnaces have been advantageously used. Distributing pipes of many kinds were exhibited. A Paris firm displayed some bitumenized iron pipes. These pipes are no recent novelty, but within a few years their use has been greatly extended for carrying water as well as gas. There are, however, many objections to pipes of this description, and it is unlikely that they will replace the ordinary kinds for gas distribution.

In the way of meters, there does not seem to be any thing new or of especial importance. Wet meters are in general use on the Continent, and therefore particular attention is paid to their manufacture. In England, the makers of wet and dry meters are engaged in active rivalry. In this country, we believe that dry meters are considered the best, and are supplanting the wet altogether. In regard to regulators and burners, there does not appear to be anything of importance to private consumers.

The utilization of the waste products of the manufacture of illuminating gas from coal has become very complete. The value of coke is well known, and it is easily disposed of. The aqueous portion of the condensible vapors contains in solution various salts of ammonia. Treatment with acids, lime, and distillation, are different methods of obtaining the ammonia in salable form.

The tar is a very complex liquid, varying in quantity and composition with the quality of coal used and the temperature of the retort. It is divided into different substances by distillation, each having its special value and use. The more volatile portions are the crude naphtha and the light oil. These are mixtures of hydrocarbons, and are separated by fractional distillation into liquids of various densities, of use for many and various purposes, such as the production of benzol and toluol, from which are made the aniline colors, for varnishes, for solvents, for scouring, for burning, &c. &c. From light oil, too, is obtained carbolic acid, which has become a product of considerable importance. Its applications are very numerous, and its manufacture has very largely increased in late years.

The principal application of the creosote or dead oil is to the preservation of wood, particularly railroad sleepers. It has also some use as a fuel and as a lubricant. The pitch is applied to all sorts of uses, such as making patent fuel, artificial asphalts, &c. Besides the hydrocarbons that are now specially separated, great numbers of others exist in coal-tar, which are not well understood, but when better known will be found to have their particular value. After the removal of its condensible constituents, coal gas is further purified by passing it over or through various absorbents, usually lime, oxide of iron, and acids. The most important impurity

to be got rid of, is sulphuretted hydrogen. This is taken up by lime, either wet or dry, but the spent lime is a great nuisance. The spent lime of the wet purifiers is valueless, but dry lime can, by weathering, become of some use as a fertilizer.

Fresh hydrated sesquioxide of iron absorbs sulphuretted hydrogen readily. It is used mixed with sawdust, in order to present a large surface to the action of the gas. On exposure to the air, the sulphide of iron takes up oxygen with re-formation of the oxide of iron and separation of sulphur. The material thus revived can be again used to purify gas, and thus alternated, until it becomes too much charged with sulphur, when it is burned, for the production of sulphuric acid.

At some establishments the last traces of ammonia are removed from the gas by acids. Dr. Smith gives quite a detailed description of the principal aniline colors, and the modes of making them, mostly taken from Dr. Hofmann's report, but even the shortest summary of it would be much too long for our columns, and, besides, the subject has often been treated in them.

MISCELLANEOUS. PRODUCTION OF AMMONIA, BARYTA, MAGNESIA, OXYGEN, PHOSPHORUS, BROMINE AND IODINE.

Ammonia and its salts are entirely obtained from the ammoniacal gas-liquor. For many purposes they are taking the place of potash compounds. Dr. Smith has nothing new to say concerning their manufacture, but he figures a simple and very convenient apparatus for the distillation of ammonia. Compounds of baryta are coming into some use. The sulphate is made for use in painting, under the name of *permanent white*, but it does not mix well with oil, and has not sufficient body, so it has to be mixed with white lead. We fear, however, that sulphate of baryta is better known as the substance used by some unscrupulous manufacturers to adulterate white lead.

The only new application of magnesia is Sorel's use of oxychloride of magnesium. A mixture of chloride of magnesium with magnesia, like the oxychloride of zinc previously made by Sorel, solidifies in a very short time, forming a hard, smooth, close-grained, white, slightly translucent, stony mass. When new mixed, it can be moulded like plaster of Paris. This mixture can be used to cement together sand and other materials to make building materials, which, it is claimed, can be made very cheaply. In the last Mechanics' Fair, we noticed houses, emery wheels, building blocks and other articles made by a process of a similar character.

The exhibitor informed us that his company owned Sorel's patents for this country, but he claimed that they had made certain improvements upon them. Their articles appeared very well, but how they will bear the test of actual use, time only will show.

It is obvious that if oxygen can be cheaply made in large quantities, it can be put to very many useful applications. Many processes have been proposed to accomplish this most desirable object, but none of them promise to be of much importance, except Tessié du Motay's method by the use of the alkaline manganates.

This process has been fully described in our columns, and therefore we will only say here, that by it oxygen is obtained by passing alternating currents of air and steam over a heated mixture of oxide of manganese and soda. From the air-current oxygen is taken up, which is again yielded to the steam. This process is being tested on a large scale, and if successful, as it probably will be, cannot fail to be of very great value. We have already alluded to the use of the manganate of soda thus formed as a bleaching agent.

The production of phosphorus has largely increased, but there is nothing else worthy of notice connected with its manufacture. Amorphous phosphorus does not supersede the use of the ordinary form in friction matches. Many objections to it have yet to be overcome. The production and applications of bromine are increasing. Its latest use is in making some of the aniline colors. It is made from saline mother waters, but lately a new source has been found in the Stassfurt deposits, from whence large quantities are now obtained. The effect of this discovery will be to lower the price of bromine, which, of course, will have a tendency to extend its use. From the soda-nitre beds of Peru are now obtained considerable quantities of iodine. This locality will probably continue to furnish large amounts of this important article for years to come.

ARTIFICIAL ICE.—Ice has long been manufactured in parts of Europe, where the natural product is much more expensive than here; but it is only recently that the competition with "old Boreas" in this line of business has been attempted in the United States. Artificial ice is now made on a large scale in Philadelphia, and its cost is said to be only about half that of ordinary ice. The materials used are water, spirits of ammonia (commonly called hartshorn), steam, and salt. The retort is used for the heating of the ammonia. A coil of pipe, through which steam passes, winds around the interior. Eight hundred gallons of the ammonia are poured into the retort, and about twenty-four pounds of steam applied. The gas arising from the ammonia is conveyed into a pipe at the top of the retort. The pipe passes into a cooler filled with water, and thence into the liquefier. It now becomes a freezing cold liquid. Connected with the condenser is a pipe which carries this liquid into a series of pipes, which diverge through the freezing box. The latter is filled with a strong solution of salt and water, which, with the aid of the liquid ammonia in the pipes, causes an intense cold. Into the freezing box are introduced forty-eight brass boxes, filled with fresh water, each of them producing a 24-pound slab of ice, four inches in thickness, two feet in length, and one in breadth. It requires four hours to freeze the contents of the forty-eight boxes.

A DEEP WELL.

WE have received the following interesting note from Dr. H. Shidy, of the State Lunatic Asylum, Mo.:

"The article under this caption in the December number of your excellent JOURNAL contains several mistakes. St. Louis, Mo., has *two* of the deepest artesian wells in the world. One is at Belcher's Sugar Refinery, and, 'as long ago as 1854, this well had been bored to a depth of 2,199 feet,' where an abundant, self-discharging supply of water was obtained; but being strongly impregnated with sulphur and other impurities, which unfitted it for use in the refining of sugar, the work was abandoned, and has not since been resumed.

"The other well, the *deepest in the world*, was intended to supply the County Insane Asylum with water; and having reached a depth of 3,843 feet, six and one half inches, and penetrated some distance in the igneous rocks without obtaining water in any considerable quantities, boring ceased on the 9th day of August, 1869. The work had continued without interruption night and day for 1,235 consecutive days, or three years, four months, and twenty days."

GOLD AMONG THE BLUE NOSES.—The quantity of gold produced in Nova Scotia from the date of the first discovery of the precious metal to the end of 1868, a period of eight years, amounts to 160,000 ounces. The best year was 1867, when the yield amounted to nearly 30,000 ounces.

AMERICAN INVENTIONS ABROAD.

A BOSTON physician was in Paris the present year, and purchased there a microscope. He heard much of a new "oculaire" (*i. e.* eye-piece, as called by English and American opticians), lately invented by Hartnach, one of the most—and deservedly so—eminent of European microscope makers. Many American gentlemen had purchased this new "oculaire," and our friend also obtained one for his new microscope. His surprise was great, on showing his improved instrument, after his arrival home, when he was told that it was the solid eyepiece, which was invented and patented in 1856 by Robert B. Tolles, then of Canastota, but now of Boston, and was well known to, and extensively used by, American microscopists. C. S.

A CASE OF SPONTANEOUS COMBUSTION.

Editor Journal of Chemistry:

A merchant in this place received a box from Baltimore containing, among other things, ordinary bat cotton, and a can of Japan lacquer, or varnish. In transportation the can was broken, and the contents ran out, saturating one or two bats of the cotton. The box was received in the evening, and put in the store at night. When opened the next morning and exposed to the air, the cotton was found to be hot and smoking. The merchant took the precaution to lay it out at the door, when it ignited and blazed up. The cotton might have been taken out of the box the evening it was received, and carelessly laid aside, or it might have ignited before the box was opened; in either event the whole stock of goods would have been destroyed, and several houses in addition. The origin of the fire would, of course, have been attributed to an incendiary. The packing of Japan varnish with combustible articles, I suppose, is frequently done; and is it not well that the public should know the dangerous results that might ensue? I was ignorant of the fact myself, and I suppose others are also, as the box was put up by a reliable house engaged in the drug trade in Baltimore. There was nothing else in the box that could have had any agency in the combustion.

WM. H. BRAMBLITT, M.D.

Newbern, Va.

NEW KIND OF PAPER.—A new kind of paper, specially adapted for various kinds of clothing, has been invented in England. Both animal and vegetable materials are employed in its production, the latter being New Zealand flax, jute, hemp, and cotton, and the former wool, silk, skins, etc. These matters are reduced to a pulp and bleached, and then felted in appropriate machinery. The mixture of these materials gives a paper of extraordinary pliancy, flexibility, and strength, which may be sewn together as easily as woven fabrics, and make as strong a seam. Among the articles made of the paper are quilts and table-cloths, stamped with patterns of great beauty, curtains, shirts, and various other articles of dress; a very good imitation of leather is made of it, of which furniture coverings and even shoes may be made. The last may be rendered waterproof by the introduction of oils and India-rubber.

THE SANDWICH ISLANDS.—A few weeks ago we listened to a very interesting and instructive lecture upon the Sandwich Islands, given by Mr. George S. Chase, before the Y. M. C. Association, at Haverhill, Mass. Mr. Chase, who has charge of the publishing department of the JOURNAL, has been a very extensive traveller, having travelled around the world, and visited almost every country in both hemispheres. He writes with ease and fluency, and his narratives of personal observations and adventures are graphic and comprehensive. An evening can be very profitably and pleasantly spent in listening to his narratives of travels.

Agriculture.

A SCHOOL OF AGRICULTURE.

Since the publication in the Journal of some remarks regarding the Agricultural College at Amherst, a very considerable curiosity has been manifested by our readers, to learn what kind of an agricultural school or "college" we would suggest, as promotive of an intelligent and successful husbandry. When pressed for a reply to the question, in private, we have said that the *first* lesson we would teach farmers in "our college" would be, how to turn oil of vitrol out of a carboy, and not spoil the clothing; *second*, how properly to dissolve bones, prepare phosphatic fertilizers and efficient composts; *third*, how to use and how to take care of agricultural implements; *fourth*, how to lay drain tile; *fifth*, how to plow and pulverize land so as to fit it for seed; *sixth*, how to make and save manures; *seventh*, how to feed and properly take care of stock; *eighth*, how to keep buildings and fences in order; and, *ninth*, how to keep, systematically and accurately, farm accounts. Although this synopsis of a course of instruction in agriculture has been given partly in jest, still, upon consideration we are convinced that the points embrace about everything which modern science can teach farmers, or nearly all that is necessary to be known to attain the highest success in soil cultivation. While a knowledge of the higher branches of mathematics and of the natural and physical sciences is very gratifying and desirable, still the possession of such knowledge does not necessarily make good farmers. Indeed, we can conceive how in the acquirement of these branches of learning, a very promising boy-farmer may be spoiled for any good practical work in husbandry. Agriculture can hardly be called a science; it is an art, a vocation, which science can assist in perfecting, just as it does assist in facilitating all industrial pursuits. Agricultural labor is so modified and interfered with by meteorological and other uncontrollable influences, that it cannot be classed among those pursuits where fixed results may be expected from a definite course of procedure. While it is true that not a single movement in the progress of the growth of a plant can be made without involving chemical changes, chemistry is incapable of explaining the exact nature of these changes, and also it is incapable of pointing out methods by which certain and positive results may be reached. In our view, a good and sufficient agricultural education may be acquired without a four-years' college course of study, without the aid of extensive laboratories, museums, herbariums, or mineralogical cabinets. We believe what is needed for the interests of agriculture is not so much "agricultural colleges," where young men are to have prolonged training in such branches of study as are taught in our ordinary educational institutions, but schools to which active farmers and their boys may resort in the winter months, and learn by observation and experiment how practically to conduct farming operations to the best possible advantage.

Let us draw the outlines of such a school. In the first place, we would locate the school — or "college," if you prefer—upon a farm which has been under thorough, judicious, and enlightened cultivation, and which has the variety of soils, the uplands and the lowlands, the northern, southern, and other exposures, needed to show the influences of meteorological agencies upon crops. We would have the farm buildings plain but substantial, and combining every improvement of tested, practical value. There should be a herd of fine animals, embracing the different kinds of stock, with horses, sheep, pigs, and poultry. The arrangements for supplying water, foddering the animals, and saving the liquid and solid excrement, should be of the most inexpensive, but efficient character. The tie-ups, the stalls, the pens, the root cellar, the tool-room, the grain-bins, the food receptacles, should be most convenient, accessible, and kept in perfect order. A set of farm implements should be provided, embracing every kind which upon trial has proved to be labor-saving and useful. In brief, this is the farm.

Now another building is needed, which we will call "the College." This may be a plain, substantial structure, with dormitories, kitchen, and two or three lecture rooms. It should not be large, as it is not desirable to have a great number of "students" congregated together. It will probably be better to increase the number of "colleges," if needed, rather than have large institutions, as in this way they will be brought within easy distance of farmers' homes. There should be a very broad, cemented, well-lighted, and warmed basement, to be used as a "laboratory." Here we will place our carboys of acids, and our barrels of "salts and alkalies," to be used in compounding our fertilizers and making composts. As the time of greatest activity in the college will be in the winter, when farmers are comparatively at leisure, it will be well in the Northern States to provide a capacious cellar with a soft bottom, for the purpose of giving practical instruction upon the philosophy of land drainage, and the method of laying tile and stone drains. We need not particularize further as regards what will be required. The necessity of having a full assortment of all kinds of the best seeds, and perhaps dried plants, for examination and study, and also a moderate quantity of chemical "tools" and re-agents, to illustrate some of the most simple and easily understood chemical reactions, will be apparent.

Now as regards "term time," students, and methods of instruction, we propose to have school open in the winter months, to receive pupils direct from the farms of all ages and conditions. Of course, the very young and the very old would not wish to resort to it. One class of students — the active, busy farmers, whose duties will not allow of protracted absence from home — may "graduate" after *one or two weeks* of study. There should be a special course of instruction for such, eminently *practical* in its character, without long lectures or learned essays. The fertilizers and composts should be prepared under their eyes, drain tile laid, short discourses given upon stock, grains, plowing, saving manures, making manures, etc. Every suggestion and every facility for obtaining valuable information should be afforded, and also a free range given of all the departments of the school and farm buildings.

Another class — farmers' boys, who can attend school in the winter months—may be "graduated" in three, or perhaps four, months. The course of instruction in connection with this class should be plain, concise, useful, and have direct reference to the duties of the farm.

Still another class, who desire practical instruction upon the farm in the summer, may remain a year, not longer. The first class of farmers may take a second or third term of instruction of a week or two, if they desire to do so. Indeed, progressive farmers would probably like to spend a short time at the school each winter, to keep themselves informed of every thing new in agriculture; and to this there can be no objection.

The "Professors" in this school should be no *second* or *third rate* men, no quacks or pretenders. A thorough, practical, operative chemist, with a clear knowledge of farm pursuits and duties, would be required for the "chair" of chemistry. A man acquainted with fruit and vegetable culture, with the selection and preservation of seeds, &c., would be needed. A good, sensible, wide-awake farmer must have charge of the farm and farm buildings, and perhaps one or two assistants may be required in the institution.

This is a very rough and imperfect outline of a plan of an agricultural school, which we are confident would be of incalculable service to the interests of agriculture, if it were established. Its influence upon farm pursuits would be immediately seen, and an improved and more profitable husbandry result, whenever farmers could avail themselves of its advantages. The plan is economical of time and money, and it brings agricultural education home to the door of every earnest, industrious cultivator of the soil.

OATS CHANGING TO RYE.

Editor Boston Journal of Chemistry: —

I noticed in the October number of the Journal of Chemistry, that a correspondent has revived the long disputed question whether oats, sown in a pasture and fed down by animals during summer, will change to rye the following season.

The solution of this question involves the principle of transmutation of species. Professor Agassiz, when speaking of transmutation, says: "I nevertheless insist that this theory is opposed to the processes of nature as far as we have been able to comprehend them, and that it is contradicted by the facts of embryology and paleontology." Professor F. J. Pictet, the distinguished French naturalist and paleontologist, says: "The theory of transmutation of species appears to me entirely inadmissible, and diametrically opposed to all the teachings of zoölogy and physiology."

Now, there appears to be no doubt that oats and rye are distinct species. They are very different in form, and are ranked by botanists as belonging not only to different species, but also to different genera. They have never been known to hybridize, which is the surest proof of their specific difference. If, therefore, the opinions of these two great masters in science are correct, oats can never change to rye.

But, if we adopt Mr. Darwin's theory, that species are transmutable, the case under consideration will not fall within the circle of conditions which that theory requires. Mr. Darwin says: "New species have appeared very slowly, one after another, both on the land and in the waters." The change, therefore, by which one species is evolved from another, is the result of a long and gradual process by repeated reproduction in plants from the seeds, and could not take place in one season, as in the changing of the oats to rye. Many years, perhaps centuries, would be required to cause a divergence sufficient to produce a specific difference.

In the case of the oats, nothing has really been done to change the nature of the plant, except to cut off or bite off its leaves. It seems to me that it would be just as reasonable to suppose that cutting off the ears of a mule would change him to a horse, as that biting off the leaves of oats would change them to rye. But, so far as I have known, when the experiment has been made to test the truth of such a change, it has entirely failed. A careful examination of the process of the fertilization and the embryonic development of plants would, I think, convince any one of the utter absurdity of such a transformation. The cases adduced in proof have, no doubt, orig-

inated with superficial observers, and on thorough examination would be found to involve some latent fallacy adequate to account for the supposed transmutation. P.

Washington, D. C.

GIRDLING FRUIT TREES.

EVERYBODY has heard of the rascally act of certain miscreants in Michigan, who girdled fifteen hundred fruit trees belonging to a man against whom they had a grudge; and likewise how the neighbors turned out *en masse*, and bandaged the trees with cloth strips dipped in great kettles of heated sealing-wax. The outrage was repeated, and again the friendly surgery of the neighbors came to the aid of the mutilated trees, though, as was stated at the time, with small hope of saving them. The sequel of the history does not appear to have become so generally known. Strange to say, the trees all lived, and bore such fruitage as had never before been seen in that region. The marvel has made a great sensation in the vicinity, and the theory has been promulgated that fruit trees can be made to bear more abundantly by girdling them. This would seem to be rather a hasty generalization from the facts in the case, and we advise our orchardists not to try the experiment upon too many of their trees at once. Some have suggested that, though the interception of the sap in the girdled trees has caused fruit to grow instead of wood this season, the real trial of the trees will come next year. Time will show; and, as we have had occasion to tell farmers more than once, they must wait until time *does* show results that can be *depended upon*, before they are in haste to jump at conclusions. An experiment in farming is seldom worth a copper if it has not continued for *five years* at least. *Sequence* is very likely to be confounded with *consequence* (the *post hoc* with the *propter hoc*, as the logicians would say), if this rule is not borne in mind. It is a pity that writers on agriculture and teachers of agriculture so often forget it.

FLIES ON HORSES.—The following is given as a preventive of horses being teased by flies: Take two or three small handfuls of walnut leaves, upon which pour two or three quarts of cold water; let it infuse one night, and pour the whole next morning into a kettle and let it boil for a quarter of an hour. When cold it will be fit for use. No more is required than to moisten a sponge, and before the horse goes out of the stable, let those parts which are most irritable be smeared over with the liquor, viz.: between and upon the ears, the neck, the flanks, etc. Not only the gentleman or lady who rides out for pleasure, will derive pleasure from the walnut leaves thus prepared, but the coachman, the wagoner, and all others who use horses during the hot months.

THE RAIN-FALL OF AUSTRALIA.—The mischief done by clearing a country of its forests has in some cases undoubtedly been over-estimated, but man cannot always remodel nature with impunity. In Australia, since 1863, the rain-fall has gradually diminished from thirty-seven inches in that year, to seventeen inches in 1868. This year, the fall during the two wettest months has been unusually small. In the Colony of Victoria, the government has appointed an Inspector of Forests, whose duty is to prevent the destruction of forests, and to establish nurseries of young trees in favorable localities, with a view to replacing, to some extent, the wooded districts that have been cleared.

Boston Journal of Chemistry.

BOSTON, FEBRUARY 1, 1870.

THE "WATER" QUESTION.

THE *N. Y. Medical Gazette* (a journal, by the way, conducted with much spirit and ability) in commenting on the views presented in the JOURNAL regarding the evaporation of water upon stoves and in furnaces, remarks as follows:

"It may be news to the chemical gentleman in question, to learn that there are certain physiological phenomena connected with excessive or defective humidity of the atmosphere; that under the latter condition, owing to the affinity of air for moisture, the respiratory surfaces will be refrigerated and dried by unusual evaporation from them; and that the same process, to a less degree, affects the whole surface of the body. Now, granting that in a literal sense, none of the existing moisture is expelled from air by raising its temperature, an immense relative reduction of its humidity is thereby effected. Suppose, for instance, that the atmosphere of a room of two thousand cubic feet contents have its hygrometric capacity for moisture satisfied on a freezing morning. We build a good fire in a stove and warm this room to, say, 75° Fahrenheit; and in doing this we so reduce the *relative* amount of moisture, that at least a pound of water is required to bring the air to the same condition in which we found it. And what is more, the thirsty air will have this water in some way, and, if we do not supply it by evaporation from external sources, will, to use a vulgar but appropriate slang phrase, 'take it out of our hides.' For our own part, we prefer the former alternative."

"It may be news" to the gentlemen of the *Gazette* to learn that millions of the human family are living under conditions where the "respiratory surfaces" are constantly being "refrigerated" and "dried" by zero air. These people manage to maintain a very tolerable degree of health, much better, we venture to presume, than a majority of those who are steaming themselves over furnace evaporating pans in dwellings in cities. The cold air of high northern latitudes is *very dry*, and in passing into the respiratory organs it has its capacity for moisture increased by warmth. Does it rob the air cells of the lungs of moisture, to the injury of health? Experience and observation prove that it does not. Robust health attends upon those who live constantly in the dryest air. The dry air of Minnesota and New Mexico is resorted to by invalids for sanitary reasons.

Dr. Hayes informs us that he has lived for months in the Arctic regions, when the air of the ship's cabin was so dry as to cause the panels and mouldings to shrink until they almost fell from their places, and yet he suffered no inconvenience or injury to health.

The views expressed by the N. Y. medical gentleman are based upon the vulgar notion that the human organism and inanimate objects are alike influenced by dry air. The human body is a very complex piece of machinery, and its relations with external objects are very imperfectly understood. Enough, however, is known to prove that it cannot safely be compared with anything but itself, in all its physical and chemical changes. The experiment suggested by the *Gazette*, to be made upon a "freezing morning," should, theoretically, give the results indicated, yet practically it would not. The gentleman need entertain no fears of having "a pound of water taken from his hide," if he builds a rousing fire in his cold parlor some "freezing morning." If he will watch the indications of the wet and dry bulb thermometers, it will be seen that the supply of moisture very nearly keeps pace with the rise in temperature. Precisely how or where the thirsty air obtains its moisture so readily and rapidly, we do not know, but abundant proofs exist that but little of it comes from "our hides." It is possible that cold dry air suddenly warmed in our rooms has a power of absorbing moisture from the outer air through channels entirely unrecognized by us. The popular notions regarding the importance or necessity of throwing into our rooms large quantities of moisture from artificial sources, are due principally to inventors and makers of new patent stoves, new evaporating devices and "hygrodeiks," and have about as much scientific value as any of the taking newspaper advertisements. We are sorry to see first-class scientific journals following in the lead of these enterprising advertising philosophers.

THE RE-CAPITATED BRAZILIAN.

OUR readers have seen the story which has been going the rounds of the papers regarding a convict in Brazil, Aveiro by name, who was executed by decapitation in company with another prisoner, and who, having the other man's head placed upon his bleeding trunk by Dr. Lorenzo y Carino, a physician of Rio Janeiro, "recovered," and ran away with a head not his own. This story is defective in several particulars. To increase the interest and wonder, the head should have been placed upon Aveiro's neck *with the face to the back* instead of in its right position. Under the influence of Dr. Carino's "wonderful electricity," the wound would undoubtedly have healed just as readily, and the man would have "recovered" just the same. What an interesting "physiological experiment" this would have been! It is true that Aveiro would be put to some inconvenience by the novel position of the "face divine," but the "little stiffness" in the neck spoken of in the statement, which he experienced for some months, might possibly have been avoided. It would be a little awkward to have to turn the back to a friend to make a bow, and also, in walking backwards, there would be danger of tumbling over fences and into ditches. Notwithstanding these disadvantages to the individual, we are sorry for "science" that Dr. Carino did not stick on the head the other way. If Barnum could get hold of Aveiro, even as he is, and conjoin him with the Cardiff Giant in one grand exhibition, they would "draw" immensely. Of course the Brazil story is true, for it has not only been copied into the newspapers generally, but also, in all soberness, into many scientific journals of high pretensions.

VACCINATION.—The recent attempts made in England and to some extent in this country, to create popular prejudice against kine-pox vaccination, cannot but be deprecated by every well-wisher to the race. The writer or public speaker who in this epoch of time denounces and condemns the great discovery of Jenner, must be either a fool or a knave. If the utility of any principle or discovery has been fully and conclusively verified and established, it is that of Jenner, which stands as a guardian angel to shield us from a disease, the bare contemplation of which fills us with horror.

The outcry against vaccination is based on the plausible and taking theory, that dreadful diseases are communicated through the act of vaccination. In general, this theory is unqualifiedly false, and its promulgation is worthy only of quacks and charlatans. In the millions who have been brought under the protective influence of kine virus, not one per cent. probably have suffered extraneous injury in any form. The investigations and researches upon this point have been of the most

extensive and reliable character, and the testimony to the safety of kine-pox vaccination, when properly performed, is satisfactory and conclusive.

Let none of our readers be led into the serious error of imbibing prejudice against vaccination. As they value their own lives and those of their little ones, let them avail themselves of the "great protection." Commendable care is exercised by all respectable physicians in the selection of matter, and they are the proper persons to attend to the service.

A Case in Court. — The case of Mr. Wellington, a lawyer of this city, who was badly injured by a kerosene lamp explosion last spring, came up for trial a few weeks since in the Superior Court. Mr. Wellington, who resides on Temple St., purchased the spurious kerosene of one Chase, a dealer, on Cambridge St., who in turn purchased it of the Downer Kerosene Oil Co. Mr. W., instead of prosecuting Chase, went back of him, and claimed damages of the Downer Company. When the case came up for trial, Judge Lord ruled it out of court on the ground that no action would lie against parties not directly concerned in causing the damage. The direct agent was Chase, and Downer only the indirect agent. He could not be made to suffer, so long as he had nothing to do in the sale of the naphtha to Wellington. This is undoubtedly good and safe law, which will be sustained on appeal to the Supreme Court. Messrs. Downer claim that they sold the article to Chase as "naphtha spirits," and he sold it to Wellington as "burning fluid." It is earnestly to be desired that the villains who are making and retailing the death-dealing illuminating fluids, should be made to suffer. There is law enough, and it is evident that juries are ready and eager to convict, so soon as instances of fraud are properly brought before them. Let the people protect themselves.

Kind Words From Subscribers. — A farmer subscriber in Vineland, N. J., in sending for the back numbers of the Journal, remarks as follows: "The long evenings now afford me a good chance to read the back numbers of the ever-welcome Journal of Chemistry. I like your Journal very much, and I wish I had taken it from the beginning. I should like to procure and read all the numbers of the former volumes."

Another subscriber in Medina, Ohio, says: "I have taken the Journal one year, and it has given me the greatest satisfaction. Many a pleasant hour have I spent in perusing its interesting pages, and I am certain that any one number is worth more than you ask for a volume." Another says: "When your Journal was brought to my notice by a friend, and I was advised to subscribe for it, I said, What do I want of a journal of *chemistry?* I am a plain farmer, I can't understand it. But, thanks to my good fortune, I *did* subscribe for it, and now I find I *can* understand the Journal of Chemistry. It has been *worth its weight in gold to me.* Every number is read and re-read, by all the members of my family, and we wait for its monthly visits with much impatience." Still another says: "If the question came between giving up the little Chemical Journal and the half dozen other papers I take, I should let them all go, and hold on to the Journal."

Nearly every mail brings a dozen or more letters containing just such kind words of encouragement as is presented in the above extracts.

Coal-tar Paint. — Some months since allusion was made to the use of coal-tar paint in the Journal, and its application to shingled roofs, fences, &c. recommended. Since that item was published, we have been led to investigate the liquids which are largely used under the name of "coal-tar paint," and we regret to say that most of them are nothing more than crude coal-tar taken from gas-works and thinned with naphtha. This gross product holds ingredients positively injurious to woody fibre, causing in it speedy disintegration and decay; such are free ammonia, sulphur, and organic acids. The "paint" we intended to commend is prepared from asphaltum, the solid product of coal-tar distillation. This substance, when dissolved in naphtha or turpentine and mixed with oxide of iron, forms a very good and safe paint, but the filthy and deleterious coal-tar must never be used upon wood-work. As it is difficult for most of our readers to know regarding the nature of the coal-tar substances employed by painters and roofers, it will perhaps be the safer way to refuse to have any of the "paints" applied to buildings.

☞ That sterling publication, the *New York Medical Journal*, edited by Professor Dunster, and published by D. Appleton & Co., makes the following pleasant allusion to this Journal and its editor in the December number:—

A Commendable Example. — Dr. James R. Nichols, editor of the Boston Journal of Chemistry, — by the by, the most wide-awake journal of its class in the country, — gave a handsome entertainment to the Essex North Medical Society, at its recent fall meeting. During their entire visit to the doctor's farm, "Lakeside," it is said that not a "case" was mentioned, nor were pills, boluses, or powders, even alluded to. The whole affair was devoted to recreation, and we are sure no class stand more in need of it than our hard-worked profession.

To Delinquents. — We send bills in this number to a few delinquent subscribers, and we hope that not one of them will delay a moment in sending along the small sum of fifty cents, which is due. If one of these missives happens to be found folded in the Journal of any good, prompt, paid-up subscriber, let him regard it as a mistake. Do not upon any account sit down and write a scolding letter about it.

Velpeau. — The interesting sketch of the great French surgeon Velpeau, which we have published in the Journal, was written by Dr. F. Peyre Porcher, of Charleston, S. C., a gentleman of much culture, and who is known to many of our distinguished physicians.

☞ We recently made analysis of a specimen of whiskey sold by a town agent, which gave the following result:

Alcohol,	39 parts.
Sugar,	3 "
Burnt Treacle,	1 part.
Sulphuric Acid,	trace.
Water,	57 parts.

A very poor specimen of whiskey certainly, to be sold under State authority.

EDITORIAL NOTES.

Terrestrial Ups and Downs. — Land is going up, in other than a commercial sense, in some parts of our planet, and down in other parts. The islands of Jersey and Guernsey are slowly sinking, though they will keep above water for some generations yet. Meanwhile new islands are lifting themselves into view in the western hemisphere, and Chili and Sweden are likewise coming up. The earth hath its undulations, as the ocean hath, though the rise and fall of the terrestrial waves are more gradual.

Fossil Shells filled with Blue Vitriol. — An immense bed of fossil shells has lately been found in southeastern Russia. The shells are filled with beautifully crystallized sulphate of copper, from which it is proposed to extract the metal. This is a good illustration of what we have elsewhere said of the replacement of organic by inorganic matter in the process of petrifaction.

Liquid Fuel for Locomotives. — Naphtha has been tried as a fuel for locomotive engines, both in France and in Russia. A heavy train has been run at a speed of forty-six kilometres (almost twenty-nine miles) an hour, on an ascending grade, between Paris and Strasbourg, with a consumption of oil at the rate of from three and a half to five kilogrammes (about seven to eleven pounds) per kilometre. The experiments were under the direction of St. Claire Deville, and the results are considered very satisfactory; as was also the case with the trials of the same fuel in Russia.

Underground Dwellings in Africa. — Dr. Livingston, who was safe at last accounts, reports that he has found tribes in Africa living in subterranean villages. Some of their excavations extend for thirty miles, and have running rills in them. A whole tribe could stand quite a long siege in these singular abodes. Whether they have underground railways, as their African brethren in this country did in former days, is not stated.

The best way of Slaking Lime. — A French engineer has made an able report on the economy of using lime ground to a fine powder, instead of slaking it in lumps. He estimates the loss in using lumps at twenty-five per cent. Besides this saving of material, it is found that lime in powder is spread with greater facility, and the mortar thus made sets quicker, and is more solid.

The "Thunderer" a Blunderer. — The *London Times* copies in all soberness the story that the telegraph wires in New York were *melted* by the rapid succession of messages sent over them during the famous "gold excitement." The report was true, of course, and it is *likewise* a fact that the telegraph companies have determined that they will hereafter avoid the risk of melting their wires, either by sending messages too *fast*, or by transmitting any that are too *warm*. Ardent lovers are no longer to be allowed to communicate by telegraph, and messages which appear to be the expression of "hot haste" will not be taken on any terms.

A Prophet Without Honor. — The Peruvians have hanged Professor Falb in effigy, because he promised them an earthquake and a hurricane, which didn't "come to time." His prophecies seem to have frightened the people pretty thoroughly, large numbers having left their homes and fled to the mountains to escape the threatened visitation. We think they served him right, though we do not suppose that they would have liked it any better if his predictions had proved true.

A Formula for Scent Bags. — Take of coriander, orris root, and calamus aromaticus, four ounces each; of lavender flowers, eight ounces; of rhodium wood, one ounce; and of musk, twenty grains. Reduce to coarse powder, and bag it. The recipe is said by good authorities to be an excellent one.

Trade in Flowers for Perfumery. — A recent French authority states that to obtain one kilogramme of oil of roses, from 10,000 to 30,000 kilos. of rose petals are required; for the same amount of oil of lavender, 250 kilos. of the flowers; of oil of geranium, 2000 kilos. of the leaves; and so on. The trade in some of these perfumes is enormous; as may be inferred from the fact that the neighborhood of Nice alone produces annually $40,000 worth of a single flower, the sweet smelling Nizza violet.

The leaves of the orange tree are valued at about forty dollars a ton — in gold, of course.

A New Kind of Lamp.—At a meeting of the British Association for the Advancement of Science, not long ago, a lamp was exhibited which transmits light through living bodies. Small animals become as if transparent; and the thinner parts of the human body, especially in a child, are quite diaphanous. We have heard before of "letting daylight shine through a man," but it was not done in precisely this way.

Vagaries of the Type.—Printed matter is rarely immaculate in respect to typographical errors. It strikes us, however, that some of our medical journals are especially rich in these provoking little inaccuracies. The account of the lamp just mentioned, as given in a medical magazine, says that the "mogresium" light is best for the purpose. If that could not be obtained, it might be well to try *magnesium*. Sometimes these misprints are very pretty little enigmas. Thus, in a recent number of "Nature" (which, as a rule, is very accurately printed), we find the following in an interesting account of deep-sea dredgings by the British expedition of the last year: "I attifie leas 60haieddnts." From the connection it is probable that it means, "I have identified at least 60," but some readers might not see it.

De Profundis. — The deep-sea dredgings to which we have just referred, prove clearly, not only that animal life is abundant at abysmal depths, but also that light must penetrate to those nethermost parts of the ocean. The eyes of creatures found at depths of from 1,500 to 3,000 fathoms are in some cases more highly organized than those of many fishes. With such eyes colors can be readily distinguished; and, since many of the objects from these great depths are found to have varied and beautiful colors when brought up to the surface, it is reasonable to suppose that they are not destitute of color down there, and that they do not "blush unseen." The "unfathomed caves" of ocean are not necessarily "dark," as both poets and philosophers have heretofore pictured them.

Mental Progress of Animals. — It has long been assumed as an axion that *instinct* differs from *intellect* in being incapable of improvement; but a writer in "Nature" argues that it is no such fixed and unchangeable thing. He believes "that much of what has been termed *cunning* in animals will be found to be very much sharpened and made evident in quadrupeds and birds, owing to the new necessities imposed upon them by man the tamer, or man the destroyer." In support of this view, he urges the fact that "no bird or quadruped so high in the mental scale as the dog, horse, rat, rook, or sparrow, has been found in the lonely oceanic isles, or in any region free, or all but free, from human influence"; not because such animals could not exist there, but because they would have no chance of improving their wits, "by coming in contact with an enemy or a friend, so complex, dreadful, and ingenious as a human being." When not trained to be the companion of man, even the dog, as in some Eastern countries, is a very stupid animal. Many other facts appear to show that "man the thinker has to a considerable extent reacted on animals, wild and domestic."

The Irrepressible Spectroscope. — There seems to be no end to the applications of this marvellous instrument. It would be rash to say what question in science it may not be the means of settling. It has lately proved, either that chlorophyl is not, as has been taken for granted, an exclusively vegetable product, or else that what have been considered as some of the lower forms of animal life are really to be classed as plants, since they contain a green coloring matter, which gives the same absorption bands as chlorophyl. It has also refuted the theory that chlorophyl is separable into two primary substances of a yellow and blue color, the xanthophyl and cyanophyl of Frémy.

LITERARY NOTES.

The Messrs. Harper, of New York, send us *The Malay Archipelago*, by Alfred Russel Wallace. This is a most beautiful and interesting book, full of thrilling narratives of adventures in the land of the orang-utan and the bird of Paradise. It presents fresh pictures of a country about which but little has been written, and therefore it will be welcomed by every reader. The Malay Archipelago includes three islands larger than Great Britain; and one of them, Borneo, is more than four times as large. The area of land embraced in the whole is larger than the continent of Europe, and the islands are covered with luxuriant tropical vegetation. Mr. Wallace's narrative of adventures will create a new interest in a hitherto unexplored country.

The same eminent house publish new editions of Dr. Worthington Hooker's Elementary Treatises upon *Chemistry* and *Natural Philosophy*, books of science suited to the school and family. Prof. J. C. Dalton's *Physiology and Hygiene* is a work which can be safely recommended for the use of students and general readers.

The Chemical Forces, Heat, Light, and Electricity, by T. R. Pynchon, M. A., just published by O. D. Case & Co., of Hartford, is a handsome volume of more than five hundred pages, and supplies a good introduction to Chemical Physics. What used to be known as the "Imponderables," are now better understood, not only in their relations to each other, but in their applications to the expansion, vaporization, &c., of solids, the steam engine, photography, spectrum analysis, the galvanic battery, electro-plating, the fire alarm of cities, telegraphy, &c., &c. The recent researches connected with light, heat and electricity, have a deeper interest, and are fraught with more important practical benefits, than any connected with other departments of scientific labor. This work of Professor Pynchon will serve a good purpose in supplying a text-book in which the most recent discoveries are presented in a clear and very concise manner.

Dr. C. Neidhard, of Philadelphia, published, in 1867, an important and exhaustive treatise upon Diphtheria, which has had a wide circulation. A copy has recently been sent to us, and we have been interested in the history of this terrible disease as presented by Dr. N. The work affords evidence of much research and careful observation, and is worth attentive examination.

A Winter in Florida, by Ledyard Bill, (New York, Wood & Holbrook, 1869), is a very pleasant account of the author's experience and observations in Florida during the winter of 1868 and 9. To the thousands of invalids and pleasure-seekers who are now turning their steps toward the land of the orange-tree and the magnolia, this narrative of travel will be of particular service, as it affords information which we regard as reliable and important.

One of the most attractive and instructive writers that our country has produced, is Donald G. Mitchell, of New Haven. The force and purity of language, the keen insight into character, the genuine humor, the good sense and knowledge of farm pursuits, displayed in "*My Farm of Edgewood*," have never been excelled in any publications, and the book is a great favorite in thousands of families. Mr. Mitchell is now editor of that charming journal, *Hearth and Home*, published by Messrs. Pettingill, Bates & Co., New York. If our readers desire a journal devoted to the Farm, Garden, and Fireside, which will be the delight of the household, let them subscribe for Hearth and Home.

The name "Country Gentleman" conveys to the mind impressions of dignity, quiet respectability, culture, good sense, accuracy; and all these most desirable traits are found in the *Country Gentleman and Cultivator*, published by Messrs. Luther Tucker & Sons, Albany. This is the leading agricultural paper of the country, and has that which it deserves, a large patronage. We always read the "*Country Gentleman*," and when it is misplaced, or lost in the huge pile of exchanges which come to the Journal office, all other duties are suspended until it is found. This journal is an honor to agricultural literature, and it is doing a great and good work in promoting the important interests of husbandry.

A growing interest in popular science is shown, among other indications, by the prominence given to the subject in the magazines of the day. "Science" is set forth as a special attraction in every new prospectus, and the names of scientific contributors are displayed in as large type as is allotted to the writers of poetry and fiction. Efforts are made to secure the aid of eminent men in this department, as in others, and their labor is liberally paid for.

Harpers' Monthly has always made popular science one of its leading features, and the articles have been ably written and admirably illustrated. The *Nation* has said that "the periodicals which the Harpers publish are almost ideally well edited," and their immense circulation shows that the verdict merely echoes that of the *nation*.

Appleton's Journal is devoted to "literature, *science*, and art." A good share is given to science, and the matter is invariably excellent. As in the case of *Harpers'*, the illustrations add much to the interest and value of the articles.

The *Atlantic*, too, has from the first given *science* a prominent place on its cover and in its contents. Agassiz has been the leading name in this department, with others not unworthy to be associated even with him.

The *Galaxy*, which is taking a high rank among its rivals, announces that Dr. Draper and Dr. Dalton are to head the list of its scientific contributors this year.

Even the juvenile magazines are, in this respect, not behind those for older people. The *Riverside*—a model periodical of its class, externally and internally—begins the new year with an article on "Gunpowder Explosions," by Jacob Abbott, which is capital in its way. In writing for young readers, however, *we* should have said "ground to the finest powder," — or something of that sort, — rather than "reduced to a state of the most extreme comminution." But even Homer sometimes nods. *Our Young Folks* for January gives a sketch of the life of Agassiz, with a really good "counterfeit" of his genial physiognomy; and Mrs. Agassiz is to continue her account of the early history of "the world on which we live."

Personal. — Mr. J. A. Gillet, late of the Cambridge High School, and one of the editors of the popular "Cambridge Course of Physics," has been appointed Professor of Mathematics and Physics in the new Female Normal and High School of New York City, with a salary of $3,500 a year.

Medicine and Pharmacy.

FRACTURE OF THE LOWER THIRD OF THE HUMERUS FROM A FALL ON THE HAND.

BY M. M. SHEARER, *Act. Asst. Surgeon U. S. A.*

[Dr. Shearer sent to the JOURNAL, some months ago, the following interesting communication, but it was misplaced, and therefore did not appear. The surgical case is one that should not fail to be recorded, although not appearing immediately upon its occurrence.]

PRIVATE Lewis Wilhite, Battery B, 4th Artillery U. S. A., while walking rapidly over a raised porch facing the barracks at Fort Leavenworth, Kansas, reached the extremity in the darkness sooner than expected, and unconsciously stepping off a full pace, missed the steps and fell headlong to the earth.

The instinctive act of preservation, throwing the hands forwards, prevailed in this instance, and the right palm catching the entire weight of the body, conjoiued with the momentum acquired by the fall, produced an oblique fracture of the lower third of the humerus just above the condyles.

I have been thus explicit in stating *how* the fracture was occasioned, by reason of two standard authors, on dislocation and fractures, diametrically differing as to the etiology of this particular kind of fracture.

Dr. F. H. Hamilton, page 244, paragraph 6, says: "I have never been able to trace it to a fall upon the hand, but to an indirect blow inflicted upon the elbow!" Dr. Gross writes in his Surgery: "This fracture is more *frequently* occasioned by falls upon the palm of the hand in attempts to save the body from more serious injury." In this case there is no doubt whatever the injury resulted in the manner described by Dr. Gross. The patient, who was in entire possession of his faculties at the time, so explicitly states it, and could not easily have been mistaken. Besides, the palm was considerably bruised, while there was not an abraded spot anywhere on the arm. A small amount of ecchymosis was discernible on the internal surface of the joint, produced by the extremity of the fractured bone.

Did not see the case for sixteen hours after the occurrence of the accident, the patient failing to report himself immediately, supposing it to be "only a sprain!" In consequence, immense tumefaction presented, the infiltration obscuring perfectly the osseous structure of the joint, and extending as high as the middle third of the humerus. Our diagnosis, therefore, as to whether dislocation existed conjointly, was considerably retarded.

Upon a cursory inspection, we first supposed it to be luxation of the ulna backwards, the projection of the olecranon process in that direction being very marked. The impression was corrected, however, upon manipulation, by remarking the condyles still in a line — from side to side — with the process. The whole three, lacking osseous support just above the condyles, were tilted backwards by action of the triceps. These symptoms, together with distinct crepitation, and a lateral movement of the member above the joint, with diminished length from elbow to shoulder, decided us as to an oblique fracture from before backwards; likewise its exact location and direction. The patient being completely anæsthetized by chloroform, a careful and extended examination was made for detection of dislocation of radius, an exceedingly obscure point to determine where much tumefaction exists. Being satisfied as to non-impairment of the joint through dislocation, extension was made, the fractured extremities brought into juxtaposition, obtuse angled splints adjusted anteriorly and posteriorly, and a roller applied from the tips of the fingers to the shoulder. The patient, having rallied splendidly from the effects of the anæsthetic, was put to bed, and a constant application of cold water to the affected limb enjoined for several days.

Up to this date the swelling has greatly subsided, osseous union has taken place kindly and firmly, betokening a speedy recovery and use of the member.

In the great majority of such accidents, violent falls upon the palm occur when the arm is in a partially flexed condition, the elbow raised from the hand, flexed horizontally to the body, instinct as it were, prompting the person falling to instantaneously so place the limb, in order to avoid a direct and more serious shock to the body, which would follow were the arm in a perfectly straight and rigid position.

In this semi-flexed condition, the force of the blow, following a straight line in the direction of an axis drawn perpendicularly to the palm or carpal extremity of the metacarpal bone of the middle finger, would emerge at the middle or lower third of the forearm, producing fracture of one or both bones in this locality. But supposing the arm *straight*, — a rare condition, I admit, but possible, — then certainly the force extends throughout the entire axis of the limb, when the weakest point succumbs. This undoubtedly will be either fracture of the lower third of the shaft of the humerus, or disarticulation of the shoulder joint. Again, the blow striking as above described, — arm semi-flexed, — might follow a straight line with the axis of the forearm, when the lower third of the humerus, receiving it obliquely, would be fractured. In either case, we can always look, as a result of accidents of this kind, for fracture above the condyles.

IMPROVED FORMULA FOR CHALK MIXTURE.

Ed. Boston Journal of Chemistry:

CHALK mixture, the *mistura cretæ* of the Pharmacopœia, is one of the remedies most frequently employed in the summer complaints of children. Yet, as commonly prepared, its use is attended with both inconvenience and danger. The mixture ferments with the greatest ease in warm weather, and the supernatant liquid becomes sour or mouldy. The mixture also ferments frequently in the stomach after administration. This is entirely obviated by substituting glycerine for sugar, according to the following formula:—

Take of Prepared Chalk and Glycerine, each, *half an ounce;* Gum Arabic in powder, *two drachms;* Cinnamon Water and Water, each, *four fluid ounces.* Rub them together until they are thoroughly mixed.

This mixture will readily keep during a whole summer. I recently had occasion to administer some of the mixture prepared as above, which had stood for three or four months during the hottest weather, and found it in perfect condition.

The diarrhœa of children in hot weather is generally accompanied, if not caused, by fermentation. Sugar is therefore contra-indicated. But glycerine seems to exert a positive soothing action upon the bowels, as well as, in some degree, to arrest fermentation.

The substitution of glycerine for sugar, in the proportion of two parts of the former to one of the latter, ought to be made in all sirups, elixirs, mixtures, which are subject to fermentation. The *mistura cretæ* may be taken as an illustration.

Glycerine may be used with great advantage to replace sugar in the food of children or adults, where there is enteric irritation or inflammation. Under these conditions of great local heat and excitement, sugar almost always ferments and acidifies. Pure glycerine, on the other hand, does not ferment, is bland, and at the same time a concentrated nourishment. In a recent case of severe gastric irritation or enteritis of an infant only three months old, fed by hand, the writer gave from four to six drachms of glycerine daily for a fortnight in place of sugar, with rice-water or porridge. Here the glycerine constituted a considerable portion of the nourishment taken. The result was entirely favorable, where it would probably have been fatal, if a fresh amount of acid from fermented sugar had been periodically introduced into the bowels.

W. F. C.

PROVIDENCE R. I., Nov., 1869.

BOSTON JOURNAL
OF
CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

Gallup Dr BA 1870

VOL. IV. — No. 9. BOSTON, MARCH 1, 1870. ONE DOLLAR PER ANNUM. SINGLE NUMBERS, SIX CENTS.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

TERMS, ONE DOLLAR PER ANNUM, IN ADVANCE.

All subscriptions begin and end with the current volume.
RECEIPTS. — A receipted bill will be sent by return mail to any subscriber who will enclose with his subscription a three-cent postage stamp, for return postage.
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Contents.

Familiar Science.

TORPEDOES IN WARFARE.

EVER since the discovery of the explosive properties of that mixture of nitre, carbon, and sulphur known as gunpowder, the modes and instruments of war have been constantly changing. There is as great a difference between the arquebus and culverin of former days, and the breech-loading magazine rifle and columbiad of the present time, as there is between one of Columbus's caravels and a modern iron-clad. Progress has steadily gone on from small, uncertain weapons, to the terribly destructive rifles, needle-guns, and monster ordnance now so common. The problem is to apply explosive force so as to combine certainty with completeness. Nevertheless, in battles, vast quantities of powder and shot are expended that do not produce the slightest effect. Forts are constructed for the defence of a coast, and navies are built for offensive and defensive purposes, but in spite of the enormous sums lavished on such works, we are constantly finding that new discoveries and improvements are making them less and less valuable, if not useless. Fortifications of granite or brick are now almost despised; there are very few such fortresses that could not be quickly battered into ruins by the artillery now in use.

So, also, iron-clad war vessels must be built, in order to counterbalance the increased destructive power of ordnance, by increasing the resistance offered to the shot. Numberless experiments have been tried, having in view the construction of some combination of materials that will successfully withstand heavy artillery. In England, especially, great sums have been expended in making and setting up targets to be knocked to pieces. It has been a question of considerable moment for some years past, which of the two sides, the offence or the defence, the gun or the target, would come out victor. The question still remains unsettled, since in such experiments many very important considerations are neglected. The subject of plating vessels with armor is very complicated, and involves many problems which are not solved by determining experimentally what thickness of iron will be proof against a particular kind of attack. In our monitors, we think that we have a war vessel better than any other form of iron-clad; yet they are not really good sea-boats. Though some of them have crossed the ocean, nevertheless it will be admitted that they are not adapted for cruising. Supposing it to be granted, however, that an iron-clad can be so built as to be impenetrable to shot from the largest cannon, and still possess all the other qualities required of a ship of war, yet such a vessel can be entirely destroyed in an instant by exploding a comparatively small amount of powder *under her*.

No armor will resist explosive force thus applied. This consideration is a very important one, since the destroying agent in such case is insignificant in comparison with the effect it produces. It will be readily seen that the possibility of making such a use of explosives opens a very interesting field of inquiry. This subject is one which is attracting a great deal of attention at the present time, and all the principal maritime nations are more or less concerned in its investigation. In the event of another war, torpedoes will play an important part in naval encounters. We propose, therefore, in the following paragraphs, to submit to our readers some remarks upon the subject of torpedo warfare.

The use of torpedoes in warlike operations is not really new, but they never have been so extensively applied to such purposes as during the civil war in this country. David Bushnell was the inventor of the torpedo. Becoming interested in the subject of submarine warfare, he devoted all his time and property to it. His plan consisted of a "submarine vessel" provided with a "magazine and its appendages, designed to be conveyed by the submarine vessel to the bottom of a ship." The boat would carry but one person, and contained sufficient air to enable him to remain under water half an hour. By expelling or admitting water, the boat could be raised or lowered at pleasure. The magazine or torpedo contained one hundred and fifty pounds of powder and a train of clockwork, which would, at the expiration of the time for which it was set, move a lock like a gun-lock, and thus explode the charge. The vessel floated low in the water, so that in the night a ship might be approached very nearly; and then, by going down, the operator could come close beneath without discovery. He could then fasten his torpedo to the bottom, set the clockwork in motion, and make off himself.

Bushnell tried many experiments with his submarine boat and torpedo which were successful. He next tried to put his inventions into practical use, by making an attempt to blow up the British ship Eagle, of sixty-four guns; but, though the operator succeeded in getting under her, he could not, for some reason, fasten his torpedo, and so failed. Two other attempts were afterwards made, but were also unsuccessful. Bushnell seems to have had very great difficulties to overcome. His health gave way, and, from the exigencies of public affairs, he was unable to obtain the requisite attention to his inventions. He did not confine himself entirely to this form of apparatus, but prepared another very ingenious one, with which he tried to blow up the British frigate Cerberus, by working it against her side by means of a line. It so happened, however, that it came in contact with a schooner, which he did not see, belonging to the frigate, and anchored just astern of her. The sailors on the schooner drew the machine on board, when it exploded, destroying the vessel, and killing three men.

Shortly after, he filled several kegs with powder and set them floating down the Delaware, toward the British fleet at Philadelphia. They were so contrived that upon touching anything, explosion would take place. But being unacquainted with the river, he set them off too high up, so the greater num-

ber did not reach their destination. One of them was taken on board a boat and blew it up. In consequence of this attempt of Bushnell's, the celebrated "Battle of the Kegs" took place. Bushnell's inventions displayed originality and ability, but everything seemed to work badly, so that at last, bitterly disappointed, he gave them all up.

Twenty years later, Fulton tried to revive the matter. In 1797, he offered to the French government a machine "to impart to carcasses of gunpowder a progressive motion under water to a given point, and there explode them." It was then rejected, but, soon after, he offered in addition another form of apparatus — a diving or plunging boat. By direction of Napoleon, experiments were tried with them, but although not unsuccessful, Fulton was unable to induce the French government to adopt his plans. He then carried them to England. Pitt, the Prime Minister, was interested in them, and gave him an opportunity to test them. Several failures occurred, and they were pronounced impracticable. At last, Fulton made, after several trials, a perfectly successful experiment. With one hundred and seventy pounds of powder, he blew up a stout brig, completely destroying it. Nevertheless, he could not persuade the English government to prosecute his schemes.

Coming to this country, he laid them before the authorities. A commission was appointed to test them practically. The experiments were not very successful, but some of the commissioners were strongly impressed with the importance of the subject. One of them said, "The submarine use of gunpowder will at no distant day be entitled to rank among the best and cheapest defences of forts and harbors." Nevertheless, no further investigations were made. The opposition to such outrageous and new-fangled notions was altogether too strong. During the war of 1812, quite a number of attempts were made by individuals to blow up British vessels, but without very striking results. They excited, however, very great alarm among the British cruisers, making them very watchful and suspicious, and also chary of entering harbors.

Colt, the inventor of the revolver, was the next person to follow in the footsteps of Bushnell and Fulton. The progress of discovery had furnished many ideas which, applied to the torpedo, greatly increased its effectiveness. Fulton had thought of employing the electric current as a means of explosion, but considered it impracticable. Colt actually applied it, and by its means made a number of successful explosions. He also tried to interest the government in his system, and, in 1842, Congress made an appropriation of $17,000 to continue his experiments, which were attracting a great deal of attention. But, as in Fulton's time, the opposition was too strong, and the whole thing was finally dropped.

The Russians, during the Crimean war, used great numbers of torpedoes, but the Allied fleets were very careful, and met with but very few accidents from them. They were, however, unquestionably a valuable means of defence; and that they were dangerous was shown by the fact that two British vessels came very near being destroyed by them. But all the cases we have mentioned are but of trifling importance, in comparison with the extensive use to which torpedoes were put during the late war in our own country.

From the very beginning of the conflict, the Union forces greatly predominated in naval power. This was a very great disadvantage to the rebels, since the extent of their coast-line, and the number of navigable streams opening upon it, invited naval attack. Their seaports were captured or effectually blockaded by our vessels. They had no navy with which to oppose ours, so they were compelled to find some other means of defence against our gunboats, or at least some way of making their entrance into and passage up harbors and rivers more difficult and dangerous. Obstructions could, of course, be placed in narrow rivers, but, besides being very limited in their application, they had the disadvantage of preventing the passage of friends as well as foes.

A torpedo system was therefore devised and very rapidly put into execution, which went far towards attaining the desired end. Torpedoes of all sorts were constructed, put into use, and soon began to demonstrate their destructive powers. It is in consequence of the success achieved by the rebels in this direction, that the importance of this branch of warfare has come to be recognized. We shall, therefore, try to give a short account of some of the details of their system. Our readers will remember that, through '61 and the early part of '62, the operations of our navy had been very successful. An efficient blockade had been kept up, and a great part of the Atlantic coast occupied. No torpedoes had thus far been met with. They were first observed in February, 1862, by some gunboats endeavoring to pass up the Savannah River. They were planted so as to be seen at low water, but at all other stages of the tide, would be entirely covered. Fortunately, they were noticed and removed by exploding them. Later in the year, almost all the narrow rivers on the coast were supplied with torpedoes of various constructions, but as yet no regularly organized system had been put into operation. In October, '62, however, by act of the rebel Congress, a secret service corps was organized, and soon torpedoes might be found in any of the waters under rebel control. Different forms of torpedoes were used according to circumstances; but most of them may be classified by division into *frame*, *buoyant*, and *electric* torpedoes.

[*To be continued.*]

THE DISTANCE OF THE SUN.

A correspondent in Iowa does not understand how the solar parallax of 8.58", as given by Mitchel in 1860, has been changed to 8.94" by some recent authorities, making a difference of almost 3,500,000 miles in the sun's distance from the earth. He says: "As the solar parallax is determined by observations on the transit of Venus, and as the last transit occurred in 1769, I am puzzled to know how the correction has been made."

It is true that the parallax as obtained from the observations of the transit of 1769 was 8.578", but a careful re-calculation, *from the same observations*, has recently given 8.91". Within a few years, moreover, several determinations of the parallax have been made by independent astronomical methods; and the values obtained range from 8.91" to 8.97". The new value obtained by Hansen, from the moon's parallactic equation, is 8.916"; by Winnecke, from the observations of Mars, 8.964"; by Foucault, from the velocity of light, 8.96"; and by Leverrier, from the motions of Mars, Venus, and the moon, 8.95". The distances corresponding to these values range from about 91,300,000, to 91,850,000. The distance 91,430,000 is adopted by many of the best astronomers, and is undoubtedly correct within 200,000 miles.

Gravity Below the Earth's Surface. — We have received from Mississippi a long communication on this subject. The writer says: "It is a settled fact, I believe, that all bodies in space are mutually attracted, directly as their masses, and inversely as the square of the distance. The same law is supposed to hold good from the surface to the centre of masses of matter." He then goes on to disprove the latter proposition, and to show that beneath the surface of the earth, the attraction diminishes directly as the distance from the centre. He is clearly correct in his demonstration, but we were not aware that the contrary view had ever been maintained. All the authorities, so far as we know, — even the common school-books,— agree in stating that below the surface the attraction diminishes (that is, it is partly counterbalanced by the attraction of the portions of the earth outside), until at the centre the attractions in all directions are equal, and a body virtually weighs nothing. The assertion which our friend quotes, to the effect that if there were a hole through the earth, a body dropped into it would go *beyond* the centre, does not conflict with this view: it would go beyond the centre, *not* because of the increasing attraction, but because of its *momentum*, —just as a pendulum swings beyond the lowest point of its curve, on account of the impetus it has acquired in descending to that point.

It does not follow, from the law of attraction mentioned above, that the *density* of the earth must be greatest at the surface and least at the centre, as our correspondent argues; but it is hardly worth while to show up the fallacy of his reasoning on this point.

THUNDER AND LIGHTNING.

A correspondent in Michigan sends us the following speculations as to the causes of these phenomena:—

"The commonly accepted theory of thunder is, that lightning, in passing through the air, separates it, causing a vacuum; and the concussion of the recoiling air upon itself sets it into sonorous vibration. If this were so, any body passing rapidly through the air, as cannon and rifle shot and falling meteoric stones, would produce a sharp report. I think the vacuum comes from another cause, and one purely chemical.

"Lightning is conducted to the earth, and from cloud to cloud, by the intervening watery vapor. The water along its course is decomposed; the hydrogen, mixing with atmospheric air, is ignited by the electric heat, or perhaps the heat of friction, producing an explosion and a track of fire along the whole electric course. It is a fact of common observation, that lightning more often strikes and more violently rends trees that contain the most of acid sap, such as black and white oak, elm, hemlock, etc. (beech and maple being almost exempt), because such trees are good conductors, while dry-wooded ones are not. The acid condition of the sap materially assists the decomposition of its water into many volumes of its constituent gases, hydrogen and oxygen; hence the more perfect destruction of such trees. I believe the great heat evolved by lightning depends more upon rapid chemical changes, such as decomposition and combustion, than any property of heat possessed by electricity. The report, too, compared with all better understood phenomena, is one of detonation."

Liquids as Conductors of Heat. — The form of apparatus for showing the feeble conductibility of liquids, which a correspondent describes, is very good; but the same fact may be shown even more simply by holding the upper part of a long test-tube full of water over the flame of a spirit lamp or Bunsen's burner. The water at the top of the tube can thus be boiled, while the lower end of the tube is held in the hand. If a small piece of ice is put at the bottom of the tube

(where it can be kept in place by a bit of wood or cork, across the tube), the experiment is even more striking, as the water can be boiled without melting the ice. In that admirable little book, "The Wonders of Heat," by Cazin (published by Scribner, of New York), our correspondent will find a number of these experiments described and figured.

ICE MOUNTAINS AND CAVERNS.

THE ice mountain in Virginia, described by Mr. Hayden in Vol. 45 of the American Journal of Science, is an instance of the fact of ice being preserved under the surface. An immense mass of *débris*, the stones varying in size from a few inches to many feet, rises several hundred feet against a rocky wall. The interstices are filled with ice, which is preserved there in the summer as in a vast refrigerator.

An ice mountain also exists at Wallingford, Vt., where a wall of quartz rock has a space of more than thirty acres at its base, covered with loose fragments, and ice occurs in a ravine in which these fragments have been cast. Ice also is constantly found in the elevated ravines of the Catskill and White Mountains.

The ice caverns of Europe and Asia also present phenomena allied to these frozen strata discovered in wells. Prof. Pictet, of Geneva, describes in the Edinburg Philosophical Journal, in 1823, four of the grottoes examined in the Alps and the Jura. Each of these had upon the bottom a surface of about 3,000 feet of ice, of the thickness of a foot. When this was quarried during the summer, it constantly renewed itself by freezing. Strong currents of cold air constantly issued from these caverns, and the strength of the current seemed to increase with the heat of summer. Water was found in them all, and the air was loaded with vapor. The freezing in these caverns is explained by the descent of currents of air into the caverns in summer, and their escaping at the bottom. These currents in their descent part with their heat, and acquire the temperature of the surrounding rocks, and if these be covered with moisture the evaporation diminishes the temperature. In winter the current ascends, and the evaporation being less, the cold is not so intense. Sir R. J. Murchison, in his Geology of Russia, has described some frozen caverns existing at Orenburg and Indursk, on the Siberian side of the Ural Mountains. These are similar to the caverns described by Prof. Pictet, excepting that the freezing, for the most part, takes place in summer, while in winter the ice thaws.

There is an old iron mine at Port Henry, on the west side of Lake Champlain, in which ice is found at a depth of from thirty to one hundred feet during the summer, and a current of cold air issues from the opening. Ice is also found in a cavern in a hill about two miles north of Brandon village. — *Aaron Lloyd, in Hours at Home.*

SEEING WITHOUT EYES.

IT is fully established that somnambulists go wherever they please without hesitation, read and write, and give ample evidence of a power of perception independent of the usual organs of vision. Persons subject to attacks of catalepsy frequently show the same peculiarity. M. Despine, late inspector of the mineral waters of Aix, in Savoy, mentions the following among many other cases: "Not only could our patient hear by means of the palm of her hand, but we have seen her read without the assistance of the eyes, merely with the tips of the fingers, which she passed rapidly over the page that she wished to read. At other times we have seen her select from a parcel of more than thirty letters the one which she was required to pick out; also, write several letters, and correct, on reading them over again, always with her finger ends, the mistakes she had made; copy one letter word for word, reading it with her left elbow, while she wrote with her right hand. During these proceedings a *thick pasteboard completely intercepted* any visual ray that might have reached her eyes. The same phenomenon was manifested at the soles of her feet, on the epigastrium, and other parts of the body, where a sensation of pain was produced by the mere touch."

Persons who have become blind have also been known to acquire the same power, and Harriet Martineau tells of an old lady who had been blind from her birth, and yet saw in her sleep, and in her waking state described the color of the clothing of individuals correctly.

In these cases, no doubt, perception is, as usual, in the brain; but either all the nerves of the surface have the power of conveying the impressions of light to that organ, or some special parts of the body, as the ends of the fingers, the occiput, or the epigastrium, assume the office of the eyes. — *Dr. Clark, in Hours at Home.*

SCHÖNBEIN'S TEST FOR PRUSSIC ACID.—It is stated by Mr. Welborn in the London *Pharmaceutist*, that Schönbein's test paper, described in the JOURNAL for November, is equally sensitive to the action of chlorine, and, in a less degree, to that of nitric acid vapor. This does not, as Mr. W. assumes, make the test worthless. It merely complicates the testing process; as in Marsh's test for arsenic, where the black spot on the porcelain *may* be produced by antimony as well as by arsenic, and further tests must be employed to decide the question.

Arts.

THE METALS OF THE HOMERIC AGE.

"JUVENTUS MUNDI, or the Gods and Men of the Heroic Age," by the Right Hon. W. E. Gladstone, (Macmillan & Co., London, 1869,) is a minute study of the times of Homer through the medium of the Homeric poems. Every chapter is of the highest interest to the classical scholar, and parts of the work will have an attraction for the scientific student as well. We cannot resist the temptation to quote a few paragraphs from the section on "Metals in Homer": —

"Archæological inquiry is now teaching us to investigate and to mark off the periods of human progress, among other methods, by the materials employed from age to age for making utensils and implements, and the poems of Homer have this among their peculiarities: they exhibit to us, with as much clearness, perhaps, as any archæological investigation, one of the metallic ages. It is, moreover, the first and oldest of the metallic ages, the *age of copper*, which precedes the general knowledge of the art of fusing metals; which (as far as general rules can be laid down) immediately follows the *age of stone*, and which in its turn is often followed by the *age of bronze*, when the combination of copper with tin has come within the resources of human art.

"The grand metallic operation of the Poems is that of Hephaistos in the production of the shield of Achilles. The metals used were gold, silver, tin and *chalcos*, which has been, by mere license of translators, interpreted as *brass*, for there was no brass till long ages after Homer's had rolled away: which has been more plausibly taken to mean *bronze:* but which, after a good deal of inquiry, I am satisfied can only mean *copper*, either universally and absolutely, or as a general rule, with very insignificant exceptions. . . .

"In the formation of the shield, there is no mixture or fusion of metals. The same, and all the same, which are put into the roaring fire, re-appear, each by its original name, in various portions of the shield. . . . There is no sign of founding or casting in this great masterpiece of Hephaistos. He could only mix by melting; and had he melted metals, we must have heard of moulds to receive them. Instead of this, the only instruments which he makes ready for the work are,

1. The anvil.
2. The hammer in his right hand.
3. The pincers in his left.

It is plain, then, that he was supposed not to melt, but only to soften the metals by heating, and then to beat them into the forms he wished to produce.

"Had Homer been conversant with the fusing or casting of metals, this is the very place where we must have become aware of it, especially as his works of skilled art are all of Phœnician origin or kin, and his Hephaistos is a god of Phœnician associations.

"If *chalcos* be not copper, then copper is never mentioned in Homer. But in an early stage of society, copper was commonly by far the cheapest and most accessible of metals; and it is quite impossible to suppose that we never once hear of copper from an author, who incessantly makes mention (so it is argued) of another metal, whereof it is by far the largest component part. . . .

"We find *chalcos* in Homer a very cheap and common metal; tin a very scarce and rare metal, only used in very small quantities, and even approaching in some degree to the character of what we now term a precious metal. It is very improbable that the defensive armor, and all the meaner utensils in Homer, could have contained an eighth part, or thereabouts, of tin. . . .

"It is said that copper cannot be hardened so as to make a cutting tool; whereas *chalcos* is named in Homer as used for peeling bark, and cutting twigs and young branches, as well as for making weapons of war. . . But as portions of tin are found in some copper ores, may it not be that there are also small portions of it in virgin copper used for these purposes? I find, moreover, that ancient nails have been discovered, containing ninety-seven and three-fourths per cent of copper, and only two and one-fourth of tin: and surgical instruments made of copper alone have been discovered recently in a tomb in Athens. . . .

"Silver appears to have been rarer than gold: as might be expected, considering that it is chiefly obtained by scientific means. It came but from one place, Alube in Asia Minor. We do not hear of it as used in exchange, nor, I think, in stored wealth; but in plating only, and in works of art. . . . Of lead we hear very little indeed. Iron was greatly more esteemed than copper, and was very rare, though seemingly more abundant than tin. We hear of it, together with gold and copper, as an article of stored wealth. It was only used for cutting instruments; and chiefly, as far as appears, for woodmen's axes. The quantities of all the metals would seem to have been very limited, except of *chalcos* only. . . . Tin was used for ornament, and was plated on copper. The only articles entirely made of it were the greaves of Achilles; and these proceeded from a divine not a human workman."

THE METRIC SYSTEM.

WE have seen communications in some of the medical journals, complaining of the use of the metric system in the books and periodicals of the day, because of the difficulty of changing the foreign denominations to our familiar ones. We cannot believe that any one who has perceived the simplicity of *plan* in the metric system, need have any trouble in *translating* its weights and measures into those commonly used among us. All that is necessary, is to note the way in which the *names* are formed, and then to fix in the memory the value of some *one* denomination in each table.

The *names* are formed on the following plan : —

The names of the *higher* orders, or the *multiples* of the standard unit (*metre, gramme*, or *litre*), are formed from the name of that unit by means of prefixes taken from the *Greek* numerals, namely: *deca-* (10), *hecto-* (100), *kilo-* (1000).

The names of the *lower* orders, or the *subdivisions* of the standard unit, are formed in a similar manner by means of prefixes taken from the *Latin* numerals, namely: *deci-* (10), *centi-* (100), *milli-* (1000).

Now, if we have learned this simple nomenclature, we have only to learn the value of the three standard units, and we can then readily figure out the value of any weight or measure that we meet with. For instance, the *mètre* is 39.37 inches. We can fix that in our memory, or call it *3 feet, 3¼ inches*, which is near enough for most practical purposes. A *décimètre* is, of course, *one-tenth* of that; a *millimètre* is *one thousandth*; a *kilomètre* is a *thousandfold* greater, etc.

If you prefer it, you can cut out (or copy upon a card, if you do not wish to mutilate the paper), the following brief tables, which give the English equivalents established by Congress in July, 1866: —

LINEAR MEASURE.

1 centimètre	=	0.3937 inch.
1 décimètre	=	3.937 "
1 *mètre*	=	39.37 "
1 décamètre	=	393.7 "
1 hectomètre	=	328 ft. 1 inch.
1 kilomètre	=	3280 " 10 "

MEASURES OF CAPACITY.

1 centilitre	=	0.6102 cubic inches.
1 décilitre	=	6.1022 " "
1 *litre*	=	1.9567 wine quarts.
1 décalitre	=	2.6417 " gallons.
1 hectolitre	=	26.417 " "
1 kilolitre	=	264.17 " "

WEIGHTS.

1 centigramme	=	0.1543 grains.
1 décigramme	=	1.5432 "
1 *gramme*	=	15.432 "
1 décagramme	=	0.3527 oz. avoirdupois.
1 hectogramme	=	3.5274 " "
1 kilogramme	=	2.2046 pounds "

The following simple rules for the conversion of the linear measures (which have probably never been published in this country) will be found convenient:—

"To change kilomètres to miles, multiply by 5 and divide by 8. To change mètres to yards, multiply by 35 and divide by 32. To change décimètres to feet, divide by 3. To change millimètres to inches, multiply by 4, and point off the last two figures. To change miles, yards, feet, or inches, into metric equivalents, multiply by the divisors, and divide by the multipliers, as just given."

As the *kilogramme* is very often used, it is well to recollect that it is 2 1-5 *pounds;* or, for ordinary cases, 2 *pounds* will be near enough. In like manner, the *litre* may generally be reckoned as a *wine quart*.

Some of our readers may not know that they have a key to the tables of linear measures and of weights, in the five-cent piece of our recent coinage. The diameter of that coin is 2 *centimètres*, and its weight is 5 *grammes*. Five of them placed in a row will, of course, give you the length of the *décimètre*; and two of them will weigh a *décagramme*.

As the *kilolitre* is a *cubic mètre*, the key to the measures of length is likewise the key to those of capacity: so that any man who is the happy owner of a five-cent bit may carry in his pocket the entire metric system of weights and measures.

CARBOLIC ACID FOR PRESERVING SPECIMENS.—At a recent meeting of the Chicago Academy of Sciences, Dr. Stimpson gave the result of three months' experiments upon carbolic acid as a substitute for alcohol, in the preservation of wet specimens. He found that deliquesced crystals of the acid, dissolved in forty times their bulk of water, gave a fluid which equalled alcohol in its preservative qualities, at less than one-twentieth its cost, with the additional advantage of keeping the specimen far more nearly in its original condition. In a solution of twice that strength, the specimen itself is soon destroyed. Specimens should be first placed in a very weak solution, say one-half per cent; but as the action of the acid is very rapid, it may be daily changed for a slightly stronger one, until the full strength (two and one-half per cent) is reached. This should be done to prevent the contraction resulting from the sudden contact of a strong solution, and preventing endosmosis. Fluids once used will be found to have lost their preservative power far more than alcohol, and must be strengthened before being used again. The freezing of the fluid may be prevented by the addition of one-eighth part of alcohol. If the smell of carbolic acid, which is very slight in the weak solutions, should be objected to, the addition of a minute quantity of the oil of wintergreen will cover it completely.

Agriculture.

S. L. GOODALE ON COMMERCIAL FERTILIZERS.

IT must be confessed that for the year past we have been living quite in the dark regarding the existence of some agricultural literature of a rather remarkable character, which the Secretary of the Maine Board of Agriculture has given to the world. The author, strange to say, did not remember us when his production was published, and we are indebted to a friend for a copy of an address upon Commercial Fertilizers, delivered before the Farmers' Convention at Augusta, Jan. 1869, by S. L. Goodale, Secretary of the Maine State Board of Agriculture.

Coming, as this document does, from one who holds an important official connection with the agriculture of a great State, we had a right to expect to find in it some suggestions of practical value, or at least the presentation of some facts, or some advice, of a useful character, and promotive of the general interests of husbandry. We are sorry to say that in this we are disappointed. Mr. Goodale, it appears, is acting in a double capacity: he is engaged in making commercial fertilizers, and serving as secretary of the Board of Agriculture. If any of the good farmers of Maine have ever suspected that there might be a certain degree of incompatibility in the two vocations, this pamphlet furnishes abundant proofs that their suspicions were well grounded. The interests of the "superphosphate" maker appear to preponderate over those of the secretary. Mr. Goodale claims to be a chemist, and to show how he came to be one, he states that "when a lad his favorite play-room was a laboratory, and that more money went for chemicals than for jack-knives and skates"; and that since he "was a lad", or since he became secretary, "he has endeavored to keep within hailing distance of the science, and on speaking terms with it." Any man who spent more money for "chemicals" than for "skates and jack-knives," when a boy, and who in manhood "keeps within hailing distance of the science," is certainly competent to act as chemist to the "Cumberland Bone Company," and also to criticise, overturn, and demolish any statement made in this, or other journals, which conflict with the interests of the said "Bone Company." The secretary further informs us, in his address, that "latterly he has given *some* thought to *business*": not the business of the secretaryship, but that of "phosphate making." Very well; we think we understand him.

Nearly three pages of this address are devoted to criticism of this JOURNAL and its editor. The article published by us in the number for April, 1868, upon "*Superphosphates*," is particularly offensive to him, and he comments upon it at length. In this article, our readers will recollect that in reply to the inquiries of farmers, "where they can procure genuine 'superphosphates,'" we state that we do not know of any *true* article for sale in the market. There is no brand that we can recommend as being fully up to a proper, scientific standard, and we advise farmers to make their own "superphosphates," as we do upon our farm. This does not suit the phosphate-making secretary, and he proceeds to inform us that "within ten minutes' walk of the JOURNAL office, there can be found a ton, or a hundred tons of good quality, which can be had for a fair price." This means, we suppose, that the "Cumberland Bone Company" had a stock of their products within ten minutes' walk of our office, when the paragraph was written. Of this important fact, we were certainly ignorant, and therefore beg pardon. We never heard of the "Bone Company" before the address fell into our hands. This "superphosphate," compounded under the supervision of the chemical secretary, he informs us, "has an addition made for the purpose of rendering it repellant to vermin in the soil, infesting plants, like wire-worms, onion maggots, etc." What it is, he does not inform us. As secretary he ought to have named the "addition"; as bone-grinder and chemist, he has a right to keep the great secret, or even to patent it if he chooses to do so.

This statement is made by way of explanation, or apology for an "unpleasant odor" which the compound has, and we are left to infer that the article "repellant to maggots and worms" is not grateful to the olfactories.

The secretary explicitly advises farmers *not* to make their "superphosphates." Of course, after this disinterested advice from so high a source, farmers will give up all experiments, all attempts to dissolve bones, and—buy the secretary's genuine mixtures. Not being in the phosphate-making business, we *have* advised farmers to manipulate their own bones, and manufacture their own fertilizers, but—we stand rebuked.

This document, with the name of the secretary upon it, stands on the same level with similar business circulars, or advertisements, and must go into the waste basket along with other rubbish. We understand it has been very extensively distributed to the farmers, at all the agricultural meetings in Maine, New Hampshire, and elsewhere, during the past year, and therefore we have felt called upon to notice it. In conclusion, we can only say, that if the farmers of Maine are to have their official documents and agricultural literature scented with the odor of the "phosphates" of any "Bone Company," we sincerely hope the "dead cat" flavor may be less offensive than is found in the article usually met with in commerce.

ROMAN AGRICULTURE.

FAULT has been found with history, that while it tells a good deal about a few leading characters, it gives us very little information about the masses of the people. We thus get a partial and often a perverted idea of the real life and spirit of a nation or a period. The history of Rome, for instance, as it appears in most of the books, is merely a succession of battle-pieces. War and conquest, and politics as connected with war and conquest, make up the bulk of it. The soldier and the statesman are almost the only actors that appear on the stage. We take it for granted that there must have been Roman tradesmen, and mechanics, and farmers, for we cannot imagine how the rulers and the warriors could get along without them; but we do not see that otherwise they are of any importance to the great drama. Especially would it surprise most persons to be told that agriculture was a recognized force in Roman polity, and that the farmer was made the direct ally of the soldier in the work of conquest. This, however, is clearly shown by Mommsen in his admirable "History of Rome," which is now made accessible to American readers by Scribner and Co.'s cheap but excellent reprint of the English translation. The following is a paragraph from the chapter on "Agriculture, Trade and Commerce," in the first volume:—

"The beautiful custom of commencing the formation of new cities by tracing a furrow with the plough along the line of the future ring-wall shows how deeply rooted was the feeling that every commonwealth is dependent on agriculture. In the case of Rome, in particular, the Servian reform shows very clearly, not only that the

agricultural class originally preponderated in the state, but also that an effort was made permanently to maintain the body of freeholders as the pith and marrow of the community. . . The whole policy of Roman war and conquest rested, like the constitution itself, on the basis of the freehold system; as the freeholder alone was of value in the state, the aim of war was to increase the number of its freehold members. The vanquished community was either compelled to merge entirely into the yeomanry of Rome, or, if not reduced to this extremity, it was required, not to pay a war contribution or a fixed tribute, but to cede a portion (usually a third part) of its domain, which was thereupon equally occupied by Roman farms. Many nations have gained victories and made conquests as the Romans did, but none has equalled the Roman in thus making the ground he had won his own by the sweat of his brow, and in securing by the ploughshare what had been gained by the lance. That which is gained by war may be wrested from the grasp by war again, but it is not so with conquests made by the plough. While the Romans lost many battles, they scarcely ever, on making peace, ceded Roman soil; and for this result they were indebted to the tenacity with which the farmers clung to their fields and homesteads. The strength of man and of the state lies in their dominion over the soil; the greatness of Rome was built on the most extensive and immediate mastery of her citizens over her soil, and on the compact unity of the body which thus acquired so firm a hold."

FARM ACCOUNTS.

The methods and results of farming are in general so defective and unsatisfactory, that a large amount of "moral courage" is deemed necessary fairly to face accounts at the end of the year, and look over the balance-sheet. It may be said, and with much truth, that most farmers have no accounts to examine, and as to a "balance-sheet," they do not know the meaning of the term. It is, indeed, a pity that farmers give so little attention to book-keeping in connection with their vocation. The value of a systematic, careful record of labor performed, and of crops, purchases, and sales, and also of the weather from day to day, has never been properly estimated. A man cannot have much self-respect, nor be mindful of his true interests, who does not use his pen daily in keeping accurate accounts of receipts and disbursements. Those who do not do this rest upon an unsubstantial basis; everything is at loose ends, and they become the easy victims of fraud and dishonesty.

Farm books should be systematically arranged and carefully kept. We should know at the end of the year how the account stands. No matter whether the balance is on the right or wrong side of the ledger, there is high satisfaction in knowing the truth; if we have made mistakes, or met with misfortunes, we want to have the facts recorded for our better guidance in the future; if we have been successful and made money, then we know we are on the right track, and the assurance of being right increases our confidence, and doubles our strength for future work.

Seed Corn. — So many requests have come to us from all parts of the country for *seed corn*, that we have placed a few bushels in the hands of *Messrs. Parker, Gannett & Osgood*, seedsmen, North Market street, this city, for distribution. Our friends can procure it of them. We do not know that it has any marked excellencies as a *variety*, but it is perfectly *sound* and *well matured*, and is reliable seed.

THE RELATIONS OF WATER TO AGRICULTURE.

[*Dr. Nichols's Address at Greenfield.*]

There is a property in water which is of the highest importance, as upon it all success in agriculture depends. I allude to its solvent power, or its capability of taking up and holding in solution every substance which enters into the constitution of plants. This singular property is, as it were, the pivot upon which the existence and welfare of the race is poised. Take away from water this power, and no greater disaster could result if the dynamical forces of the universe were thrown into disorder. The rain which falls upon the earth is due to the condensation of aqueous vapor previously existing in the atmosphere, and supplied in great measure from the surface of the sea, the area of the latter compared with that of the land being very great — necessarily so perhaps to furnish the requisite extent of evaporating surface. This water is, as is well known, perfectly fresh and pure, the saline constituents of the ocean having no sensible degree of volatility at the temperature at which the vapor has been raised. No sooner, however, does it reach the earth than its solvent powers are brought into requisition, and it becomes contaminated with, or takes up a large number of substances, which it holds in solution. The waters of rivers and springs invariably contain a greater or less amount of alkaline and earthy salts, which have been washed out of the earth by percolating rains. In the water we daily use for household purposes, and that which we furnish to our animals, are found considerable quantities of these salts, together with numerous other substances. We are accustomed to regard these as *impurities*, and they are such, strictly considered; but these very impurities are of vital consequence to the living system. These matters exercise an important influence upon the body in health and disease, and if they were entirely absent, physical weakness and probably death would ensue. It has been proved by careful experiments upon men and animals, that pure distilled water, so vapid and disagreeable to the taste, cannot be allowed to take the place of impure spring water, without producing emaciation and actual disease. There is a wonderful provision in nature by which the solvent powers of water are prevented from being injurious to the race. It will be understood that water is capable of dissolving many compounds of the elementary bodies which are poisonous or prejudicial in their influence, as well as those which are harmless or beneficial. Among the metals, almost the only one the oxide of which is harmless to the living body, is the metal iron. This is held in almost all natural waters. If the oxides of copper or lead were as constantly present in our springs, lakes and rivers, as iron, our earth would be uninhabitable. The daily absorption into the system of minute quantities of metallic poisons, is known to be followed by consequences of a fearful kind. Why are not these poisonous salts present in our natural waters? It is not owing to their insolubility, but to the fact that they are very sparingly diffused through the earth; they are not present in most soils. Iron is everywhere; copper, lead, arsenic, nickel, etc., are confined to specific localities, away from the great centres of population. Lime is a very abundant product of nature, and the water in some sections is changed with it, in the form generally of a carbonate. If another carbonate, — the carbonate of baryta, — were as common, animated life would fall before its deadly influence. Thus we see the hand of kind Providence manifested in all the provisions of nature. The condensation of poisonous substances held in water leads me to briefly remark upon the importance of not doing violence to ourselves, by allowing the deleterious metals which nature has so wisely placed in remote localities, to come in contact with water designed for culinary employment. This we are very liable to do, in the use of leaden service-pipes. I do not intend to create needless alarm, but I must be permitted to say that more of the obscure and painful diseases which come into the notice of physicians are due to lead-impregnated water, than is generally supposed. Many of these instances are found in the families of farmers, for unfortunately the innovations of fashion and modern improvements have led to the banishment of the old well-sweep and curb, and the copper pump and leaden service-pipe have taken their place. It should be understood by farmers and stock-raisers that it is not the members of the household alone that suffer from lead-impregnated water; the animals — the cows, the oxen, and the horses — are just as susceptible to its deadly influence as human beings. I have frequently found in my observations in the country, that the stock upon farms were furnished with water conveyed through lead pipes from lakes and mountain springs, while the family, with commendable caution, drew their supplies from other and safer sources. Many a fine animal has been lost to its owner through the agency of lead poison, and I trust the hint given will not pass unheeded. Iron pipes for the conveyance of water are cheap and safe under all possible conditions, and if those of the capacity of one or two inches are used, they will not soon become obstructed with rust. Never employ what is known as "galvanized" iron pipe, as it is exceedingly dangerous during the first two or three months of service. The superficial covering of zinc upon its surface is rapidly decomposed, and the carbonate and oxide are held in solution or suspension in the water. The salts are hurtful, and must not be allowed to mingle with the food and drink. I allude to this variety of pipe at this time, because I have recently been consulted in several cases of poisoning resulting from its use.

The vast importance of the solvent power of water will be appreciated when it is understood that it is due to this that all plant structures are able to grow. The aqueous fluid which slowly but constantly during the life of the plant creeps up from the roots, passing through every microscopic cell and fibre, carries along in its current the little atoms of inorganic substances which are so essential to its development. The stream floats not only a great variety of common and well-known elements and compounds, but also, in the case of many plants, some of the most rare and curious of which science has any knowledge. Potash, lime, nitrogen, phosphorus and silica, are almost universally found in the sap and substance of plants, and these are the elements which the farmer is desirous of placing in the soil so that the water may dissolve and convey them in ample abundance to vegetable structures. These are the great essentials so far as the supply is connected with the agency of water, and they are in a measure accessible; but there are other bodies of the highest importance which it is impossible to furnish. We can supply in a large measure the nitrogenous and other elements which are common to the cereal grains, but we cannot in the case of many of the esculent vegetables. It is certainly remarkable that the common garden beet demands from the water of its circulation one of the rarest of all the minerals, rubidium. This metal has only recently been made known to us, through the agency of that marvellous optical instrument, the spectroscope. When and how the water finds and takes up this strange metal, is a problem we are wholly unable to solve. By spectroscopic analysis we are able to detect the thirty-thousandth part of a grain of the chloride of the metal; yet it is so sparsely disseminated that even this delicate test fails to give any signs of its presence in soils upon which the beet-root flourishes. The growth of the root demands it, and water by some subtle instinct hunts it from the soil, and supplies it in the needed quantity. Tobacco is one of the most extraordinary plants which spring from the soil. In its ash are found a class of rare and complex bodies which it has abstracted therefrom, and which are not found in any other regular structure. Also, it is a great plunderer of the soil, in respect to those substances which are supplied to the soil through the ordinary fertilizing agents. The amount of mineral constituents which it carries off, can be judged of by carefully examining the ash upon the end of a smoker's cigar. Every one hundred pounds of the dried leaves which the soil produces, rob it of at least twenty pounds of its most valuable mineral atoms. This vast amount of mineral the plant pumps up, while held in solution in water. To this plant, potash is what pie or cake is to the school-boy: it evidently loves it, and consumes it in prodigious quantities. Five per cent of the dried leaves are composed of this alkali. A bushel of ashes, such as the smoker so carelessly and wastefully brushes from the end of his cigar, would, if leached, and the lye formed into soap, make enough to answer the purpose of a small family for a year. The new and rare element, lithium, is found in the tobacco plant, and, although the

spectroscope will detect in any substance a quantity so infinitesimally small as the six-millionth part of a grain, yet it is hardly revealed in soils in which the plant flourishes. These facts open up subjects of thought so interesting and instructive, that it is hazardous to enter upon their consideration in the few moments allowed to a public address. I have only drawn a brief outline of some of the important relations of water to agriculture. It is a subject of almost limitless extent, and may be studied with profit by every cultivator of the soil.

Boston Journal of Chemistry.
BOSTON, MARCH 1, 1870.

PROSPECTUS.

BOSTON Journal of Chemistry.

Vol V. — Commencing July 1, 1870.

Volume V. of the JOURNAL, commencing July 1, 1870, will be increased in size, each number containing not less than *twelve pages* of reading matter. It will be printed from stereotype plates, on the finest book-paper; and we shall continue to make it the *best and cheapest scientific journal in the world. The terms for the* JOURNAL *will be one dollar per year; single numbers, ten cents.*

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TO PHYSICIANS,

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It will come as a reliable friend and adviser, affording information and instruction upon all matters relating to the manufacture and dispensing of medicines, and the other substances and agents produced or vended by them.

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TO CHEMISTS, MANUFACTURERS, ARTISTS, TEACHERS, STUDENTS, CLERGYMEN,

All intelligent readers, men and women, everywhere, the *Boston Journal of Chemistry* will supply information and instruction of the highest importance and value.

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ERRORS IN CHEMICAL NAMES.

"SULPHATE of copperas" was given in a newspaper, the other day, as one of the components of a recipe. Did it mean sulphate of *copper*, commonly known as "blue vitriol," or did it mean *copperas*, often called "green vitriol," which is a sulphate of *iron?* Copperas contains no copper, though its name is suggestive of that metal. In the recipe to which we have referred, a chemist would suppose that sulphate of copper was intended, and not copperas; but if one should go to a druggist's and ask for "sulphate of copperas," a careless clerk would be quite as likely to give him the one as the other.

It is no uncommon thing to see these slips of the type in recipes published in the newspapers. We have seen "organized ether" for "ozonized ether," in a city journal. "Carbolic acid" has been printed as "carbonic acid" in repeated instances. Now a misprint in itself is no unpardonable sin, but misprints of this particular kind are *not* so readily to be excused. They are especially liable to escape detection, and they may do a deal of mischief. We can imagine cases in which the consequences might be very serious, and even fatal. Ought journalists, then, to attempt to print such matter, unless some one connected with the periodical is sufficiently versed in science to know whether it is printed correctly? Caution is certainly demanded in the use of chemical names, when we know that, if changed in a single letter, they may represent substances of radically different properties. A *sulphate* and a *sulphite*, or a *sulphite* and a *sulphide*, are almost identical as mere words, but the compounds known by those names are wholly dissimilar in their nature, and it might be dangerous sometimes to mistake one for another. There are hundreds of such nearly coincident terms in the chemical nomenclature, readily distinguishable by one who is familiar with the principles of that nomenclature, but easily confounded by one who does not understand the system.

Sometimes these blunders are simply amusing. A harmless joke perpetrated by a scientific writer may be taken in sober earnest by one of these editors who dabble in things above their comprehension, and may thus become, for those who "see it," a better joke than it was in the first place. In a letter sent to the London *Times*, not long ago, Mr. Crookes referred to the highly explosive nature of a dye which had been denounced as poisonous. He said: "It is almost as explosive as nitro-glycerine, and has already destroyed one factory, with loss of several lives. Should the dye retain this character in the fabric, the wearers of these socks would be able to vary in a highly sensational manner the excitement they are now indulging in." The editor of another London paper, delightfully innocent of all appreciation of the joke, reproduced the statement in the following shape: "Mr. Crookes has recently asserted that woollen stockings dyed with picrate of potash are liable to explode on the feet of those who sit too near the fire." This was sufficiently startling, and probably no ambitious cockney who had bought a pair of the brilliant but dangerous stockings, ventured to put them on after reading it. The double risk of being poisoned or blown up would be too much for John Bull, though a Yankee might be reckless enough to run it.

GEORGE PEABODY.

SINCE the last issue of the JOURNAL, the world's great benefactor, the friend of education, science, art, and everything that tends to elevate and ennoble the race, has been gathered to his final resting-place. George Peabody sleeps by the side of his father and mother, in the cemetery of his native town, Danvers. No private citizen ever received, at his decease, higher honors, and no one ever more richly deserved them. But our readers are acquainted with all the details of what has occurred, and therefore we need not dwell upon the subject. In this connection, however, we are reminded of a remark made by Mr. Peabody, the last evening we spent with him. It seemed to express a presentiment that the time of his departure was not far off. He was speaking of his residence in Baltimore, and giving some most interesting reminiscences of those with whom he was connected in business. "But," said he, "they have nearly all passed away, and the time is short for us all. I have in my trunk a document which I carry with me wherever I go. It contains the names of *one hundred and twenty* of the prominent shippers and merchants of Baltimore, who were in business when I was there, and as fast as I have learned of their *failure in business, or death*, I have noted it against their names. The last record left *but six names unmarked*. Most of them are *dead*, and a large proportion failed in business before death."

The examination of this document seemed to fill him with the profoundest impressions of the mutability of all earthly things, and the uncertainty of life. The paper had originally been placed in his hands by the merchants, as chairman of a committee, chosen to present a petition to the board of underwriters.

Among the many institutions aided or founded by Mr. Peabody, we think no one will longer perpetuate his *memory*, or render more efficient aid to science, than the Peabody Academy of Science, at Salem. We shall give some particulars regarding this institution at a future time.

Mr. Carl Meinerth, of Newburyport, has furnished us a few dozen very beautiful mezzotint card photographs of Mr. Peabody. We will send one of them to any subscriber who will send us the name of a new subscriber for Vol. V., with one dollar enclosed.

☞ Every number of the JOURNAL is stereotyped, and therefore we can furnish back numbers of the present volume to all who may desire them.

CHLORAL. — The editor of the JOURNAL, having been recently prostrated by great nervous exhaustion, resulting from protracted mental labor, made trial of the new agent chloral hydrate as an hypnotic. It proved, in his case, a remedy of remarkable efficacy. After suffering from nervous wakefulness for a period of nearly seventy hours, thirty grains of chloral brought in thirty minutes a sweet refreshing sleep, lasting eight hours. In three subsequent trials it has acted as a powerful, harmless hypnotic. He is still too weak to make any extended observations regarding the remedy, but desires, in this number, simply to call the notice of physicians to an agent which is certainly worthy their prompt attention.

ANCIENT STATES AND EMPIRES. — A notice of Dr. Lord's new book, *Ancient States and Empires*, will be found under its appropriate head. We have spent so many pleasant hours in its perusal, and have derived from it so much instruction, that we feel a strong desire that our readers should have access to the work. To bring it within the reach of those who have not the means to make a direct purchase, we propose to send the book free to any one who will send us *ten dollars*, with the names of *ten new subscribers*. We will enter the names of the subscribers for the whole of Vol. V., and send them all the remaining numbers of Vol. IV. This liberal offer ought to place the history in at least a thousand families, where it would not otherwise find its way. The price of the work is $3.00.

ONE OF THE DRUG STORES. — A prominent drug store, situated on the corner of two important streets in this city, is advertised in the newspapers as for sale. The owner says: "A knowledge of the drug business is not necessary, as the trade is principally fancy goods, patent medicines, cigars, and soda water."

In what strange association medicines for the sick are placed in this and other cities! "*Patent medicines, fancy goods, cigars, and soda water*" are principally sold in this "*drug store*," and no knowledge of medicines is needed by the proprietor! And yet this *is* a drug store, and the sick are expected to go to it for remedies. The proprietor deals in cigars and soda water, needs no knowledge of medicine or pharmacy, and yet has medicines to dispense. What a commentary this is on the present state of the drug trade!

EDITORIAL NOTES.

A REMEDY FOR THE HEADACHE. — "We can confidently recommend" to those suffering from headache the following excellent recipe, which is given by Pliny: "The small bone from the head of a snail that has been found between two cart ruts, and after being passed through a gold ring with a piece of ivory, is attached to the patient in a piece of dog's skin." The eminent old Roman adds that it is "a remedy well known to most persons, and always used with success"; but if, owing to constitutional peculiarities of the patient, it *should* fail in any case, we advise following it up with another valuable prescription from the same distinguished philosopher, namely, "the brains of a vulture mixed with oil and cedar resin, and applied to the head and nostrils."

SOME GOOD THINGS IN ANCIENT ROME. — But the Romans were not the worst of fools after all. Somebody has lately shown that the water supply of the ancient metropolis was more liberal than any great city of our day has provided for its inhabitants. The public baths were not inferior to those of Boston; in fact, they were on a considerably larger scale, and were patronized by all classes of the people. There were also some good sanitary regulations, and, what is more, they were enforced in the sturdy Roman way. Overseers, appointed by the government, examined the meat in public markets, and butchers were often fined for selling that which had not been officially approved. The record of some of the prosecutions under this law has been preserved to our day. There were no enactments against the sale of bad kerosene, for the excellent reason that the poor benighted heathen of that day had no kerosene, good or bad; but we may be sure that if they *had* had it, and if, as in the city of New York, more than one-tenth of all the fires (98 out of 913 in a year) had been caused by it, there would have been stringent laws to regulate its storage and sale, and those laws would not have been a dead letter.

"THE WORLD OF WONDERS." — An English book with this title is a fair sample of a certain class of popular books on science, being a jumble of facts and falsehoods gathered at random by an ignorant editor. Among the "wonders of digestion," a mournful story is told of a juggler who passed a sword "too far down the *windpipe*" into his stomach, where it was nearly all dissolved, but "a foolish medical man ordered the conjurer horse exercise," which led to "a severe internal wound and death." We hope the doctor was indicted for malpractice, and that no physician will ever again be in haste to prescribe horseback riding for a patient who has swallowed a sword. The same book, among "wonders of vegetation," gives pictures of a turnip with a human face (grown in 1682), a radish in the form of a human hand (A. D. 1672), and other plants equally remarkable.

Our readers must not confound this "wonderful" book with the "Library of Wonders" published by Scribner & Co., of New York. All the books of that series are thoroughly trustworthy.

SAL MIRABILE. — Speaking of wonders reminds us of Glauber and his "wonderful salt," or *sal mirabile*, as he named it, because it had, according to his view, wonderful power in the vegetable world, in medicine, and, indeed, for "all men of whatsoever state or condition." He little thought that hundreds of thousands of tons of it would come to be made yearly, not for direct use, but simply as a stage in the manufacture of soda-ash, which is mainly used in the preparation of that *sal mirabile* known as *soap;* for soap, chemically speaking, *is* a salt.

POPULAR SCIENCE. — As a recent writer has well said, "Do not let us suppose that popular knowledge is merely a little of the least valuable. The people seize on the highest, and, for general purposes, best; and let scientific men blame themselves in most cases if their work is not known to the public. The amount of scientific work done in Europe is beyond the ken of any man. Even profound scientific men are obliged to pick out the best in a popular way; the word *popular* having a meaning differing according to the man. Scientific journals exist professedly to abstract the best, and reviews and newspapers abstract again, and make clear; that which bears explanation without long study becomes popular. No magnitude repels the public; vastness is always attractive, but complicated studies require time, and these never can become popular, whether small or great in value. The people seize *the best they can use*, and this is popular science."

NEW SOURCE OF QUICKSILVER. — A stratum of quicksilver ore has been recently discovered in the island of Borneo. The ore promises to be one of the richest in the world, yielding from 70 to 80 per cent of pure metal. In fact it is very nearly pure mercuric sulphide. The average yield of mercury ores is from 2 to 20 per cent of metal. Borneo is rich in minerals of all kinds, and the ores are generally of superior quality.

FAST TRAVELLING. — There is a canal from Mons in Belgium to Paris, a distance of 350 kilometres, or about 220 miles. The barges laden with coal that navigate this canal make only three voyages during a whole year. The statement is made on the authority of *Les Mondes*, and may, therefore, be depended upon.

COAL-TAR COLORS. — 100 lbs. of coal-tar yield 3 lbs. of crude, and 1½ lbs. of pure benzol. From this are obtained 3 lbs of nitrobenzol, 2.25 lbs. of rosaniline, 3.37 lbs. of aniline red, and 1.12 lbs. of fuchsine; 1 lb. of pure fuchsine requires 3000 lbs. of pit-coal. The coal-tar produced by all the gas-works in Europe is sufficient to yield annually 53,000 cwt. of fuchsine!

MARVELS OF TELEGRAPHY. — Somewhere in the *Spectator* Addison quotes, from a monkish Latin writer of the middle ages, an account of a wonderful magnet, by means of which two lovers, far away from each other, might, under certain conditions and at certain hours of the day, hold sweet converse, in spite of the leagues that separated them. This dream of the mediæval monk has become a reality under the magic wand of modern science; or rather, the fiction has been more than made true. At all hours of day and night, across broad continents, beneath thousands of miles of tempestuous ocean, messages are sent on the wings of lightning. All things that are done by men are made known throughout the circuit of the globe in less than the "forty minutes" in which Puck promised to put a girdle round it. The miracle has become so familiar to us, that it ceases to excite our wonder or admiration; but what would old Ben Franklin say, if he could come back to earth and pay a visit to one of our telegraph offices?

THE AMERICAN DISEASE. — A Yankee, writing home from Berlin, says that dyspepsia, neuralgia, and nervous exhaustion are much less frequent in Germany than here at home; and that a friend of his who consulted a German physician was told that he had "the American disease, — dyspepsia."

WESTWARD MARCH OF MEDICAL LITERATURE. — A medical journal has been started in Oregon, under the title of the *Oregon Medical and Surgical Reporter*. It is edited by Prof. E. R. Fiske, of the Faculty of Willamette University, in the city of Salem, and published at $4.00 per annum. Success to our new contemporary on the sunset edge of the Continent!

CONCERNING DROPS. — Herr Quincke, of Berlin, has found that the size of drops bears a fixed relation to the chemical composition of the liquid. He has proved experimentally that all liquids, at a temperature near their liquefying point, have specific cohesions, which are proportionate to the numbers 1, 2, 3, 4, etc. Taking the specific cohesion of the metallic bromides and iodides as 1, that of mercury, the nitrates, the metallic chlorides, the sugars, and the fats, will be 2; that of water, the carbonates, the sulphates, and probably also the phosphates, will be 4. In the case of the metals (referred to the same standard), the specific cohesion of lead, bismuth, and antimony is 2; that of platinum, gold, silver, cadmium, tin, and copper, is 4; that of zinc, iron, and palladium, 6; that of sodium, 12.

DON'T USE CRACKED DISHES. — Such dishes absorb oils and fats from the various kinds of food put into

them. These fats soon become decomposed in the pores of the dish, and no amount of cleansing can remove the nauseating and poisonous deposit. The peculiarly unpleasant taste sometimes noticed in pie-crust is caused by baking it upon old cracked dishes, from which it absorbs the rancid fat left by former bakings.

ANTIDOTE TO CARBOLIC ACID. — Until people learn to distinguish the different preparations, of greatly varying strength, which pass under the common name of *carbolic acid*, it will be well for them to make a note of the following suggestion published in England by one of the leading houses engaged in the manufacture of this important article: —

"Messrs. Calvert wish to make known the fact that sweet oil or castor oil in large quantity is the best antidote to carbolic acid, when it has been swallowed in poisonous doses."

Speaking of poisons, somebody has recommended that the labels of druggists' bottles in which poisons are put up, should bear a brief statement of the best antidotes for those poisons. It is a good idea, and if carried out would often be the means of saving life.

HORSE-CARS WITHOUT HORSES. — A company has been organized in New Orleans, for the application of condensed air as a motive power for street railways. For economy in weight, the cylinders into which the air is compressed are to be made of *paper*. A trial cylinder of this kind has borne a pressure of three hundred pounds to the square inch without yielding. A car fitted up for experimental purposes, with leaky iron cylinders (weighing 1600 pounds) made three miles and a half in seven and a quarter minutes, carrying twenty-eight passengers. The cylinders are to be on the top of the car, and are to be charged at the depot by means of a stationary steam-engine.

A NEW USE OF PHOTOGRAPHY. — A London company is building a railway somewhere in South America, and photographs of the completed portions of the road have to be sent to London as vouchers for the work done by the contractors, before they can receive the successive instalments of their pay.

A BIG FIRE. — The heat given out from each *square yard* of the sun's surface is as great as would be produced by burning *six tons of coal* on it *each hour*. Taking the sun's surface as 2,284,000,000 square miles, each of which contains 3,097,600 square yards, our young friends can figure up how many tons of coal it would take to supply this big heating apparatus. All the coal fields of our little planet would be exhausted in very brief space, if they had to feed a furnace like that.

☞ It is very gratifying to know that the proposition to increase the size and price of the JOURNAL, meets with nearly the unanimous approval of our old friends and patrons. So strongly attached are they to the publication, and so much practical instruction have they derived from it, that even if the cost was many times as great, they would not allow its visits to be discontinued. In publishing a journal of this character for four years at a cost barely sufficient to pay for paper and printing, we have done what we think was never accomplished before. Although no pecuniary return has come to us, we have the satisfaction of knowing that an army of friends has been raised up, all over the country and the world, who will remain with us to the end. This journal has but just entered upon its career of usefulness, and we can assure old friends and new, that we have an abundance of good things in store for them.

LITERARY NOTES.

Scribner & Co., of New York, have just published *Ancient States and Empires*, by John Lord, LL. D. Our readers will remember our commendation of Dr. Lord's *Old Roman World*, which appeared two years since. This new book is even more attractive and interesting. It begins with the history of mankind in the Garden of Eden, and carries the reader along the great succession of events to the fall of the Roman empire. The work should find a place in every family, for its perusal will delight and instruct children as well as adults. Dr. Moffat, the accomplished Professor of History in Princeton College, pays it the following appropriate tribute in the *Princeton Review*:—

"This book is not a mere compendium of history or sketches, or dry and dead annals. It has, like all the author's productions, the flesh and blood hues, the motion, the breath, and pulsations of life. It is full of graphic portraitures of the life, manners, customs, and institutions of the Ancients, and of the growth of Oriental, Greek, and Roman culture and civilization. There are few who have not known and felt the inspiration of the author's enthusiasm, poetic eloquence, and vivid delineations in his great historic lectures. They will find all these animating the printed page. They will also find the condensation and clearness required in a text-book for the young, enlivened with all the brilliancy of which the matter and space admit. We think that it is highly adapted to the use of students in schools and colleges, and of all who. before going into thorough historical research, wish a pleasant introduction to the elements of ancient history."

Prof. Pumpelly's *Across America and Asia* has reached a third edition before it is three months old. This rapid sale of a book which, as one of the best critics has said, "repels at first sight," is simply a tribute to its substantial merit. *Old and New* (the new magazine of that name which, by the way, is old and new in leaping at once into mature life, like Minerva from the brain of Jove), says of it: "Whoever reads five pages will not leave the book willingly. His excellent opportunities were well improved by the author; and he has made a fascinating narrative, which carries with it sound and sagacious observation of the great social problem the East now presents to the West. His sincerity impresses us at once, and he has given that bird's-eye view which is the most reliable in this hurried and partial intercourse between modern nations. Who is ever deceived when he follows his first impression of a human face or character? It is only when this subtle image is blurred and confused by subsequent and imperfect knowledge, that the deep instinct which attracts or repels the natures of men or peoples, is turned away from its true course."

While this book will attract the general reader, it will have a special interest for the scientific student. The author is one of the few travellers who know what to see, and how to see, and he knows, also, how to tell the story of his travels in a clear, direct, graphic way; so that he gives us as complete an account of the physical geography (using the term in its widest sense) of the regions he visited as could well be put into the space.

Fields, Osgood, & Co. have reprinted *A Physician's Problems*, by Dr. Chas. Elam, — a thoughtful and able book on a most fascinating subject. The topics are those which relate to the "brotherhood of spirit and body," and, as a brother critic has said, the author "has treated them with the learning of a scholar, and the practical sense of a trained medical man. It is a volume which we read with decided zest, for its discussions have a sort of personal interest; and besides, the reader is constantly refreshed by anecdotes, instances, references to literary men and the habits of great men, by whatever, in short, will throw light upon the problems considered."

The editor of *Old and New* gives a list of twenty-one books which have recently been most in demand "at the largest retail store in Boston," and among them are the three noticed above — Dr. Lord's, Prof. Pumpelly's, and Dr. Elam's. The fact is creditable to the readers as well as to the writers.

We referred in our last to the fact that the popular magazines are making *science* one of their prominent features. This is the case with *Old and New*, which has secured Profs. Cooke and Lovering, of Harvard College, among its contributors in this department.

Putnam's Magazine, which is hereafter to be under the editorship of Parke Godwin, puts down as one of its "distinctive features," and *first* in the list, "popular papers on science and natural history, and practical information for everyday life."

Lippincott's Magazine, which has won a high literary reputation in its first two years, promises a continuance of its excellent "articles on popular science," among the other temptations of its prospectus.

Lippincott & Co. have just added *Good Words*, one of the most successful of the English popular monthlies, to their list. Their edition is a fac-simile of the original, and we have no doubt that it will become a favorite on this side of the Atlantic. Charles Kingsley and Prof. Ansted are among its scientific contributors.

Carlyle has said that "history is distilled newspapers," and the *Half-Yearly Abstract of Medical Sciences*, edited by Dr. Stone, might be called "distilled medical journals." Sixty or more foreign periodicals are boiled down, and their essence given in these semi-annual volumes of three hundred pages each. The one for the last half of 1869 has just been issued by Henry C. Lea, of Philadelphia, and shows the same judgment and skill in the selection and condensation of matter as its predecessors.

The *College Courant* (New Haven, Conn.), is not a mere organ of Yale College, but represents the collegiate interests of the whole country. It numbers among its contributors more than a hundred presidents and professors of our leading colleges. We can indorse the opinion expressed by Dr. Dunster, in the *New York Medical Journal*, that "it is one of the most interesting and valuable of our non-professional exchanges," and "indispensable to all college graduates of this country."

Every Saturday, in its new form, takes the leading place among our illustrated papers, while it gives, as it always has done, the very cream of foreign periodical literature of the lighter sort.

Medicine.

HYDRATE OF CHLORAL.

THE distinguished Dr. W. A. Hammond publishes in the *New York Medical Journal* the following interesting and important article upon chloral. Although it is long, we feel assured our readers will thank us for placing it before them:—

All the experiments which have been performed with the hydrate of chloral, whether upon man or the lower animals, go to show that it is a powerful hypnotic; but there is a difference as to whether the first effect is not the very reverse of sedative. Demarquay has shown, by *post-mortem* examinations, that it produces congestion of the brain and its membranes; but his researches are, in this respect at least, not very precise, for they do no

touch upon the point of different effects being produced by different doses; nor was any accurate examination of the state of the cerebral circulation made during life. My first object, therefore, was to determine the influence of the hydrate of chloral over the cerebral circulation.

Experiment.—I examined very carefully, with the ophthalmoscope, the retinæ of a rabbit, and ascertained that they were in a normal condition. I then injected seven grains of the hydrate of chloral, dissolved in water, into the cellular tissue, and two minutes afterward made another ophthalmoscopic examination. The vessels were decidedly increased in size, and several that were previously invisible made their appearance. The pulse and respirations were both increased in frequency. At the end of five minutes another retinal examination showed increased congestion, not only of the retinæ, but of the optic disks. The pupils were largely dilated. After seven minutes had elapsed, the animal exhibited signs of drowsiness. The pupils began to contract; and examination with the ophthalmoscope showed that the retinal congestion was greatly lessened. At the end of ten minutes sleep was profound. The pupils were strongly contracted; the temperature had fallen four degrees; the action of the heart was less frequent; the respirations were diminished, and the retinæ were of a pale pink color, with but two or three very minute veins visible. At the end of two hours the sleep was very deep; the respirations were feeble and slow; the ears were cold, and the retinæ were pale and exsanguined. After nine hours and twenty minutes the animal was found awake, and in a perfectly normal condition as regards temperature, circulation, respiration, and the condition of the retinæ.

This experiment was repeated three times, and always with similar results.

Now, as is well known, the ophthalmoscopical examination of the retinæ affords very exact indications as to the condition of the cerebral circulation; but by means of an instrument devised, though in somewhat different forms, by Dr. Weir Mitchell and myself, independently of each other, we are enabled to determine the point directly. This instrument, which I venture to call the cephalo-hæmometer, consists of a brass tube which is screwed into an opening made in the skull with a trephine. The lower end of the tube, which rests upon the dura mater, is closed with a piece of very thin india-rubber cloth; the upper end of the tube is closed with a brass cap, into which a glass tube is inserted. To this tube a scale is attached, and the brass tube is filled with colored water, so that when it is screwed into the skull, and the end touches the dura mater, the level of the liquid stands at zero. When the apparatus is in place and properly adjusted, it is very evident that any increase in the amount of blood circulating through the brain will cause the dura mater to press with increased force against the rubber membrane, and will thus cause the liquid to rise in the glass tube. Any diminution of the circulating fluid will cause the level of the liquid to fall. We have thus a very accurate means of measuring the cerebral hæmostatic pressure.

Experiment.—I operated on a rabbit with a small trephine, and inserted a cephalo-hæmometer. As soon as the instrument was *in situ*, I injected seven grains of the hydrate of chloral into the cellular tissue. In one minute and ten seconds the fluid began to rise in the tube, and in three minutes it stood at a point an inch higher than the normal level. After five minutes it was an inch and seven-eighths higher. This was the maximum point. It now began to fall steadily, and in two minutes and fifteen seconds reached the zero, the point from which it had started. Coincident with its further depression, drowsiness came on, until, when the level was about an inch below the zero, the condition of sleep was well established. The fluid continued to fall till the level was two inches and a half below the zero, which point was reached in thirty-two minutes after the injection was made. It remained stationary about an hour longer, and then fell about a quarter of an inch lower. It was not further depressed. After the lapse of seven hours and forty minutes it began to rise, and with this change the respiration, which had been feeble, became stronger and more rapid, and the animal exhibited signs of returning animation. At the end of nine hours and twenty minutes the animal awoke, and the level of the liquid, which at the time was about half an inch below the zero, rose rapidly to the original point. It continued to rise for a few minutes, but gradually fell again to the zero. This experiment was repeated upon three other rabbits, and similar results elicited.

Up to this time, it will be observed, that what may be called large doses for rabbits had been employed. Desirous of ascertaining the effects of a small dose, I performed the following experiment:—

Experiment.—Having adjusted the cephalo-hæmometer to the skull of a large rabbit, I injected under the skin a solution containing one grain of the hydrate of chloral. The water in the tube began to rise in a minute and forty seconds, and at the end of five minutes was three-eighths of an inch above the zero. The animal continued lively, and the pupils were dilated. The respiration and pulse were both accelerated. In half an hour the level of the liquid was at its highest—about three-quarters of an inch above the starting point. It now began to fall slowly, and in fourteen minutes was at the zero. During the whole time of the experiment the animal showed no signs of sleep, but was, on the contrary, unusually active. Ophthalmoscopic examination revealed the existence of a state of congestion of the retinæ, which lasted till the liquid in the cephalo-hæmometer had fallen to its original point. The experiment was repeated, with similar results, on two other rabbits.

Demarquay found, as one of the results of his investigations, that the hydrate of chloral in large doses produced continued congestion of the cerebral blood-vessels of the rabbits to which he administered it. His observations were made *post mortem*, and cannot, therefore, be considered as altogether reliable. The congestion was, in all probability, caused after death.

To be still further assured upon the point, I performed the following experiment:

Experiment.—I removed from a large rabbit nearly one-half of the cranium, and, opening the dura mater, laid bare the cerebrum and its membranes. I had thus almost the whole superior and external surface of one hemisphere exposed to view. I now injected one grain of chloral into the cellular tissue. In about two minutes the surface became redder and the vessels larger. I now injected five grains. The surface of the brain now became of a dark-blue color, and protruded through the opening in the skull. In something less than five minutes, however, a change ensued. The color gradually changed to red, the brain sunk again below the surface of the opening, and a state of anæmia ensued. With these changes the animal fell asleep. At the end of half an hour the surface of the brain was colorless, and no blood-vessel could be perceived. After seven hours and thirty-three minutes from the first injection, the brain again assumed a pale-red color, and the animal awoke.

I regard these experiments as showing conclusively that the first effect of the hydrate of chloral is to cause congestion of the cerebral blood-vessels, and that subsequently it induced directly the opposite condition. With a small dose, this latter effect is not reached, congestion only being produced.

[*To be continued.*]

A REMEDY FOR ASTHMA.

Editor Boston Journal of Chemistry:

For the benefit of those afflicted with *asthma*, I enclose a recipe which can be commended as being at least simple, safe, and useful. A prominent professor in one of our New England colleges, who has been an asthmatic for upwards of forty years, and tried a great variety of remedies, gives this the preference over all others. It consists simply in inhaling the smoke of stramonium leaves, which have been immersed in a saturated solution of nitre (nitrate of potassa), and then dried. Prepared in this way, it burns with great energy and completeness, rarely going out until the whole is consumed. These remedies, separately, have long been known, both to professional and private experience; but the combination seems particularly convenient and useful. It is best kept in a tin or other metallic box, the inside of the cover being used as a surface on which to burn it while inhaling. The effects are the more marked if it is used early, and before the paroxysm becomes fully developed. E. K. BAXTER, M. D.

Sharon, Vt.

Dr. R. Snead, of Strawberry Plain, Tenn., sends us the following:—

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—*L'Union Médicale.*

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Medical Department, - Boston, Mass.

SUMMER SESSION, 1870.

THE regular course of Summer Instruction will begin at the Massachusetts Medical College, North Grove street, Boston, on March 14th, and continue until the next Winter Course of Lectures, on the first Wednesday in November. The Session is divided into two Terms by the Summer vacation of two months. Gentlemen who finish their undergraduate course during the summer months, should join the Medical School at the beginning of the Fall Term, Sept. 13th, their requisite three years of study being thus completed in time for the special examination for medical degrees, which precedes the annual commencement at Cambridge.

Recitations are held daily by the Professors and Instructors in all the branches necessary to a medical education. Clinical instruction in Medicine and Surgery is also given daily at the Massachusetts General Hospital and the City Hospital. Other hospitals, and the various dispensaries and infirmaries in the city are likewise open to students. Lectures on special branches will be given at the College by University Lecturers, and courses on the sciences connected with Medicine, Zoölogy, Botany, Chemistry and Physics, will be delivered in Cambridge by the Professors in these departments, which students may attend without extra charge.

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☞ A detailed account of the Winter and Summer Sessions, as well as of the Harvard Dental School, will be forwarded (post-paid) by DAVID CLAPP & SON, 334 Washington street, Boston. The Janitor of the College will advise students in the selection of boarding places, and will always have a list of such as are in the vicinity of the College Building, varying in their rate of charges. Students are invited, on coming to town, to call upon the Dean of the Faculty, 114 Boylston street, to whom all letters must be addressed.

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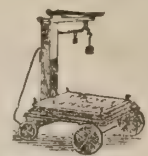

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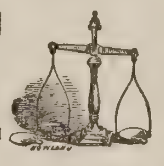

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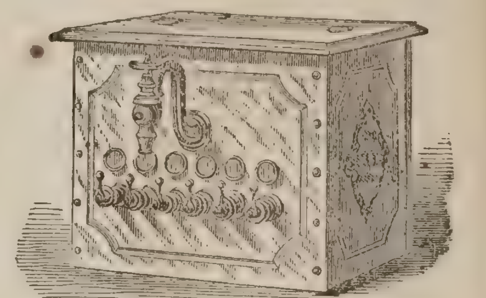

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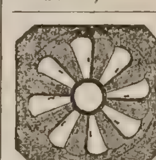

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BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

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EDITED BY JAS. R. NICHOLS, M.D.

VOL. IV.—No. 11. BOSTON, MAY 1, 1870. ONE DOLLAR PER ANNUM, SINGLE NUMBERS TEN CENTS.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston.

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Contents.

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Of the numbers mentioned we have a few copies left, which we will forward to our friends, at the following prices, viz: Vol. I., three numbers, twenty-five cents; Vol. II., eight numbers, fifty cents; Vol. III., ten numbers, fifty cents. Vol. IV. has been stereotyped as issued, and we are able to furnish back numbers since July 1869, to any extent. Price, single copies, six cents; six copies for twenty-five cents.

Familiar Science.

WHERE DO DIAMONDS COME FROM?

UNTIL within a period of one hundred and fifty years, the East Indies furnished all the diamonds found in the markets of the world. In Hindostan and Borneo the precious gems were found in detached crystals, accompanied with grains of gold, amongst metallic sand washed down from the mountains. When the poor miner who wandered into the mountainous districts of Brazil in pursuit of gold accidentally stumbled upon the famous diamond mines of that country, the whole world was filled with excitement, and the number of miners who crowded thither was very great. The quantity of gems of the very first water obtained from these mines was sufficient to keep the gay and luxurious courts of France and Spain in a blaze of light, as the noble ladies of the time adorned their persons with them. The region of country in Brazil in which diamonds are found is extremely limited. The district of Minas Geraes extends only about eighty miles north and south, and eight from east to west. The character of the earth is an agglomerate, formed by the decomposition of granite and mica slate, and is made up of rounded white pebbles and light-colored sand; in this mixture the diamonds are found along with grains of gold, sometimes crystalized. It is curious that the nature of the earth and the deposits corresponds with that of Hindostan and Borneo where diamonds exist. No one knows how a diamond is produced, or where its natural home is. If its original position is a rocky matrix, as is suspected, it is certain no one has ever seen it. The chemist or mineralogist who will furnish a diamond involved in its primitive home, will certainly shed great light upon an interesting scientific problem, and render his name famous. The mountains which supply the *débris* which hold the gems, are composed of schistose rocks, intermixed with quartz, sandstone, brescia, flinty slate, limestone, etc. The limestone brescia is the only rock in which diamonds are found in the mountains, and this comprises all we know regarding their original position. By what subtle chemical processes the brilliants have been formed, at some time, in the course of those stupendous changes to which our planet has been subjected, we have no knowledge. Undoubtedly fire, water, gases, pressure, etc., have all been concerned in the synthetical work. Chemists have not yet been able to manufacture colorless gems, and it is doubtful if the process is ever understood. In an industrial view, the problem has but little practical importance.

It may not be generally known to our readers that new diamond mines have been recently discovered in Australia, and that we are at present receiving from that distant quarter of the world large numbers, and of a brilliancy unsurpassed. In February last the Diamond Mining Co. forwarded to England two hundred and twenty-five diamonds, the produce of four weeks' work with one washing machine. This Company have sent in all, since October, nine hundred and eighty-four stones. Another machine will be at work this summer, which it is expected will more than double the supply. A Mr. Scott, working in the Mudgee district, washed twelve loads of earth and obtained one hundred and ten gems, weighing three and one half dwt., equal to 26 carats; nine of them weighed one carat each. The miners earn about £12 a week, or $60 our currency. A party of miners owning about eight acres of territory have refused $20,000 for one half interest in the "diggings." It is evident that the world is about to receive from Australia a large accession to its diamond treasures, and it is possible that the quantity will be so large as greatly to unsettle prices. The value of diamonds is based upon an arbitrary standard, and a considerable increase in the supply will have the effect to create a panic among holders, and values will fall to a much lower point. Our wealthy and fashionable ladies may yet live to see the brilliants flashing upon the bosoms of their servants in the kitchen, and from the cravats of the Johns and the Patricks in the stables. No very serious disturbance to the world's well-being will result, if this revolution in the value of diamonds should occur.

DUST AND DISEASE.

PROF. TYNDALL's lecture on this subject, before the Royal Institution, has made a great sensation on both sides of the Atlantic. Singularly enough, both the lecturer and the majority of those who heard or who have read his lecture, appear to consider that the *organic* character of "the gay motes that people the sunbeam" is a new discovery. The Professor himself, after telling how he burned up this floating dust, says: "I was by no means prepared for this result; for I had thought, with the rest of the world, that the dust of our air was, in great part, inorganic and non-combustible."

But, as Dr. R. Angus Smith has stated in a paper published since Prof. Tyndall's lecture, "the knowledge of organic matter in the air has never been absent entirely from men's minds in historic times"; and the truth has never been more completely expressed than by Bishop Berkeley, in *Siris*:—

"Nothing ferments, vegetates, or putrefies, without air, which operates with all the virtues of the bodies included in it,—that is, of all nature. . . . The air, therefore, is an active mass of numberless different principles,—the general sources of corruption and generation; on the one hand, dividing, abrading, and carrying off the particles of bodies, that is, corrupting or dissolving them; on the other, producing new ones into being, destroying and bestowing forms without intermission. . . . The seeds of things seem to be latent in the air, ready to pair, and produce their kind whenever they light on a proper matrix. The extremely small seeds of ferns, mosses, mushrooms, and some other plants, are concealed and wafted about in the air, every part whereof seems replete with seeds of one kind or other. The whole atmosphere seems alive. There is everywhere acid to corrode and seed to engender. Iron will rust, and mould will grow in all places."

As long ago as 1846, Dr. Smith described, before the Chemical Society, a simple method of obtaining organic

matter from the condensed breath on windows. This attracted sufficient attention at the time to lead the British Association to request him to examine the subject further, and report upon it. He did so, and his report was published in 1848. The following are extracts therefrom:—

"That animals constantly give out a quantity of solid organic matter from the lungs, may readily be proved by breathing through a tube into a bottle, when the liquid or condensed breath will be collected at the bottom of the bottle; or by breathing through a tube into water, when a solution of the same substance will be found in the water. This would scarcely require proof if we consider that breath so frequently has an organic smell.

"If this condensed breath be put on a piece of platinum, or on a piece of white porcelain, and burnt, the charcoal which remains and the smell of organic matter will be conclusive. If it be allowed to stand for a few days (about a week is enough), it will then show itself more decidedly *by becoming the abode of small animals.* These are rather to be styled animalculæ, and very small ones certainly, unless a considerable quantity of liquid be obtained; they may be seen with a good microscope. Animalculæ are now generally believed to come from the atmosphere and to deposit themselves on convenient feeding places; that is, they only appear where there is food or materials for their growth, and they prove, of course, the existence of that continuation of elements necessary for organic life. At the same time, their presence is a proof of decomposing matter, as their production is one of the various ways in which organized structure may be broken up."

In 1866 again, in a Report to the Cattle Plague Commission, Dr. Smith refers to Pasteur's investigations in the same field, in the following terms:—

"It would appear as if oxygen were not the only agent in the atmosphere causing decomposition. The investigations of M. Pasteur, who found the subject in this uncertain condition, have advanced it so far that we may now with certainty reason in the belief that organized substances are really found in great abundance in the atmosphere (in all places), and that they are the cause of some hitherto entirely mysterious phenomena, putrefaction included. His object was first to inquire into the possibility of spontaneous generation, and he found that carefully filtered air allowed no organisms to appear in vegetable solutions. He found that near the usual surface of the ground these organisms were so numerous that whenever a vessel containing vegetable matter fit for their growth was opened for a very short time they were found to enter; that in cellars and damp and quiet places, where there was no air or dust floating about, these organisms were fewer; and that, as he ascended the sides of the Alps and the Jura, they diminished in number. A commission of the French Academy confirmed his results."

For some years past, Dr. Smith has been attempting to *measure* the amount of this putrescible matter in the air of different places, and also the amount that has undergone putrefaction and left its remains in the air,—"the sewage of the atmosphere," as he forcibly expresses it. In this attempt he has succeeded to a considerable extent, and the results are to be published in a work on "Chemical Climatology."

Prof. Tyndall cannot claim, therefore, to be the discoverer of the organic character of the dust in the air. Nor has he advanced our knowledge with regard to the "germ theory of disease," which, as "*Nature*" reminds him, is neither confirmed nor refuted by his investigations. What he *has* discovered is an easy, and, at the same time, a very clear and striking method of *showing to the eye* that the dust in the air is largely organic. The practical results of his experiments, so far as health is concerned, are summed up by "*Nature*" thus:—

"Prof. Tyndall has given us a scientific account not only of certain optical properties of impure air, but likewise of the benefit of several popular practices; such, for example, as lighting fires during epidemics, to purify the air; the use of gauze curtains in malarious districts, as a protection against fever; covering the mouth with cloth during sleep in fever countries, and the like. He has shown that heat purifies, more or less, impure air; and that impure air can be deprived of its suspended impurity by filtering it, as is the case with water. On the real proximate aërial cause of disease, if such there be, no new light has been yet thrown by the optician, the microscopist, or the chemist."

Scienti[illegible] men are fast coming to the conclusion that *carbonic acid*, which has so long been held responsible for most of the mischief done by bad air, is by no means so pernicious as has been supposed, and that a large part of the mischief ascribed to it should really be charged to these *organic* impurities in the atmosphere. On the other hand, as Doctor Smith suggests, it is not to be taken for granted that *all* the organic matter in the atmosphere is necessarily injurious to health. Of these organized germs some are unquestionably hurtful, but "it may be that others are required for the maintenance of healthy animal life, exactly as in vegetable fermentation." Many workers are already busy in this field of research, and Prof. Tyndall's experiments will attract increased attention to it, while they suggest a new method of conducting the investigation, and one that will doubtless lead to fresh discoveries of the greatest interest and importance, both theoretically and practically.

GASES AND LIQUIDS.

One of the most interesting and most important of recent discoveries is that of "the continuity of the gaseous and liquid states of matter," by Dr. Thos. Andrews, Vice-President of Queen's College, Belfast. He has proved experimentally that these two states are nothing more than widely separated forms of the same condition of matter, and that they may be made to pass into one another by gradations so gentle that there shall nowhere be a perceptible breach of continuity. Carbonic acid has thus been carried from the gaseous to the liquid state, without break or interruption. Dr. Andrews has lately illustrated this in a lecture before the Royal Society, from the concluding paragraphs of which we give the following extracts:—

"Take, for example, a given volume of carbonic acid gas at 50° C., or at a higher temperature, and expose it to increasing pressure till 150 atmospheres have been reached. In this process its volume will steadily diminish as the pressure augments, and no sudden diminution of volume, without the application of external pressure, will occur at any stage of it. When the full pressure has been applied, let the temperature be allowed to fall till the carbonic acid has reached the ordinary temperature of the atmosphere. During the whole of this operation no breach of continuity has occurred. It begins with a gas, and by a series of gradual changes, presenting nowhere any abrupt alteration of volume or sudden evolution of heat, it ends with a liquid. The closest observation fails to discover anywhere indications of a change of condition in the carbonic acid, or evidence, at any period of the process, of part of it being in one physical state and part in another. That the gas has actually changed into a liquid would, indeed, never have been suspected, had it not shown itself to be so changed by entering into ebullition on the removal of the pressure. . . . From carbonic acid as a perfect gas to carbonic acid as a perfect liquid, the transition we have seen may be accomplished by a continuous process, and the gas and liquid are only distant stages of a long series of continuous physical changes. Under certain conditions of temperature and pressure, carbonic acid finds itself, it is true, in what may be described as a state of instability, and suddenly passes, with the evolution of heat, and without the application of additional pressure or change of temperature, to the volume which, by the continuous process, can only be reached through a long and circuitous route. In the abrupt change which here occurs, a marked difference is exhibited, while the process is going on, in the optical and other physical properties of the carbonic acid which has collapsed into the smaller volume, and of the carbonic acid not yet altered. There is no difficulty here, therefore, in distinguishing between the liquid and the gas. But in other cases the distinction cannot be made; and under many of the conditions I have described it would be vain to attempt to assign carbonic acid to the liquid rather than the gaseous state. Carbonic acid, at the temperature of 35·5°, and under a pressure of 108 atmospheres, is reduced to 1-430th of the volume it occupied under a pressure of one atmosphere; but if any one ask whether it is now in the gaseous or liquid state, the question does not, I believe, admit of a positive reply. Carbonic acid at 35·5°, and under 108 atmospheres of pressure, stands nearly midway between the gas and the liquid; and we have no valid grounds for assigning it to the one form of matter any more than to the other. The same observation would apply with even greater force to the state in which carbonic acid exists at higher temperatures and under greater pressures than those just mentioned. . . . The properties thus exhibited by carbonic acid are not peculiar to it, but are generally true of all bodies which can be obtained as gases and liquids. Nitrous oxide, hydrochloric acid, ammonia, sulphuric ether, and sulphuret of carbon, all exhibited, at fixed pressures and temperatures, critical points, and rapid changes of volume with flickering movements, when the temperature or pressure was changed in the neighborhood of those points."

Dr. Andrews closes his lecture thus:—

"A problem of far greater difficulty yet remains to be solved, the possible continuity of the liquid and solid states of matter. The fine discovery made some years ago by James Thomson, of the influence of pressure on the temperature at which liquefaction occurs, and verified experimentally by Sir W. Thomson, points, as it appears to me, to the direction this inquiry must take; and in the case at least of those bodies which expand in liquefying, and whose melting points are raised by pressure, the transition may possibly be effected. But this must be a subject for future investigation; and for the present I will not venture to go beyond the conclusion I have already drawn from direct experiment, that the gaseous and liquid forms of matter may be transformed into one another by a series of continuous and unbroken changes."

The Physiological Effect of the Ruhmkorff Spark.—It has been taken for granted that to allow the spark of a large Ruhmkorff coil to pass through the body would be dangerous, if not fatal; but recent experiments by Dr. Richardson, in England, have proved that this is an error. Our readers have heard of the immense Ruhmkorff coil at the "Royal Polytechnic," in London, which gives a spark of 25 or 28 inches. Dr. R. sent the charge of this powerful machine through a pigeon, which had previously been put under the influence of anæsthetics. Each spark caused a general muscular contraction, but the action of the heart and of the respiratory organs was not affected, and the bird came out of the experiment unharmed, except for the ruffling of its feathers. A frog was then subjected to a similar trial, with a like result. To one who has witnessed the action of this monster coil, which in its luminous and calorific effects as far exceeds an ordinary induction coil as the latter surpasses a common Leyden jar, this seems scarcely credible. Whether the experimenter allowed the spark to pass through any part of his own person, after trying it on the pigeon and the frog, is not stated in the only account of the investigation that we have seen; but if *they* could stand it, there could be no serious risk in a man's taking a similar dose of artificial lightning.

Vine Culture in France.—According to the Bulletin of the Scientific Association of France, the vine occupies in that country 2,500,000 hectares, or 6,175,000 acres,—the sixteenth part of all the land capable of cultivation. The gross produce amounts to 1,500,000,000 francs, or about $300,000,000 in gold. This industry gives employment to six million men, women, and children, and nearly two million merchants, agents, etc.

Cologne Vinegar.—To one pint of good *eau de cologne*, add half an ounce of strong acetic acid. This mixture is much used in France as an application in nervous headaches, etc.

VICTORIA AND ITS GOLD.

THE population of the Australian colony of Victoria has risen from 77,000, in 1851, to 660,000, in 1867, and its acres under cultivation from 57,000 to 631,000. Its imports and exports are tenfold what they were in 1851, and the valuation of taxable property in town and country is estimated at £42,000,000.

This marvellous growth is mainly due to the discovery of gold in 1851. The richness of the gold-fields is shown by the fact that, from 1851 to the end of 1868, the yield had been 36,835,691¾ ounces, worth £147,342,767. The annual product is, however, steadily diminishing. In 1856, the quantity exported was 2,985,991 ounces, while in 1868 it was only 1,657,498 ounces. In 1854, when the gold fever was at its height, the number of miners was 65,763; but it has slowly fallen off, and in Sept., 1868, was 63,482.

Silver, tin, copper, antimony, zinc, lead, cobalt, bismuth, manganese, and iron are found in Victoria, some of them abundantly. Coal, lignite, and bituminous shales are also met with; and the sapphire and the diamond are to be added to the list.

HOUSEHOLD RECIPES.

TO IMPROVE STARCH.—To each bowl of starch, add one teaspoonful of Epsom salts, and dissolve in the usual way by boiling. Articles starched with this will be stiffer, and will be rendered to a certain degree fireproof.

TO REMOVE STAINS FROM LINEN.—To remove wine, fruit, or iron stains, wet the spot with a solution of hyposulphite of soda, and sprinkle some pulverized tartaric acid upon it; then wash out as usual. Strong vinegar can be used instead of the tartaric acid.

MOTH POWDER.—Lupulin (flour of hops), 1 dram; Scotch snuff, 2 oz.; gum camphor, 1 oz.; black pepper, 1 oz.; cedar sawdust, 4 oz. Mix thoroughly, and strew (or put in papers) among the furs or woollens to be protected.

LIQUID FOR CLEANING SILVER.—Add gradually 8 oz. of prepared chalk to a mixture of 2 oz. of spirits of turpentine, 1 oz. of alcohol, ½ oz. of spirits of camphor, and 2 drams of aqua ammonia. Apply with a soft sponge, and allow it to dry before polishing.

Arts.

NEW THINGS IN THE ARTS.

TUNGSTEN BLUE.—M. Tessié du Motay, whose name is already familiar to our readers in connection with the new method of obtaining oxygen gas cheaply on a large scale, has announced the discovery of a new coloring substance. It has a striking resemblance to Prussian blue, but differs from it in not being bleached by sunlight. Like that substance, it resists the action of acids, but not of alkalies. The directions for preparing it are as follows: Dissolve, in a sufficient quantity of water, and successively, 10 parts of tungstate of soda, 8 of tin-salt (protochloride of tin), 5 of ferrocyanide of potassium, and 1 of perchloride of iron. When all these substances are dissolved, the mixture is thoroughly stirred up, and the sediment which is formed is separated by filtration. As soon as the liquid has run off, the moist pasty matter is spread out in thin layers upon suitable glass plates, or shallow dishes, and for several days exposed to the action of strong daylight and sunshine. This slowly causes the formation of a beautifully-blue pigment; and this action may be accelerated by washing the material, so as to remove the matters soluble in water which it yet contains. The tungsten blue can be heated to about 180° C. without decomposition. Its percentage composition in 100 parts, is—water, 7·85; tin, 31·69; iron, 5·13; cyanogen, 19·41; blue oxide of tungsten, 35·60; total, 99·68. It costs no more than the finest quality of Prussian blue.

WATERPROOFING PAPER.—The solution of oxide of copper in ammonia acts, as is well known, as an energetic solvent of cellulose, or woody fibre. Advantage is taken of this fact in waterproofing paper by the following process:—

A tank is made to contain the solution just alluded to, and the paper is rapidly passed just over and in contact with the surface of the liquid, by means of properly placed rollers moving with speed. The paper, on leaving, is pressed between two cylinders, and next dried by means of so-called drying cylinders, similar to those in use in paper mills. The short contact of the felty paper tissue with the liquid gives rise to just sufficient solution of cellulose to form an impermeable varnish.

WATERPROOFING WOVEN FABRICS.—A late number of *Cosmos* gives the following method:—

1 kilo. of alum is dissolved in 32 kilos. of water, and 1 kilo. of acetate of lead is dissolved in the same quantity (separately) of water. The two liquids having been mixed, there is, of course, precipitated sulphate of lead; as soon as this is deposited, the clear liquid is decanted, and the fabric which it is desired to render waterproof is thoroughly steeped in this fluid, and next dried by being hung up in open air.

COPPER WINDOW SASHES.—These sashes are now manufactured in England under patent. The metal used is drawn copper, and is hard and tough. The sashes, when completed, are submitted to a bronzing process and are not affected by atmospheric influences. They have been experimentally proved to be weather tight, and are thus peculiarly adapted for resisting the attacks of heavy rain in exposed situations. The manner in which the parts are put together precludes the possibility of rattling in high winds. Once fixed, these sashes require no painting or other attention. The glass is embedded in an impermeable putty, and fixed in its place by strips of copper attached with screws of the same metal. The first cost is slightly beyond that of the ordinary sashes, but their unquestionable durability more than compensates for the extra outlay.

LACQUERS.

1. *Deep Golden Lacquer.*—Seed lac, 3 oz.; turmeric, 1 oz.; dragon's-blood, ¼ oz.; alcohol, 1 pint. Digest for a week, shaking frequently; then decant and filter.

2. *Golden Lacquer.*—Turmeric, 1 lb.; gamboge, 1½ oz.; gum sandarach, 3½ lbs.; shellac, ¾ lb. (all in powder); rectified alcohol, 2 gallons. Dissolve, strain, and add 1 pint of turpentine varnish.

3. *Red Lacquer.*—Spanish annatto, 3 lbs.; dragon's-blood, 1 lb.; gum sandarach, 3¼ lbs.; rectified alcohol, 2 gallons; turpentine varnish, 1 quart. Dissolve and mix, as in No. 2.

4. *Pale Brazen Lacquer.*—Gamboge (cut small), 1 oz.; Cape aloes (do.), 3 oz.; pale shellac, 1 lb.; rectified alcohol, 2 gallons. Dissolve and mix, as in No. 2.

5. *Another Brazen Lacquer.*—Seed lac, dragon's-blood, annatto, and gamboge, each, 4 oz.; saffron, 1 oz.; rectified alcohol, 10 pints. Dissolve, etc., as in No. 2.

As these lacquers are often wanted of different shades of color, it is well to keep on hand a concentrated solution of each coloring ingredient, so that it may be added at any time to produce the desired tint.

USEFUL RECIPES.

MUCILAGE FOR LABELS.—Macerate five parts of good glue in eighteen or twenty parts of water, for a day, and to the liquid add nine parts of rock candy and three of gum arabic. The mixture can be brushed upon paper while lukewarm. It keeps well, does not stick together when dry, and adheres firmly to bottles when moistened.

For the labels of soda and seltzer water bottles (or for any bottles kept in damp cellars), make a paste of good rye flour and glue, and to each pound of it add half an ounce of linseed oil varnish and half an ounce of turpentine.

An excellent paste for the manufacture of portfolios is made by preparing a saturated solution of borax in hot water and filtering it when cold. It is then to be heated and as much well washed and dried caseine dissolved in it as it will take up. This is to be used when cold, and is said to be much superior to glue.

ZINC WHITEWASH.—Mix oxide of zinc with common size, and apply it with a whitewash brush to the ceiling. After this, apply in the same manner a wash of the chloride of zinc, which will combine with the oxide to form a smooth cement with a shining surface.

TO TIN IRON COLD.—Take equal parts of quicksilver and block tin, and melt them together. Mix also equal parts of muriatic acid and water. Apply the amalgam with a clean rag steeped in the acid mixture.

AN AMALGAM FOR ELECTRICAL PURPOSES.—Those who have occasion to experiment with frictional electricity will be glad to know of a new amalgam, which is much better than the one in common use (two parts quicksilver, one of tin and one of zinc). It is made by melting two parts of chemically pure zinc in an iron ladle, and then carefully adding, while gently stirring it with an earthen pipe-stem, one part of quicksilver. After cooling, an extremely tough, but easily pulverized amalgam, of a silver white color, is obtained, which may be kept in closed vials for any length of time; and when needed, the necessary quantity is to be ground up in a porcelain mortar, with a little tallow.

In the construction of electroscopes, aluminium foil is much superior to gold foil, being equally sensitive, while it is much stronger and less liable to be torn.

TO PASTE PARCHMENT PAPER.—It is well known that it is not easy to make surfaces of parchment paper adhere by means of common paste. If, however, the surfaces are moistened with dilute alcohol or other spirits before applying the paste, they will adhere with the greatest tenacity.

COMPOSITION FOR WALKS.—The following is highly commended, and is not patented:—

Sand, 5 parts; coal ashes, 2 parts; slaked lime, 1 part; fine gravel, 2 parts. Mix cold, and add coal tar, hot or cold, until the mass becomes just sticky with it. Make the foundation of the walk by ramming down or rolling hard 6 inches of gravel; then put on a three-inch layer of the mixture, and roll or pound very hard.

PRESERVATION OF MILK. *Cosmos* gives the following recipe:—

Add to every litre (about 29 ounces) of unskimmed milk, previously poured in a well-annealed glass bottle, 40 centigrms. (about 6 grs.) of bicarbonate of soda. Place the bottle containing the milk, well corked, for about four hours in a water-bath heated up to 90° (194° F.). On being taken out, the bottle is varnished over with tar; and in that state the milk it contains will keep sound and sweet for several weeks.

To Preserve Steel Goods from Rusting.—The simplest way of preventing the oxidation of polished iron and steel goods is to dust them over with quick lime. When articles are required to be preserved for many months (such as polished steel grates), strips of paper freely covered with powdered lime are to be wrapped around the bars; or they may be placed in cases, and interstices filled up with quick lime. Pianoforte wires and small goods are preserved in the same way. The *rationale* of the method is this—steel will not oxidize in dry air, and thus indirectly the lime preserves steel from rust. This is not a new plan, but it is the method adopted by the majority of the Birmingham houses.

Purification of Water.—Dr. Dunning, of Amsterdam, recommends for the purification of dirty water, for household and manufacturing purposes, the addition of half a grain of chloride of iron to each quart of the water. By this means the foreign constituents are deposited, and by a further addition of about one and a third grains of soda to a quart of the water, the iron is precipitated. Experiments made on a large scale, in Holland, upon impure river water, gave the most satisfactory results.

Cement for Aquaria.—A correspondent, who has made hundreds of aquaria, and who has experimented with numerous cements for the purpose, writes us that the following is much better than the one for which we gave a recipe in our last number:—

Take 10 parts by measure of litharge,
10 " " " " plaster of Paris,
10 " " " " dry white sand,
1 " " " " finely powdered rosin,

and mix them, *when wanted for use*, into a pretty stiff putty with boiled linseed oil. This will stick to wood, stone, metal, or glass, and hardens under water. It is also good for marine aquaria, as it resists the action of salt water. It is better not to use the tank until three days after it has been made.

Waterproof Varnish.—Take 2 parts of rectified petroleum spirit, in which dissolve 2 parts of prepared gum dammar, and filter or strain the whole. In making paints, take stearic acid or paraffine, alone or in combination, and reduce them by means of heat to a liquid state. To every 8 lbs. of paraffine or stearic acid, alone or in combination, add 2 lbs. gum dammar. The paints may be colored by any suitable coloring matter, and may be applied in a heated state; or when used cold, may be diluted to a suitable consistency by means of rectified petroleum spirit.

Stucco.—This substance, now much in use for walls, pillars, etc., is at present prepared by mixing plaster of Paris with a solution of gelatine or glue, instead of with water. This, while stiffening more slowly, becomes much harder than with water alone. For white stucco, the proper quality of gelatine must be employed; for colored, less care need be exercised. When the mass has been suitably applied, and sufficiently hardened, the surface is to be moistened and rubbed down with pumice stone until smooth. It is finally to be coated by means of a brush with a concentrated solution of gelatin, and, when perfectly dried, it may be polished with tripoli on a buffer, with the addition of a little olive oil. It is often desirable, in using plaster of Paris in the ordinary way, to prevent its hardening too rapidly. This may be easily done by adding a saturated solution of borax to the water in suitable proportion. One volume of the solution to twelve of water will prevent hardening for fifteen minutes; while with equal parts this will not take place for ten or twelve hours.

Genuine Port Wine.—Cider, 14 oz. Alcohol, 3 oz. Strong decoction of logwood, 4 oz. Alum, 40 grains. Cream of tartar, 20 grains. White sugar, 1¼ oz. This, being a *native* wine, is largely patronized in America. By all means, make it for yourself. It will be much cheaper than to buy it, and you will have the satisfaction of knowing that it is unadulterated.

THE TESTING OF KEROSENE.

There has been a good deal of dispute and some litigation, in England, in regard to the method of testing petroleum and similar oils which is prescribed by law. The discordant results obtained by different chemists in testing samples of the very same oil have led scientific men to investigate the subject very carefully, and the conclusions to which they have come are of great practical importance.

In the first place, it is found that the *time* taken to heat the oil up to the "flashing point" has a marked influence upon the result. In experiments made by Mr. Calvert upon six different samples of oil, it was found that when they were heated from 52° F. up to the flashing point in fifteen minutes, they "flashed" at temperatures *from 2° to 8° lower* than when twenty minutes were taken to heat them to the same extent; and in the latter case they flashed at temperatures from 2° to 9° lower than when thirty minutes were spent in the process. Thus the very same oil, heated for fifteen minutes, flashed at 95°; heated for twenty minutes, flashed at 99°; for thirty minutes, flashed at 108°. All three tests would be consistent with the wording of the law (which merely directs the use of "a small flame" in heating the oil); but while two of them would condemn the oil and subject the seller to a penalty, the third would prove it safe for sale or use.

This difference is probably due to the fact that when the oil is heated slowly, the more volatile products escape gradually into the air, and are never present in sufficient quantity to produce a flash when a taper, as directed by the act, is passed within a quarter of an inch of the surface of the oil.

Again, it is found that, if two thermometers are placed in the oil, one (as the act prescribes) one and one-half inches below the surface, and the other only one-half inch, there will be a difference of several degrees between the two at the time of the flash. In three experiments, the difference was 5°, 4°, and 4°, respectively.

This very curious and unusual difference in the temperature of a fluid near the surface, and at a point an inch lower, is probably to be ascribed to the fact that the oil is not a homogeneous liquid, but a mixture of several hydrocarbons; the lightest of which rise first to the surface, carrying the heat with them.

Mr. Calvert recommends that the vessel containing the oil should be heated by setting it into a vessel of water, previously heated to some 10° above the probable flashing point—or to about 110°—and that the bulb of the thermometer be placed half an inch below the surface of the oil. The flashing point is then to be tested in the usual way. A variety of experiments with this method gave uniform and consistent results.

JOTTINGS.

A Soda Mine.—The *Gold Hill News* gives an account of a soda mine in Nevada, which is as singular as it is valuable. It is an immense and apparently inexhaustible deposit of almost pure soda. It is free from all earthy matter, and yields 80 per cent of soda, the balance being mainly salt. A shaft has been sunk beside it to the depth of fifty feet, from the bottom of which a drift has been made for 25 feet into the vein of soda, without getting through it. The owners sell the soda to soap manufacturers in the State, and also as a chemical agent in the reduction of ores. It is also used for washing and other purposes for which ordinary soda is employed.

Oxygen Peddled in the Streets of Paris.—Oxygen is now made on a large scale in Paris. Carts, with metal reservoirs containing the compressed gas, deliver it to customers in all parts of the city. Some of the theatres are large consumers, using it for illumination both outside and inside. The oxyhydrogen light is also much used for the illuminated advertisements that are now so common on the Boulevards and elsewhere. These are produced by a magic lantern and screen in the second stories of buildings, and the furnishing of them has become quite a business.

Good News, if True.—It is stated that M. Tessié du Motay (may his shadow never be less!) has devised an oxyhydrogen light, in which no pencil of lime, magnesia, or zircon is required. Supercarburetted hydrogen is used instead of ordinary hydrogen. The new light is wonderfully cheap, as well as brilliant, costing only two centimes (*less than half a cent*) for five hours. If there is no mistake about this (and it comes on good authority), the old-fashioned mode of gas-lighting may be considered as "played out."

The Newall Telescope.—This new instrument, made by Cooke & Sons, of York, Eng., for R. S. Newall, of Gateshead, is now completed. A full description of it, with illustrations, is given in No. 16 of *Nature*. The object-glass has a clear aperture of twenty-five inches. The great refractor at Cambridge, Mass., has but fifteen and one-half inches aperture, and the one made by Alvan Clark, for the Chicago Observatory, eighteen and one-half inches. This last was the largest refracting telescope in the world, but is thrown quite into the shade by this new English instrument. The light-collecting capacity of the latter is nearly *double* that of the former, or as 625 (the *square* of 25) is to 342.25 (the square of 18.5). After being thoroughly tested, the telescope is to be removed to some climate more favorable for astronomical observations than that of England.

Last Words over two Great Works.—"*Gesta dei per Francos*, le Canal de Suez est l'œuvre de Dieu et de la France," says M. Lesseps, at the conclusion of his labors. "We've got through praying and are going to strike," was the message which sped from Promontory Point to all the cities of the Union, after the thanksgiving had been uttered, and the hammer was about to descend on the last spike which completed the Pacific Railway. As *Engineering* remarks, these utterances are characteristic of the two great nations that had achieved two great national undertakings.

Alcohol and Soda.—It has long been known that soda is not only unable to dry alcohol, but that it actually moistens it; but the fact has only recently been explained. It appears that the sodium replaces the hydrogen of the alcohol, while the displaced hydrogen combines with the oxygen of the decomposed soda, and thus forms water.

Southern Ice for Northern Cities.—One of the curiosities of this singular season is the sending to the South for ice to eke out the deficient supply from the native "crop." The *Picayune* says, that New Orleans now manufactures its own ice by steam, and that the Louisiana Ice Company recently received an order from Philadelphia for fifty tons of the product. The editor adds, "We shall be supplying Boston next, though that would indeed seem like sending coals to Newcastle."

Agriculture.

ABOUT MANURES.

At this season of the year, when farmers are employed in preparing their fields for the growth of crops, the question of manures becomes one of the first importance. We have repeatedly pointed out to farmers the great difference existing in manures which are alike in physical appearances, and also we have shown to be erroneous the notion that bulk in manurial substance affords evidence of value. A cord of barnyard manure taken from the premises of one farmer may be worth ten dollars, while the same quantity from another may not have half that value. Animal excrement as a marketable commodity has a fixed price in our towns and cities, and no variations are made, based upon assumed differences in fertilizing value. And yet, if exact justice were done to seller and purchaser, and the price based upon actual value, it would present as wide a range as is found in different qualities of cloths or groceries. The excrement sold by one stable keeper or farmer, who feeds his horses and cows upon rich upland grasses, with an abundance of grain, would hold more than double the amount of soluble plant nutriment contained in that of another, who supplied to his animals only meadow hay and small quantities of the cereals. The vender of excrement who carefully houses it, and retains in association much of the liquid portion, supplies an article of *twice* the value of that produced from the same rich foods, but left out of doors in yards, exposed to the winds and drenching rains. This matter of exposure of manures is so important, the injury from exposure being really so great, we cannot speak of it too earnestly. The fertilizing elements in excrement are mostly soluble in water, and when the barnyards are drenched with it, they usually overflow, and the valuable portions are carried away. The farmer who hauls out his manure in the autumn, and leaves it in a heap upon his field, cannot fail to notice the extreme fertility of the spot where it was deposited. For several consecutive years vegetation grows upon it in rank luxuriance, and it is a marked feature in the cultivated field. By the leaching influence of rain-water, the salts are removed from the dung and carried into the soil, and if that be porous or silicious, a considerable portion is carried down so far as to be beyond the reach of plant roots. The loss from this treatment of manure is very great, and it cannot be shown in a more striking or conclusive way, than by presenting an analysis of a specimen of manure taken from a water-soaked heap, and another from a parcel preserved in a barn cellar. The exposed manure furnished,

Nitrogen	1.35 per cent
Soluble organic matters,	1.78 " "
Soluble inorganic matters	2.67 " "
Phosphoric acid	0.20 " "
Potash and soda	0.79 " "

The cellar manure furnished,

Nitrogen	1.88 per cent
Soluble organic matters	6.22 " "
Soluble inorganic matters	3.98 " "
Phosphoric acid	0.29 " "
Potash and soda	2.00 " "

It will be noticed that in the nitrogen (ammonia-forming constituent), the soluble organic and inorganic bodies, and potash and soda salts, there is a loss in the exposed manure, which renders it of less than half the money value of the other. The quality and the preservation of manures supply topics which should be presented to farmers very often, that they may be led clearly to understand the whole subject, and provide against losses, which are of a most serious nature. We shall refer to this important matter again.

A FALSE THEORY FROM A TRUE PRINCIPLE.

Editor Boston Journal of Chemistry: —

In the case of the fruit trees, mentioned in the Journal for February, there is no doubt that the girdling was the cause of the abundant fruitage; but it by no means follows from this fact that a general principle can be deduced, that trees would be improved, or the crop increased for a series of years, by such treatment. It is well known that gardeners frequently girdle a branch, by removing a narrow ring of bark around it, when they wish to increase the size and beauty of the fruit; but it is done at the expense of its vitality, and, unless the operation is skilfully performed, will invariably destroy it before the season of bearing the next year.

The crude sap, taken up from the soil by the roots of the tree, ascends principally through the vascular tissue of the alburnum, or sap-wood, to the leaves of the branches, and there both this and the carbon of the carbonic acid, absorbed from the air by the leaves, are organized into the proper substance for the growth of the wood and fruit. It then descends on the outside, principally through the sieve tissue of the cambium layer, forming a new layer of wood and bark; while a part also goes to the nourishment of the fruit. If there is no obstruction of the elaborated sap in its downward course, it is equally distributed to the branches, fruit, stem, and roots; but, if the bark and cambium layer are removed by girdling, it is stopped in its descent, and consequently received into the branches and fruit in excess, and they are thus increased at the expense of the part below. In this way we account for the increase of the fruit by girdling.

Professor John Lindley, when speaking of this subject in his late treatise on horticulture, quotes Mr. T. A. Knight approvingly, as follows: "When the course of the descending current is intercepted, that naturally stagnates, and accumulates above the decorticated space, whence it is repulsed and carried upward, to be expended in an increased production of blossoms and fruit." This theory is adopted by the best physiologists of the present time, and can be demonstrated with almost mathematical certainty. Therefore, this unnatural development of fruit, instead of indicating an improvement of the trees, must be looked upon as a premonitory symptom of disordered physical action, and of premature death.

If the bark and the cambium layer have been removed by girdling, as seems to be the case with the trees, the downward circulatory connection on the outside between the upper and the lower part is destroyed, and the upper part at least must die. If, however, the cambium layer has not been destroyed, and has been so covered by wax and bandages as to prevent evaporation and drying of the surface of the decorticated part, there is a chance for some of them to live. It is true that some few cases are recorded of trees which have lived several years after the bark and cambium layer have been removed, but they are of very doubtful authority.

M. Ernest Faivre, a French physiologist, gives a statement of his recent investigations on this subject, published in the *Gardener's Chronicle*, about two months ago, in which he says: "In mulberry trees, as in all trees deprived of latex, annular incisions generally produce the following manifestations: 1. Formation of a swelling, or tissue restorer, at the upper lip of the wound. 2. Diametrical growth of the parts above the zone of bark taken off. 3. Hardening of the wood in that region. 4. Stationary condition of the parts below, if they are deprived of leaves and buds; or, if not, vigorous shoots from below the lower lip of the wound. 5. More easy, more early, and more abundant flowering and fructification. 6. Destruction, after a variable time, of all the parts above the annulation."

From the foregoing observations it appears that girdling trees in any form is ruinous, and almost always fatal; therefore I heartily concur in the advice given in the Journal that orchardists should not experiment on their trees too freely before they see what the final result will be with those already girdled. P.

Germination of Seeds.—The sprouting of seeds can be facilitated by chemical agencies, especially by the action of ammonia and oxalic acid. A solution of the latter will often cause them to germinate within a day or two, even after having been kept for forty years. Coffee seeds, which are proverbially hard to start, are best forwarded by placing them in a covered vessel containing equal parts of water and spirits of sal ammoniac, at the ordinary temperature. At the end of twelve hours the roots will be found to have started. Most of the stories of the germination of wheat found in mummy cases are of very dubious character. Travellers and others have often been "sold" by the Egyptian rascals who have furnished them with these seeds of two thousand or more years ago. It is stated, however, on pretty good authority, that in 1834, at a meeting of a German Scientific Association, grain was exhibited which had been raised from seed found in an Egyptian tomb, where it must have lain for twenty or twenty-five centuries. This seed had been soaked for a considerable time in fatty oil before planting.

HOW MEADOW HAY MAY BE DISPOSED OF.

Those who are obliged to feed meadow hay to their cattle wholly or in part, at this season, know full well that their animals have but little relish for it, and that it lacks the necessary nourishment to keep them in condition. We recently tried a little experiment that proved to our mind that there is a way in which such kind of hay may be prepared so that it will be eaten readily; and though it lacks the nourishment of better feed, we think cattle could be made to thrive upon it.

Looking through the barn, and meditating upon the possibility of being short of the better kinds of hay, especially if the spring should be late, and having more meadow hay than will be needed for bedding — a kind of hay, by the way, that the cattle will eat but little of at this season — we run a forkful through the hay-cutter, turned hot water upon it, and to what would fill a half bushel, two quarts of meal were added. After a thorough mixing it was covered up, and left to steam and soak for an hour, when it was placed before a cow that is kept upon as good fodder as the barn affords, with a little something else besides. The mixture was as greedily devoured as if it had been the sweetest rowen. Not a particle was left. Another lot was prepared and given to another cow with the same result. We did not lose any sleep that night on account of the possibility of being short of hay, for we feel confident that at least one foddering per day of cut meadow hay, prepared as above, may be fed to advantage, thus getting rid of the poor hay and making a saving of the good. — *The People.*

Mark Twain on Agriculture.—The proprietors of the *Galaxy* have engaged Mark Twain to conduct a new department in that magazine, and he has selected that of *Agriculture*. In a letter to the editor, he says, "I have no practical knowledge of Agriculture, but that need not interfere. You may have noticed that the less I know about a subject, the more confidence I have." There are other writers on agriculture in the papers who have precisely the same qualifications for the work, but who are by no means so candid in stating the fact as our jocose friend Mark has been.

Boston Journal of Chemistry.
BOSTON, MAY 1, 1870.

PROSPECTUS.

VOLUME V. of the JOURNAL, commencing July 1, 1870, will be increased in size, each number containing not less than *twelve pages* of reading matter. It will be printed from stereotype plates, on the finest book-paper; and we shall continue to make it the *best and cheapest scientific journal in the world.*

The terms for the JOURNAL *will be one dollar per year; single numbers, ten cents.*

The JOURNAL will be, as it has been, independent, unbiased, careful, and reliable. No individual, corporation, or organization is rich or influential enough to suppress its opinions, or in any way control its influence. It will continue to expose frauds, schemes, and speculations, which profess to originate in or grow out of progress in science and art. The great and growing evil of *adulterations* in articles of food, medicine, fertilizers, and substances used in the arts, will receive special attention, and the nature of the sophistications and adulterations will be fully exposed. We shall present numerous useful practical formulæ, recipes, and scientific suggestions, which alone will be worth many times the price of the publication.

TO PHYSICIANS,

It will continue to be of *special service*, as it will keep them informed of the nature of all new remedial agents, all new discoveries in chemical and medical science, all new principles or processes connected with toxicology and pharmacy.

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It will come as a reliable friend and adviser, affording information and instruction upon all matters relating to the manufacture and dispensing of medicines, and the other substances and agents produced or vended by them.

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It will impart information upon the important subjects of the chemistry of plant-growths, and the nature and preparation of fertilizing agents.

TO CHEMISTS, MANUFACTURERS, ARTISTS, TEACHERS, STUDENTS, CLERGYMEN,

All intelligent readers, men and women, everywhere, the *Boston Journal of Chemistry* will supply information and instruction of the highest importance and value.

The JOURNAL has, at the present time, a large army of friends, and these we ask to aid us in extending its circulation. Our patrons know how instructive and useful it *has been* in the past: we assure them it will be even *better* in the future. Cannot each one send us a new subscriber, to commence with Vol. V.?

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To any person who will send us the name of one new subscriber, with $1.00, we will send a fine mezzotint *carte de visite* photograph of the late George Peabody. For two new subscribers, with $2.00, a *cabinet* size photograph of the late George Peabody. For three, with $3.00, one copy of the JOURNAL free for one year, or a Petite Microscope. For five, with $5.00, a set of twenty carpenter's tools in a hollow handle. For six, with $6.00, one copy of Dr. Nichols' Chemistry of the Farm and the Sea; Rolfe and Gillet's Hand-book of the Stars, Hand-book of Chemistry, or Chemistry and Electricity; or the Nursery Magazine. For ten, with $10.00, one copy of Dr. Lord's Ancient States and Empires; or Oliver Optic's Magazine; Our Young Folks; or, The Riverside Magazine. For twelve, with $12.00, Tilton's Horticultural Magazine. For sixteen, with $16.00, one copy for one year of either of the four dollar Magazines mentioned in the list following; or a * Boy's Tool Chest, thirteen inches long, eight inches wide, and eight inches high, with a complete set of Carpenter's tools, saw, plane, etc. For twenty, with $20.00, the N. Y. Journal of Psychology, or the Philadelphia Medical and Surgical Reporter. For twenty-five, with $25.00, a fine * Set of Croquet implements. For eighty, with $80.00, a * Complete set of Chemical Apparatus, suitable for all the experiments described in Rolfe and Gillet's Hand-book of Chemistry. For one hundred, with $100.00, one * Cutter Clinical Microscope; or, a fine * Waltham Watch, in a silver case.

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THE SOUTH.

WE spent a large part of the month of March in travelling through some of the Southern States, — Virginia, North and South Carolina, Georgia, etc. It was our first visit to this section, and the trip was full of interest. We left home to recuperate exhausted energies, and to avoid the chilling winds of March; but we have to declare that we suffered more from cold in South Carolina than we ever did in the frosty Bay State. March was a cold, disagreeable month in all parts of the South, and the poor invalids from the North must have suffered intensely. We came back, questioning more seriously than ever the wisdom of sending consumptives away from comfortable homes, at any stage of the disease. At present, it is impossible to procure proper food and home comforts, at any of the so-called sanitary retreats in the Southern States. Every place is crowded with visitors, of whom a large number are strong, lusty men and women, travelling for pleasure and to spend money. They secure the best seats in the railway cars, and the best rooms at the hotels; and weak invalids, unless accompanied by strong friends, stand a poor chance of securing needed comforts. The people of the South are kind, attentive and obliging, and do all they can to render the visits of Northern men and women agreeable. Not the slightest revengeful feeling or petulant humor did we discover in any individual, and we believe there is as good order and as much kindly feeling existing in the Southern States as in any section of the country. In agriculture, commerce, and the mechanic arts, a glorious future is opening to the South. The colored population, as a general thing, are living upon the best of terms with their former masters, and are cheerfully aiding in developing the resources of the country. We were pained, however, to learn that disease is making sad havoc among them. Pneumonia, in the acute form, is sweeping away thousands every month, in Georgia and the Carolinas. One planter, who employs nearly four hundred, informed us that ten per cent of them had died from this disease since Christmas. They are naturally improvident and careless, and being obliged to assume the responsibility of looking out for themselves, they suffer from insufficient food, and exposures. The white people do all they can to aid them, but, after all, it is but little that they can do. The millions of acres of unimproved lands in the South must, before many decades have passed, be brought under cultivation, and the enormous exportation of cotton, rice, cereal grains, and tobacco, will turn the golden currents, flowing in the track of commerce, towards our shores, and render us the richest nation under the whole heavens.

CINCHO-QUININE.

WE notice that Mr. W. T. Wenzel, druggist, of San Francisco, publishes a paper upon Cincho-Quinine in the April number of the *Pacific Medical and Surgical Journal*, which purports to have been read before the California Pharmaceutical Society. In this communication Mr. W. states that, upon analysis of the article, he is unable to find in it quinia, quinidia, or cinchonidia, but he does find quinicia, cinchonicia, and cinchona. Of course, we do not know whether the gentleman had in hand the article as prepared by us, or that of some other maker, of whom possibly there may be a dozen. If the specimen was the product of our laboratory, the value of his extraordinary analytical skill may be understood from the fact that the article *did* contain all the alkaloidal principles he was unable to find, and but mere traces, scarcely enough for detection by the most delicate tests, of two of those which he alleges he found. Of quinidia alone we think no specimen has ever left our laboratory containing less than four or five per cent, and also all the other alkaloidal principles found in Loxa bark.

The analysis of a body made up of such complex and delicate organic principles as are found in barks, is an exceedingly difficult labor, and the tests and reactions, involving deceptive color-tints or forms of crystals, are so fallacious and unreliable, that competent, experienced chemists are careful in expressing positive opinions regarding the results of such investigations.

We supply cincho-quinine at wholesale, at about *one half* the price of sulphate of quinine, and the bark alkaloids are in their naked alkaloidal condition, not presented as sulphates. The article, during the past two years, has been used in all parts of the country, probably by not less than *three thousand physicians*, in quantities from one ounce to forty or fifty by each, and a majority of these have kindly communicated to us the results of the trials.

The testimony in its favor is nearly unanimous. Physicians state, that cincho-quinine being almost tasteless, and so much cheaper than sulphate of quinine, and equally efficacious, it is preferable to that salt. This is the language employed by the distinguished medical gentlemen who have given it careful and extended trial.

Referring again to the author of the communication which has called forth these remarks, we venture to suggest that it is quite possible his analytical labors have not been so entirely *disinterested* as he would have us believe them to be.

A little gratuitous advertising through the Medical Journals may not be distasteful to him or detrimental to his interest as druggist and manufacturer of "*non-officinal remedies and pharmaceutical novelties.*" We learn from an advertisement which appears in the *Pacific Medical and Surgical Journal*, that among the "pharmaceutical novelties" he manufactures, are "*Elixir Calisaya,*" and "*Sucro Gaduoleine.*" What the latter medical compound is we are not informed, and we would suggest to the gentleman, that at the next meeting of the California Pharmaceutical Society he present an elaborate "analysis" of this strange nostrum.

☞ Read our *Prospectus* and *Premium List.*

POPULAR BOOKS ON SCIENCE.

There are those who are disposed to sneer at popular books on science, because they are, at best, mere compilations from the materials given in larger and more elaborate works. If this work of compilation is badly done; if, through haste or ignorance, those "half truths," which are virtually *whole lies*, are the result of the attempt to abridge or simplify the original matter, there is good ground for this criticism; but if the work is honestly and ably done, scientific men should welcome it rather than discourage it. In a review of one of these books in "*Nature*," Rev. Charles Kingsley has the following very sensible remarks on this point:—

"In this age of *specialization*, when each minute branch of physical science requires a lifetime of research, how are the many unscientific to be taught the vastness and beauty of nature, save by those who take the results of other men's labor and cast them together into a shape which the many will care to look at? Provided they do not actually steal, allow them to borrow as freely as they will. What they borrow from the scientific writer, they will repay him a hundredfold, in the form of pupils, readers, and enlightened public opinion. Meanwhile, those who wish well to the cause of truth, may trust that by every book of this kind one more human being will be wakened to the magnificence as well as the importance of facts; one more will be saved from the ancient empire of unreason; one more will be inclined to give rational glory to God, as he discovers how glorious his works are, even in the minutest polyp; and one schoolboy, it may be, or even undergraduate, seeing this book in his sister's hands, while he is at home for a vacation, will be led to inquire (not without reason), why he also is not taught something about these strange and beautiful works of God, and something of the science which investigates them, instead of the mispronounced Latin and Greek, in learning which (and most imperfectly) he spends the ten or twelve golden years of youth."

In this country, schoolboys are more generally taught the elements of physical science than in England (though, in the majority of cases, unfortunately, both the text-books and the teaching are wretched), and even in our colleges, the absolute despotism of the dead languages is declining, and the claims of science to an honorable place in the course of study are beginning to be recognized. But the entire scientific education of the masses of the people must long continue to be gained, as it has been, from these books prepared for general reading, and from periodicals (among which we consider it an honor to have our own reckoned) devoted to the dissemination of scientific knowledge in a form which shall be popular in the best sense of the word,—accurate without being too technical, simple without being puerile, entertaining without being "sensational."

PHYSICAL SCIENCE AT HEIDELBERG.

In some respects the facilities for the study of physical science at the University of Heidelberg are superior even to those at Berlin and Göttingen. The *Physical Laboratory* is under the supervision of Kirchhoff, who lectures weekly, with experiments, on a given subject. The following week each student in the laboratory goes through the experiments for himself, and this constitutes the main feature of the course. For several days in the week the students can also conduct researches of their own.

The *Chemical School*, under the management of Bunsen, has added even to its former renown. In no other European laboratory, except that of Liebig, at Giessen, have so many first-class scientific chemists been trained. Prof. Roscoe says, that among those who studied with him at Heidelberg, were "men who are now making rising reputations in most of the German universities, or in the various institutions of France, Russia, Portugal, Great Britain, and America." In Germany (unlike this country, where a knowledge of the drug business is not deemed necessary for keeping an apothecary shop and dispensing medicines), all druggists and pharmacists are compelled to attend a regular university course in chemistry, and many of the students at Heidelberg belong to this class.

Besides these two departments, the University has yet another, devoted to physical science,—the *Physiological Laboratory*, conducted by Helmholtz. An ample and elegant building has lately been erected for the use of the Professors in Physics and Physiology, with lecture-rooms, laboratories, apparatus rooms, etc., and also dwelling-houses for the professors.

With these three departments, under the direction of three men so renowned as Kirchhoff, Bunsen, and Helmholtz, we can hardly wonder that Heidelberg is attracting the very *élite* of the whole world's pupils in physical science.

The Journal.—The new volume of the Journal commencing in July, will embrace improvements which we are confident will be pleasing to our large family of patrons and friends. A new head, new paper and type, with the enlargement to sixteen pages, will give the Journal an appearance which will be in keeping with its greatly extended influence and circulation. Not a patron has thus far signified his intention of withdrawing from us in consequence of the necessary increase in price. On the contrary, our list is increasing at an unusual rate, and we have every evidence that the proposed improvements will result greatly to the advantage of the paper. Friends, and old subscribers, send in the names! We have no canvassers but you, and to you we look for aid in extending the circulation and consequent usefulness of the Journal.

Correspondence.—A large number of letters addressed to the editor of the Journal remain unanswered, as it is impossible to respond, owing to want of time and strength. Our friends must remember that our duties are very exacting and multifarious. Beside the care of the Journal, we have extensive chemical manufacturing interests to look after; also, our farm in the country, experimental researches to make, lectures and reports to prepare, and important trusts, both public and private, to attend to. These tax our weakened energies to the utmost, and render it impossible to answer or even read letters soliciting advice or assistance upon matters connected with agriculture, chemistry, or the industrial arts. Many letters, even from personal friends who have good claims upon our attention, we are obliged to neglect. All correspondence relating to business matters which our assistants can manage will be promptly attended to.

The Air Furnace.—Owing to the displacement of the sketches of the new air furnace alluded to in the last number of the Journal, our engraver has not been able to have the cuts ready for this number. They will appear in our next. Our experiments upon furnaces have created a wide-spread interest among both users and manufacturers, and we hope great good will result from the investigations. Many letters have been received from various parts of the country, in which the writers solicit an interest in the "patent" of our new device. We would say to such correspondents, and all others, that we have no patents to dispose of. The experiments were made with the view of conferring benefits upon the public, not for the advancement of private interests. If the improvements made in furnaces are useful and important, as we know them to be, they are open to all, without money and without price. We are desirous that the manufacture shall be in competent and reliable hands, and that the price shall be fair and equitable; but further than this we have no interest.

EDITORIAL NOTES.

Trusting Nature.—We often hear of trusting Nature in disease, but, as a recent writer very sensibly says, "before trusting Nature, and proceeding to help her, it would be well to inquire whether she intends to cure the patient, or to put him into his coffin. For myself, I greatly mistrust her, and would wish to ask, previous to assisting her, whether she is really my mother, or only my step-mother." There are many popular expressions which turn out to be nonsense when we look at them closely. Most of the proverbs which are often quoted as if they were infallible utterances, are directly contradicted by other proverbs equally in repute as oracles of pithy wisdom. "Look before you leap"; but, "nothing venture, nothing have." The "rolling stone gathers no moss"; but, "the sitting hen never grows fat." And so with scores of these "wise saws," which, instead of being universally true, are partial and one-sided, and consequently often false.

A Startling Discovery.—One of our Boston papers lately remarked, concerning the electric light: "It is exceedingly brilliant, and science has developed the fact that it is entirely different from the calcium light, and may be used with perfect safety." It is gratifying to know that these two modes of illumination have at last been proved to be different. We hope no scientific man will hereafter make the mistake of considering them identical. Speaking of lights, science has *also* "developed the fact," that a tallow candle is entirely different from bad kerosene, and may be used with perfect safety, while the latter cannot. The *savant* who has just announced this discovery, will resume his chemical investigations after a brief vacation,—rendered necessary by the exhausting nature of his recent labors,—and he does not despair of eventually demonstrating that chalk and cheese are distinct chemical compounds.

The Winter Weather.—The mean temperature of the three winter months, according to the accurate meteorological record kept by Prof. Loomis, at New Haven, was only 1.7° above the average. The small amount of ice which formed during the winter might be supposed to indicate a much higher average temperature; but, as Prof. L. remarks, "the apparent discrepancy is explained by the fact that the coldest weather of the past winter occurred early in December, but was not of sufficient duration to form ice of great thickness. Then followed seven weeks of unusually mild weather, during which the ice of December generally disappeared. The month of February has been as cold as usual, but this was insufficient to make entirely new ice of great thickness."

The *average* temperature of December was a fraction of a degree *below* the average of the past ninety years; but the first half of the month was unusually cold, the last half unusually mild. There was nothing very

remarkable in the *mean* temperature of January, compared with several other seasons in the course of the last twenty years, though it was above the average. February, like December, was a fraction of a degree *below* the average of the ninety years.

The amount of rain and melted snow at New Haven, was 13.18 inches for the three months, or 20 per cent greater than the average for that place.

MEDICAL WITNESSES.—In a recent suit in England, Dr. Rumsey, of Cheltenham, while testifying as to the condition of the defendant at a certain time, said, in answer to a question from the attorney, "I am here to give evidence as to facts, not to state opinions." The *Lancet* commends him, and adds:—

"A subpœna does not require a witness to state opinions. Medical practitioners who are so unfortunate as to be mixed up with the parties to a lawsuit, cannot too well remember that any evidence that they give may, if it so please them, be strictly limited to a narration of facts observed."

THE OLDEST INHABITANT.—The most venerable relic of humanity extant is the skeleton of one of the earlier Pharaohs, encased in its original burial robes, and in a good state of preservation. It was added to the treasures of the British Museum a year and a half ago. The lid of the coffin that contains this regal mummy bears an inscription which shows him to have been the Pharaoh who succeeded the heir of the builder of the Great Pyramid, about a thousand years before Christ, or before the birth of Solomon.

HIGH LIVING.—According to a foreign scientific periodical, the highest inhabited spot on the globe is the hamlet of Antisana, in Peru, 4,101 metres above the level of the sea. Another authority gives the height as 13,455 English feet, which is very nearly the same. The boiling point of water at this elevation is 187° F., which must interfere seriously with its use for some culinary purposes. The highest inhabited point in Europe, according to the same authority, is the Hospice of St. Gothard, 2,075 metres above the sea (6,867 feet, as given by Baedeker); but this must be an error. The inn on the Furca Pass is 7,911 feet above the sea, and the Hospice of the Great St. Bernard is 8,999, as Baedeker states it, and 8,200 or more feet, according to other authorities. This is probably the highest point in Europe which is inhabited throughout the year. At the summit of the St. Theodule Pass, in Switzerland, 10,899 feet above the sea, there is a little inn where a couple of men live during the summer months, to furnish entertainment to the numerous travellers who cross the pass.

CHEMICAL MAGIC.—Not many weeks ago, in Berlin, Madame A. W. Hofmann gave a grand entertainment and ball to a large company of her eminent husband's pupils. In the ball-room there were placed on a table a great number of bouquets of flowers (artificial, of course), all snow-white, and also many pieces of white silk ribbon; at the other end of the room a fountain was arranged, throwing, from narrow openings, jets of *eau de Cologne*. The bouquets were taken by the ladies, and the ribbons by the gentlemen; and, while waltzing together, and thus arriving at the end of the room where the fountain played, the ladies, holding their bouquets to be sprinkled with the perfume, beheld the white flowers become suddenly beautifully red, violet, blue and yellow, while the ribbons carried by the gentlemen, assumed, under the same influence, similar colors. The secret of this trick is simply that the flowers and ribbons had been very gently dusted over with the dry powders of various aniline colors, and, on becoming moistened by the eau de Cologne (alcohol), these powders became dissolved, and imparted colors to the objects.

ETHEREAL INEBRIATION.—It appears that methylated ether is extensively used instead of whiskey in the counties of Londonderry, Antrim, and Tyrone, in Ireland. Topers take doses of from two to four drams, from twice to six times a day. A Mr. Draper has published a pamphlet in which he deplores the injury thus done to the Inland Revenue, and to the Fire Insurance Companies; the former suffering from the loss of nearly $30,000 a year in the tax on whiskey (the ether pays no tax), and the latter from the increased risk of fire due to the free use of a very inflammable liquid by ignorant and drunken people.

Speaking of ether, it is a curious fact that the sensitive plant is paralyzed by its vapor.

JAPAN GIVING LESSONS TO FRANCE.—A French translation of a Japanese work on the rearing of silkworms has just appeared in Paris. It is published "by the order of his Excellency, the Minister of Agriculture." It is said to be the first French translation of a Japanese book.

OZONE AND EXPLOSIVES.—It is a singular fact of recent discovery, that nitro-glycerine, dynamite, iodide of nitrogen, chloride of nitrogen, and some other similar compounds, explode the moment they are brought in contact with ozone. The experiment may be tried by putting a drop of nitro-glycerine into a jar containing ozone. Ordinary gunpowder and picrate of potash gunpowder are very slowly decomposed by ozone.

NITRIC ACID FOUND IN THUNDER STORMS.—When the spark of the great induction coil at the "Royal Polytechnic" is passed through air, and the air is blown against damp litmus paper, a red coloration is produced. In order to ascertain whether the acid was nitric acid, air through which the spark was passed was drawn through distilled water. Nitric acid was thus obtained in large quantities, showing that the popular notion that this compound is always formed in thunderstorms is well founded. This fact, moreover, proves that a thunderstorm, as has been generally believed, tends to purify the air.

TO DETECT ADULTERATIONS IN CANDY.—A number of the wholesale candy-makers in New York, have united in recommending the following as a simple means of detecting falsifications in confectionery:—

"Any person may analyze lozenges, opaque candy, or sugar plums, by simply dissolving in water. If the water remains transparent, the candy is pure; but if milky or depositing a sediment, terra-alba, or some equally harmful adulteration has been used."

That confectionery is extensively adulterated is a notorious fact. If any one doubts it, he has only to go to the wholesale dealers, who will give him their prices for both the pure and the impure article. Tons of terra-alba are daily devoured by unsuspicious lovers of sugar-plums.

BOSTON JOURNAL OF CHEMISTRY.—Dr. Nichols seems determined to make this the leading chemical journal of the country. We would commend it to the notice of our readers as every way worthy of their patronage. — *Phila. Med. and Surg. Rep.*

CHRONOLOGICAL FODDER.—It is said that Guizot has become dyspeptic from eating too many dates. A historian may be pardoned for taking to a diet of that sort, but it is unfortunate that he should stick to it so closely as to injure his digestion. Lowell, in his "Fable for Critics," speaks of a critic who was "fond as an Arab of *dates*."

LITERARY NOTES.

MESSRS. Lippincott & Co. have just published "*A Handbook of Operative Surgery*," by John H. Packard, M.D., of Philadelphia. The author has aimed "to produce a practical guide, omitting nothing which would be to the purpose, and introducing nothing foreign to it," and the plan has been faithfully carried out. The clearness and conciseness of his directions, in connection with the copious illustrations on steel and wood, furnish precisely what is wanted in a practical handbook. Though the volume is compact, it is at the same time comprehensive, giving a practical description of at least one good method for every surgical operation in general use at the present day. We commend it to the attention of our professional readers.

The name of Fresenius has become almost a synonyme for analytical chemistry, and we are glad to see the new edition of his "*Quantitative Chemical Analysis*," edited, from the last German and English editions, by Prof. S. W. Johnson, and just issued by Messrs. J. Wiley & Son of New York. It is not so much a reproduction as a "reconstruction" of the original work. It has been carefully condensed where it could be done by discarding what was superfluous or untrustworthy; and on the other hand, judiciously augmented by the introduction of much valuable matter from foreign and native sources. Bunsen's new methods of treating precipitates, and Dr. J. Lawrence Smith's admirable method of fluxing silicates for the estimation of alkalies, may serve as samples of these important additions. The whole work shows the hand of a man thoroughly up with the times, and perfectly at home in both the theory and the practice of his subject.

Prof. Johnson has used the old notation and nomenclature, not because he does not fully recognize the necessity of teaching the new, but because the old "is still, and must for a long time remain, a part of the vernacular of the physician, the apothecary, the metallurgist, and the manufacturer."

Dr. Hall's "*Health by Good Living*" has already reached a seventh edition. One of the leading medical magazines says of it:—

"Written for popular perusal, it is one of the few books of the kind we can conscientiously recommend. To our professional brethren who are afraid of 'a good square meal,' we especially commend it. It is full of good sense, and is professionally unexceptionable in tone."

"*The Bowdoin Scientific Review*" is the title of a new fortnightly journal, edited and published by Profs. Brackett and Goodale, of Bowdoin College, Brunswick, Maine. The four numbers already issued are excellent, both in matter and in mechanical execution. The price is only two dollars a year.

The first *Annual Report* of Dr. James E. Reeves, City Health Officer of Wheeling, West Va., is in many respects a model document. It gives in a pamphlet of fifty pages an account of the "physical and medical topography" of the city,—its geology, ethnography, and manufactures; the diet, drinks, and habits of the people; the churches, hospitals, prisons, and other public institutions; full vital statistics and related information, etc., etc. We wish that our limits permitted us to speak of it more at length.

Two more volumes of Scribner & Co.'s "Library of Wonders" have been published.—"*The Wonders of Glass-Making*" and "*The Sublime in Nature*." All the books in this series belong to that class of "popular books on science" which we have commended more at length in another part of this paper.

Medicine.

HYDRATE OF CHLORAL.

WHEN this new agent was first suggested by Liebreich, and the results of his experiments were presented to the medical world, we regarded it with no special interest, and doubted if it would attract more than the ephemeral attention usually bestowed upon therapeutical or chemical novelties. After careful examination, and trial of the agent, we have been compelled to modify our early views, and we do not now hesitate to express the opinion, that it is not equalled in importance by any medical discovery since the anæsthetical properties of ether and chloroform were made known. Pure hydrate of choral possesses medicinal properties of such positive and beneficent character, that we are prepared thus early in its history to predict for it a place in medicine, second in importance to no other agent. The numerous trials in Europe and in this country prove it to be a safe and reliable hypnotic, and that in this regard it supplies a want long felt by physicians. We have taken the chloral repeatedly in various quantities, and under ordinary and peculiar circumstances and conditions, and have carefully noted its effects upon the secretions, the digestive organs, the circulation, and the brain. Not the slightest derangements of an unpleasant nature have occurred, nor have any abnormal conditions been produced which would lead us to fear to use it freely and continuously when needed. In certain quantities, it invariably produces natural and refreshing sleep, which is followed by no cerebral or gastric disturbance. For years we have suffered from attacks of mental prostration, attended by most persistent insomnia. No agent within the domain of therapeutical chemistry, organic or inorganic, afforded us any essential relief, until the hydrate of chloral was submitted to trial. We certainly feel under the deepest obligations to the learned and ingenious Dr. Liebreich, for his researches upon this remarkable compound.

Now, above all things, let us *protect* this important remedy, since it is placed in our hands. It would be a misfortune to have it discarded or condemned by any physician, through the employment of an impure or imperfect article. During the past two months we have bestowed much attention upon its manufacture, and have learned that it demands more care and skill to produce it in its highest integrity, than is required in the manufacture of any other laboratory product. The action of dry chlorine gas upon alcohol is liable to result in the formation of a great number of curious and contaminating substances, and the slightest derangement or interruption of the process interferes with the production of chloral. The process is a long and tedious one, requiring constant and careful watching during several days and nights. The neglect of a careless attendant may cause chemical reactions which entirely change the nature of the product, and occasion the most serious losses. It is exceedingly difficult, or in fact impossible, to remove many of the deleterious substances liable to be formed along with chloral in the retorts used in its manufacture, and hence nearly or quite all the specimens of the agent, produced upon this side of the water, have proved upon analysis to be *very impure.* Most of the specimens of German production we have found to be of great purity and excellence. As regards tests, it is sufficient to say, that when to a few drops of concentrated solution of hydrate of chloral in a test tube, is added an equal quantity of caustic potassa, if a dark or brown tint is produced in the liquid, it must be rejected as impure.

The present scarcity and exceeding high cost of chloral will not long continue. It must be observed, however, that from the great care required to produce it in an absolutely pure state, the price can never be very low, unless new and cheaper methods of manufacture are discovered. We believe the new agent will be found to be of service in a large number of serious affections which come under the notice of physicians. Among the annoying or distressing illnesses which we have good reason to believe it will alleviate, is sea-sickness. It has not been tried in a sufficient number of instances to enable any one to speak positively upon this point, but we think those who are about going upon the water will do well to make trial of it.

There is so much that is interesting and important connected with the new agent, that we shall keep our medical readers informed of any new discoveries connected with it.

WHOOPING COUGH.

ACCORDING to both French and English authorities, this disease has been successfully treated by *hydrate of chloral.* Dr. Ferrand, in the *Bulletin de Thérapeutique*, states that he had three patients in one family, to whom, after trying various remedies in vain, he gave chloral in syrup — 2 grammes of the former to 150 of the latter, or 25 centigrammes of chloral to the spoonful. The first three days two spoonfuls were prescribed for each evening, were not regularly given, and only the tolerance of the medicine was established. Then three spoonfuls were prescribed and were regularly given, and there was an abrupt and favorable change. Instead of three or four attacks of coughing, with vomiting, in the course of each night, there was unbroken and refreshing sleep. In the morning, on awaking, there was an attack of the cough for a few days, which soon disappeared.

Dr. Adams, in the *Lancet*, says that he has used the same remedy in severe cases of the cough. For a child of about six years old, the dose is five grains in syrup and water, two or three times a day. If the cough be most distressing at night, a dose of six grains given only at bed-time will usually ensure a comparatively quiet night. In some cases, he has used the solution of the peroxide of hydrogen during the day, and a dose of hydrate of chloral at bed-time, with marked benefit.

Benzine is another new remedy for whooping cough. An Italian physician, Dr. Bottari, in *Lo Sperimentale*, says: 1. The inhalation of the gases developed in the process of purifying illuminating gas has a happy effect on whooping cough, provided that disease be free from complications. 2. It is probable that the effect is due to the benzine developed in the distillation from the coal. 3. Benzine may be administered in doses of from 10 to 20 drops a day in mucilage or syrup. It may be employed at the same time as a vapor diffused in the chamber of the patient. If the benzine be used in the first stage of whooping cough it appears to be inert; while the improvement is marked and rapid if the agent be resorted to after the first stage, provided there be no congestion of the respiratory organs.

A writer in the *Lancet* strongly recommends the application of a blister to the nape of the neck or the shoulders of the little sufferer. The *Cincinnati Lancet* asserts that the leaves of the chestnut tree are an infallible specific in the disease. An infusion of the leaves is made, by taking half an ounce of them to the pint of boiling water, adding enough white sugar to make it palatable. Give the child as much of this, cold, as he will take during the day and evening; he soon gets to like it, if it is given as a drink instead of cold water.

HAY FEVER.

DR. COOK, of Selma, Ohio, who has suffered for years from *hay fever*, has made the disease a special study, and reports the result of his investigations to the Medical Society of the County of New York. He is satisfied that the affection has nothing whatever to do with the cutting or curing of hay, but depends solely on the irritation of the mucous surfaces, produced by the pollen of the plant variously known as *tall ambrosia*, *bitter-weed*, *rag-weed*, *hog-weed*, etc. This plant is very abundant in the cultivated portions of the country, in our latitude. The flowers are yellow spikes, covered with a dense pollen, which is widely disseminated by the winds. Persons affected with the disease find relief by a trip to the seaside or the mountains, merely because they are removed from the cause, as the weed does not grow either in barren or in uncultivated districts.

His treatment is the following: Prior to the manifestation of a paroxysm, a weak solution of tannin in rain water is administered, by means of the nasal douche; or sometimes a weak solution of alum, in order to harden these membranes; but should an attack supervene, which manifests itself by violent sneezing, a free discharge of thin acrid mucus from the eyes and nose, with a sensation of suffocation, then he uses a weak solution of permanganate of potash (from 3 to 5 grs. of the salt to the ounce of water) as an abortive; should the patient be enervated, then tonics should be given in conjunction with the salt, as indications present themselves.

Under this regimen Dr. C. has found little or no difficulty in mastering this disease at any time, and often one application of the potassic permanganate is sufficient to relieve the suffering in a very few minutes.

LACTIC ACID IN CROUP.

DR. ADOLPH WEBER was led to try lactic acid in croup, on account of its power of dissolving fibrinous exudations; and it has proved an efficient remedy in every case, even the most severe.

The treatment consists in the local application of the remedy to the windpipe by means of inhalation. The patient is made to inhale a solution of lactic acid (fifteen to twenty drops in half an ounce of water) at first every half-hour, and afterwards, when the respiration improves, every hour or every two hours a solution of 10 to 15 drops in half an ounce of water.

The inhalation is discontinued as soon as the dyspnœa has subsided, and to promote expectoration camomile tea is exhibited.

In using the inhalation, care must be taken that the vapor does not affect the eyes or face.

With this treatment was conjoined the internal exhibition of carbonate of soda every half-hour, or every hour, which was thought to exert a beneficial effect upon the exudation.

THE DOCTOR IN THE NURSERY.

THE following excellent suggestions are from Vogel's *Practical Treatise on the Diseases of Children:* —

Now, as regards the conduct of the physician, the utmost patience and gentleness are indispensable in his intercourse with children. Those from one to three years old are always the most difficult to manage. Nurslings and children under one year are seldom very timid, and are easily quieted by some diverting noise. But older children often have an insurmountable shyness for every strange face. Such a child the physician must not approach immediately after entering the room;

he should at first ignore the child's presence altogether; should enter into a conversation with the parents or nurse, in a gentle voice, and finally gradually approach the child with some bright object, or with a piece of sugar. When at the bedside, the child should not be immediately uncovered, its abdomen felt and squeezed, and the physical examination instituted. Some questions suitable to its age are first put to it, its playthings are admired, or it is told of some new ones, and promised to be presented with them, etc., etc.; in short, it is necessary to be on friendly terms with the child before the undertaking of a regular, thorough examination can be thought of. In this manner, however, it is almost always possible to quickly gain the friendship of the child. If, with a friendship formed in this manner, a little seriousness and energy are allowed to be blended, much more authority will thereby be acquired in a moment over the child than the parents ever thought possible. Children, under such authority, allow themselves very quietly to be examined, readily lie down upon any side desired, take even the bitterest medicines without objection, and assist the medical examination in every manner possible. *Never, and under no circumstances, should the attempt be made* to bring an unruly child into obedience by harshness, by firmly holding it, and still less even by a slight blow. Such measures not only cause greater fear, and give rise to violent crying, but the physician will thereby only bring upon himself the aversion and even hatred of most narrow-minded parents, — the class that usually have boorish and unmanageable children. On the other hand, if the physician in such instances retains his equanimity and mild voice, the parents will feel most disgraced by the ill-breeding of their children. They then sometimes punish the child so severely that the physician, from a medical point of view, has to interfere, and then he will have gained an humble and submissive patient. In general, the principle will hold good that the more seriously sick the child is, all the more easily will it permit itself to be examined.

FORMULÆ.

Hunter's Red Drop. — Corrosive sublimate, 10 grs.; hydrochloric acid, 12 drops. Triturate in a glass mortar and add gradually one oz. comp. spt. lavender. Dose, ten drops 2 or 3 times a day. *It is said* this preparation will not salivate.

Pills of Camphor are best made by trituration with castor oil, adding a very small quantity of alcohol if the mass is disposed to crumble.

Camphor Ice. — Expressed oil of almonds and rose-water, each 1 pound. White wax and spermaceti, each 1 ounce. Camphor, 2 oz. Oil of rosemary, 1 dr. Melt together. Glycerine may be substituted in part for the oil and rose-water.

☞ The article upon "Agricultural Schools," published in the JOURNAL in February, has received the warm commendation of agriculturists in all parts of the country. *Hearth and Home*, edited by Donald G. Mitchell, Esq., copies a considerable portion of the article, with the following introductory remarks: —

"We clip the following very sensible remarks from that excellent monthly paper, the BOSTON JOURNAL OF CHEMISTRY. We shall return to the subject at some future day; meantime we indorse fully the homely and jocular, yet practical common-sense view which Dr. Nichols takes of the matter."

We hope the accomplished author of "My Farm at Edgewood" will give us his views upon Agricultural Education, as we are certain they will be sound and practical.

BOSTON JOURNAL OF CHEMISTRY.

DEVOTED TO CHEMISTRY AS APPLIED TO

Medicine, Agriculture, and the Arts.

EDITED BY JAS. R. NICHOLS, M.D.

VOL. IV.—No. 12. BOSTON, JUNE 1, 1870. ONE DOLLAR PER ANNUM, SINGLE NUMBERS TEN CENTS.

THE

Boston Journal of Chemistry

IS PUBLISHED UPON THE FIRST OF EACH MONTH, BY

JAS. R. NICHOLS & CO., 150 Congress St., Boston,

TERMS, ONE DOLLAR PER ANNUM, IN ADVANCE.

Contents.

☞ Subscribers will remember that the volumes of the *Journal* commence and end upon the 1st of *July*, not January.

RECEIPTS.—A receipted bill will be sent by return mail to any subscriber who will enclose with his subscription a three-cent postage stamp, for return postage.

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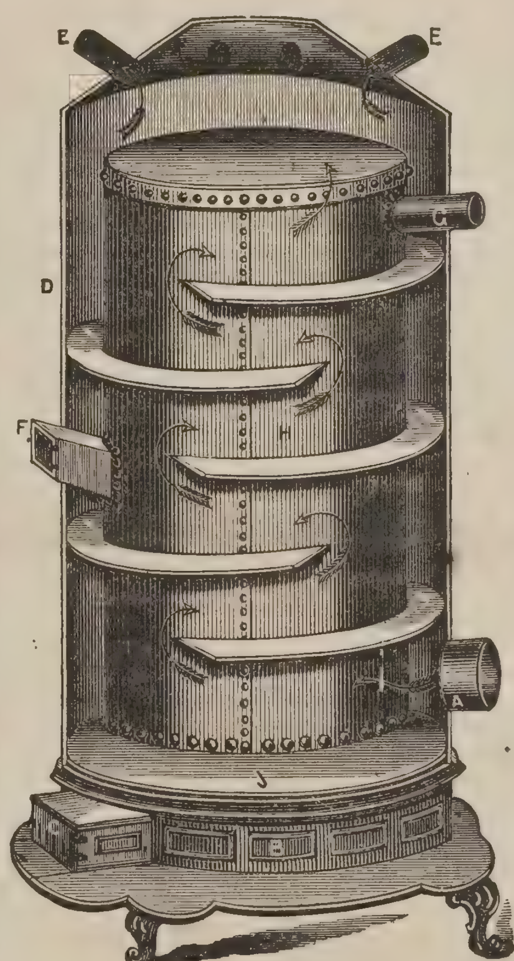
☞ Correspondents are particularly requested to give their names in full, with their Town and State; and in case of change of residence, requiring a corresponding change in the mailing of their papers, to give, not only the new address, but the old one also.

☞ We have no complete files of either Vols. 1, 2, or 3; of Vol. I. (originally issued bi-monthly), we have only Nos. 4, 5 and 6 (January, March and May, 1867); of Vol. II. (monthly), we have Nos. 2, 4, 5, 7, 8, 9, 10, 11 (August, October, November, 1867, January, February, March, April, and May, 1868); of Vol. III. we have all the numbers *except* 11 and 12 (May and June, 1869). All the other numbers are out of print, and it is impossible for us to furnish them.

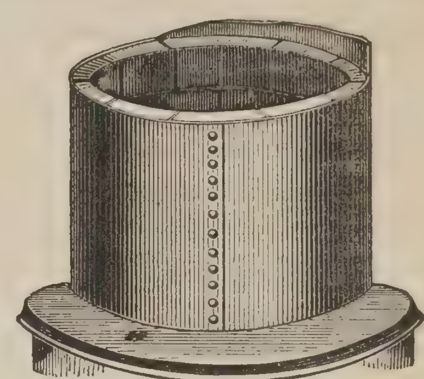
Of the numbers mentioned we have a few copies left, which we will forward to our friends, at the following prices, viz: Vol. I., three numbers, twenty-five cents; Vol. II., eight numbers, fifty cents; Vol. III., ten numbers, fifty cents. Vol. IV. has been stereotyped as issued, and we are able to furnish back numbers since July 1869, to any extent. Price, single copies, six cents; six copies for twenty-five cents.

Familiar Science.

THE IMPROVED AIR FURNACE.



THE cuts presented in connection with this article are intended to illustrate the interior arrangements of the portable air furnace, which we have been led to devise, with the view of obviating some of the objectionable features of those now in common use. It is very simple in construction, and although it presents but few changes in the forms of existing devices, yet these changes are radical, and modify completely the important working results. The heat-radiating surfaces are constructed *entirely of wrought or malleable iron*, securely riveted together, like the plates of a steam boiler, so as to be dust-tight and gas-tight. The important sanitary and other advantages of this method of construction have been fully discussed in former numbers of the JOURNAL. The air chamber is so arranged (forming a distinct compartment) that it is impossible for ashes or dust, except what may exist in the external atmosphere, to gain admission, and consequently the heated current flowing into the dwelling is pure and wholesome. The cold air entering the apparatus is compelled to pass over



every portion of the heated surface, and thus the radiated heat is fully utilized. The furnace ensures perfect cleanliness and freedom from obstructions in draft flue and air current, and derangements can hardly occur to vex, and endanger the health of the user. And further, there are no points where active oxidation or unusual wear can go on so as rapidly to destroy it. These are the distinguishing features, or points of excellence, found in the furnace. There are others, however, which are so obvious it is unnecessary to allude to them. Referring to the cuts: *A* is the pipe through which cold air enters the furnace; *B*, the ash chamber and grate; *C*, the ash-pit door; *D*, the external covering of galvanized iron; *I*, the series of annular metallic rings placed around the heat-radiating dome, to bring the air to every part of its surface; *F*, the feed orifice; *E*, the places of exit for the heated air; *G*, the smoke flue; *J*, the ring by which the air chamber is attached to the base. The small cut represents the fire-pot lined with fire-brick. The wrought-iron, riveted dome passes over this in close contact, and with the annular ring tightly riveted to it at the bottom, forms, in connection with the galvanized outside covering, the air chamber. The cuts do not show the grate, and some other working parts of the furnace. It will be observed that the air enters *above* the ash chamber and grate, and there is no possible connection between the ash and air chambers. No matter to what extent combustion is interfered with, or how violently the grate may be shaken, it is impossible for ashes or gas to pass into the air chamber, if the furnace is *faithfully* constructed. *Perfect construction* in this furnace is essential to its *perfect success.* No workmen but those who are honest, competent, and responsible should be allowed to attempt to construct it. The riveting of the plates is a matter which demands experience and skill, and is the point to which the most careful attention should be given. We presume that in most of the great cities and towns of the Northern and Western States, there are workmen competent to construct this furnace. It may be made of any size, and placed in brick if deemed desirable. The furnace which we had in use during the last winter was constructed under our own supervision, by a stove manufacturer, and its workings were most admirable. Its cost was less, it

consumed less fuel, than other furnaces of its size, and there was entire exemption from gas and dust, so destructive to health and comfort. In further explanation it should be said, that the base of the furnace is of cast-iron, and the doors are ground to a tight joint. The air to support combustion is admitted through a nicely adjusted slide valve, which may be controlled through the medium of a wire carried to the sitting-room or parlor above. The connection of the feed door and smoke flue with the wrought-iron, heat-radiating dome, *must be such as to admit of no possibility of leakage.* In the furnace we have constructed, the feed cylinder is tightly riveted on to the dome, and the connecting joint necessary for the door is placed *outside* of the air chamber. This insures perfect safety. Whenever a *competent, thoroughly reliable* manufacturer, in this city, or elsewhere, enters upon the construction of this furnace, we will give his name to our readers.

SHUT YOUR MOUTH.

Prof. Tyndall's researches on "Dust and Haze" continue to attract a great deal of attention, both in England and in this country. Scientific men are discussing them, and the popular press is making the most of the theme and its suggestions. The hygienic question of the hour is not what we shall eat or drink, but what —or rather *how* — we shall breathe. If the seeds of disease are everywhere floating in the air, and cannot be removed except by filtering it through fire or water, or some such substance as cotton wool, what is to be done? Shall we all put on "respirators," and go about like so many muzzled dogs? If the only alternative is death or that sort of disfigurement, all good-looking people at least will make their wills and resignedly await their doom. But fortunately we need not bandage our mouths with filters of cotton in order to escape the poison that lurks unseen in the air. Every man who has a nose has a natural "respirator" which is all-sufficient for ordinary purposes. The breath of life was breathed into man's *nostrils*, as we read in holy writ, and through his nostrils, and *not* through his *mouth*, it was intended that he should breathe. Some ten years ago, Catlin, of Indian notoriety, published a little book (it is still in print, we believe), entitled "*The Breath of Life*," which was a quaint but very sensible disquisition on the injurious effects of "mal-respiration,"—that is, mouth-respiration. It ought to be circulated as a sanitary tract, and just at this time it would be likely to be generally read. Its text, or motto, is "Shut your Mouth!" and, as the author urges, it ought to be inscribed "in every nursery and on every bedpost in the universe." It is unquestionably true that people who live and breathe according to this simple law are less liable to infectious diseases and pulmonary difficulties, than those who make the mouth the main organ of respiration. Catlin gives an account of a voyage he made between two South American ports, when thirty out of eighty passengers died of yellow fever. He says that careful observation satisfied him that, with scarcely an exception, the victims of the disease were those who habitually breathed through the mouth. In numerous other instances in which he was in the midst of yellow fever and cholera, he remarked the same general exemption from disease on the part of those who kept their noses open and their mouths shut. This is worth remembering, and our readers may be sure that, even if it does not benefit them, it certainly cannot harm them, to cultivate the habit of breathing through the nostrils, especially when exposed to a malarious or pestilential atmosphere. If, as Prof. Tyndall believes, ordinary air is never free from organic pollution, let us make fair trial of the nasal filters with which Nature has furnished us before we resort to any artificial contrivances for the same purpose. It will be both cheaper and more comely to shut the mouth than to muzzle it.

BEDS AND BEDDING FOR THE SICK

A few words in relation to bedding and bedsteads; and principally regarding patients who are entirely, or almost entirely, confined to their beds.

Feverishness is generally supposed to be a symptom of fever. Sometimes it is, but usually it is a symptom of *bedding*. The patient has had re-introduced into the body the emanations from himself which day after day and week after week have saturated his unaired bedding.

In looking out for an example in order to show what *not* to do, we should take the specimen of an ordinary bed in a private house: a wooden bedstead, two or even three mattresses piled up above the height of a table; with a valance attached to the frame. Nothing but a miracle could ever thoroughly dry or air such a bed and bedding. The patient must certainly alternate between cold damp after his bed is made, and warm damp before, both saturated with organic matter, and this from the time the mattresses are put under him until the time they are picked to pieces, if this is ever done.

If you consider that an adult in health exhales by the lungs and skin, in the twenty-four hours, three pints at least of moisture, loaded with organic matter ready to enter into putrefaction; that the quantity in sickness is often greatly increased, the quality is always more noxious—just ask yourself next where does all this moisture go to? Chiefly into the bedding, because it cannot go *anywhere else.* It *stays* there, because, with the exception of a weekly change of sheets, scarcely any other airing is attempted. A nurse will be careful to fidgetiness about airing the *clean* sheets from clean *damp*, but airing the *used* sheets from *noxious* damp will never even occur to her. Besides this, the most dangerous effluvia we know of are from the excreta of the sick. These are placed, at least temporarily, where they must throw their effluvia into the under side of the bed, and the space under the bed is never aired: it cannot be, with our arrangements. Must not such a bed be *always* saturated, and be always the means of *introducing again* into the body of the unfortunate patient who lies in it, that poisonous matter which nature is trying to *get out* of the system?

If a bed is higher than a sofa, the patient often prefers not to get out at all, rather than undergo the fatigue of getting out. If the bed were a low one, he might often feel like taking a few minutes' exercise every day in another room, or even in the open air. It is so very odd that people never think of this, or of how many *more* times a patient who is in bed for twenty-four hours is obliged to get in and out of bed than they are, who only get into bed and out of bed perhaps once during the twenty-four hours.

A patient's bed should always be in the lightest spot in the room: and he should be able to see out of a window.

It is scarcely necessary to say that the old four-post bed with curtains is utterly inadmissible, whether for the sick or for the well. Hospital bedsteads are in many respects very much better than private ones.

There is reason to believe that not a few of the cases apparently resembling scrofula among children, proceed from the habit of sleeping with the head under the bed-clothes, and so inhaling air already breathed, which is further contaminated by exhalations from the skin. Patients are sometimes given to a similar habit, and it often happens that the bed-clothes are so disposed that the patient must necessarily breathe air more or less poisoned by exhalations from his skin. A good nurse will be careful to attend to this. It is an important part, so to speak, of ventilation.

It may be worth while to remark, that where there is any danger of bed-sores, a blanket should never be placed *under* the patient. It retains damp, and acts like a poultice.

Never use anything but light blankets as bed covering for the sick. The heavy cotton impervious counterpane is bad, for the very reason that it keeps *in* the emanations from the sick person, while the blanket allows them to pass through. Weak patients are invariably distressed by a great *weight* of bed-clothes, which often prevents their getting any sound sleep whatever.

One word about pillows. Every weak patient, be his illness what it may, suffers more or less from difficulty in *breathing.* To take the weight of the body *off* the poor chest, which at best is hardly up to its work, ought therefore to be the object of the nurse in arranging his pillows. Now what does she do, and what are the consequences? She piles the pillows one upon the other like a wall of bricks, the head is thrown upon the chest, and the shoulders are pushed forward, so as not to allow the lungs room to *expand.* The pillows, in fact, lean upon the patient, not the patient upon the pillows. It is impossible to give a rule for this, because it must vary with the figure of the patient. Tall patients suffer much more than short ones, because of the drag of the long limbs upon the waist. But the object is to *support*, with the pillows, the back below the breathing apparatus, and above the hips; so as to allow the shoulders room to fall back, and to support the head, without throwing it *forward.* The suffering of exhausted patients is greatly increased by neglect of these points. And many an invalid, too weak to drag about his pillows himself, slips his book or anything at hand behind the lower part of his back to support it.

HOUSEHOLD HINTS.

To Renovate Black Silk.—Rub the silk all over on the right side with a solution of carbonate of ammonia and water (two teaspoonfuls powdered to a quarter of a pint of warm water), and smooth it on the wrong side with a moderately hot iron, and the silk will regain a bright appearance.

Substitute for Washing Soda.—For washing delicate fabrics the hyposulphite of soda is much better than common soda. It does not attack the skin of the hands, nor the articles to be washed, while it is an effective bleaching agent, and removes many kinds of spots better than anything else that can be used. It is now manufactured on a large scale for photographic purposes, and is quite cheap.

Waterproofing Cloth.—A writer in the London *Illustrated Times*, who has tested the method of waterproofing with sugar of lead and alum, as given in our last number, says that he has worn garments of common Scotch tweed thus treated, in the wildest storms of wind and rain, without getting wet. Even after walking in a driving rain for nine miles, his clothes were as dry under his waterproof overcoat as when he put them

on. He advises soaking the cloth in the liquid for twenty-four hours, and then hanging it up to dry without wringing.

A Cheap Filter. — The *Manufacturer and Builder* gives the following directions for a simple filter to purify cistern water: Place on the perforated bottom of a box a piece of flannel, and on this some coarsely powdered charcoal, then coarse river sand, and cover the whole with sandstone broken into small pieces.

Glazing for Linen. — To every quart of starch add a teaspoonful of salt, and one of white soap scraped fine. Boil the starch (after adding hot water) until it is of the proper thickness.

Salt in Cooking Vegetables. — If one portion of a dish of vegetables be boiled in pure water, and the other in water to which a little salt has been added, the latter will be found better flavored and more tender; if potatoes, they will be mealier. Onions are especially improved by being cooked in salt water. Their rankness of odor and flavor is mitigated, or modified into a peculiar sweetness and aroma. The salt appears to hinder the evaporation of the more volatile principles of the vegetables.

White Wash that will not rub off. — Mix up half a pailful of lime and water; take half a pint of flour and make a starch of it, and pour it into the whitewash while hot. Stir it well, and make it ready for use.

THE ORIGIN OF THE ELECTRIC TELEGRAPH.

In 1831, and part of 1832, the writer, then studying in the schools of the world-renowned Paris, had his lodging in the modest upper chamber of the unpretending "Hotel de Calcutta," in the "Rue de Savoy," near the famous old "Pont Neuf," on the students' side of the Seine, in the "Pays Latin." At the same time there lived in the same hotel another young compatriot, also engaged in the prosecution of his studies. His calling led him into very different places from those frequented by the writer, but on Sundays and holidays a visit to the Louvre often found the latter standing, in rapt admiration, before an immense canvas, reached by a stage eight or ten feet in height, upon which the former was daily engaged in copying the great picture of the "Shipwreck," which, at that day, graced (and perhaps still graces) the wall of the first room of the grand gallery of the Louvre. Time passed on, and, as the picture advanced to completion, and the artist grew in reputation, his friends augured most favorably for the future fame of one whose first finished piece produced him (rumor said) the handsome sum of *one thousand dollars*.

In the summer of 1832, this artist was on his way home in one of the fine ships of the Havre and New York line. Steam did not, in those days, puff the traveller on his homeward path across the grand Atlantic in seven or eight days, and adverse winds not infrequently protracted the voyage far beyond the endurance of impatient absentees, longing for home, for fame, and for fortune. The voyage, on this occasion, was unusually long. The passengers had used every ordinary resource by which they might hope to subtract an hour or two from the tedious time. All had been employed, all had been exhausted, all had failed.

At last a fellow-passenger, whose studies had also been going on in that grand old omnibus, Paris, and who, like the painter, was returning home with head and heart both filled, like his, with hopes of greatness, and the means of achieving it, and whose career has been hardly less successful, brought on deck his scientific apparatus, and proposed to lop off an hour or two from the tedious time by exhibiting experiments. Electricity and galvanism contributed their quota. In one of these experiments the effect produced was seen at a considerable distance from the instrument that was working. An Englishman, who was carelessly looking on, remarked, "What a pity we can't send messages as quick as that."

This remark seemed to pass away like the flash that had occasioned it, for no further reference was made to it, but it was a seed that had fallen on good ground, and in due time it sprang up and bore fruit millionfold.

Arrived at New York, the *ennuyé* passengers separated. But nothing was heard of the ambitious painter, whose copy of the "Shipwreck" had spread his fame ahead of him.

The old rope-walk that stood on or near the spot on which the distributing reservoir of the Croton water now is, was hired by some unknown person, who was engaged in some unknown experiments which did not seem to give much promise of useful result, since month after month and year after year passed by, and still the mysterious workman was as dark and mysterious as ever, and his barred doors still defied the curiosity of the curious, till at last even the mystery itself ceased to attract notice.

Ten years passed thus, and at the end of that time Morse emerged from his ropewalk with his telegraph accomplished, and electrified the world. — *Rural Carolinian.*

HABITATIONS FOR MEN.

There is nothing more disgraceful to the social life of this city (New York) than the homes we are in the habit of preparing for the poorer classes — and even for the middle class, for that matter. We complain of our streets, our markets, our wharves, and our public vehicles, and we complain justly, because they are below the standard of a third-rate city, anywhere; but worse than these are the tenement houses, put up for the accommodation of those of limited means. They are often scarcely fit receptacles for cattle. Many a horse, indeed, is stalled in a finer, cleaner, better-ventilated room than many a man. Thousands of families would be glad to exchange their cellars and garrets, where father, mother, and children are huddled together in a promiscuous and unwholesome squalor, — unwholesome morally as it is physically, — for the clean straw and warm blankets of our canine and equine favorites. Yet the men we condemn to these noisome retreats are not only our fellow-creatures, they are also our fellow-citizens, sharers in the government, voters who help to make the laws, and give character to our civilization.

It is the more shameful it should be so, because, with the same expenditure of money, but a little more compassion and care, lodging-houses could be made as comfortable as they are now repulsive. Let capitalists and builders build in flats or apartments properly arranged, as they do abroad, and let a janitor look properly after the police of them, and the most reckless and filthy housekeepers could soon be brought to desire and maintain agreeable and cleanly quarters. — *Putnam's Mag.*

Physical Constitution of the Sun. — To sum up the case, in respect to our knowledge of the physical constitution of the sun, we find that the seeming regularity and smoothness of the orb, and its homogeneous and quiescent condition, are mere illusions, arising from the immensity of the distance from which we view it. Its surface is, in fact, furrowed by enormous incandescent billows, and is in a state of incessant and violent commotion. Enormous flame-like coruscations, in masses larger than this globe, rise, and glow, and wave, and then melt away and disappear. Some of these blazing radiations appear to project themselves forty or fifty thousand miles into the surrounding space, though, on account of the immense magnitude of the body of the sun, and his vast distance from us, they do not perceptibly affect the smoothness of the contour of his disk, as it appears from the earth, to our unassisted vision; but the real violence and rapidity of the action thus taking place are inconceivable. On the one hand, cavities of absolute darkness, and on the other vast protuberances of extraordinary and special brightness, form and fluctuate over the surface, increasing and diminishing at the rate of thousands of miles in extent in very brief periods of time.

It is absolutely, though not relatively, as if the whole continent of America were to rise from the sea, in the midst of the most violent commotion, in the night, and then as suddenly melt away and disappear in the morning.

Thus the sun, instead of existing in the calm, placid, and unchanging condition which it appears to assume, is in reality a mass of seething and surging incandescence, deformed by incessant and tempestuous agitations of surface, produced by contests among forces the nature of which eludes our research as completely as the enormous magnitude and extent of their effects surpass our powers of conception. — *Harper's Magazine.*

Arts.

PARCHMENT.

There are certain manufactures of very ancient date in which there has been no material change even down to our day, and the making of parchment is one of them. Goatskin and sheepskin are preferred for the purpose; calfskin and lambskin being reserved for vellum, which is a finer quality of the same substance. The art consists in making the skin very thin and nearly transparent without destroying its firmness and strength. After the hides have been deprived of the hair and the flesh, they are immersed in a solution of alum and sea salt; they are then very quickly dried and stretched on wooden frames by means of screws, and drawn so tight that no wrinkle or fold remains. When the skin is very dry, the workman, with a sharp iron, takes off all the flesh which may still adhere to the inner surface. He then scrapes the outer surface to remove all dirt, taking great care not to injure the epidermis. The inner side is next *pounced;* that is, covered with a layer of very finely powdered lime, and rubbed with a large pumice-stone. The lime absorbs all the water yet retained in the skin. After this operation the skin is again dried, and is next handed over to the polisher, who repeats the process already described. The skin is thus made thinner and smoother. The final polish is given to it by means of a very soft pumice-stone. It is then folded, cut to the proper size, and pressed; after which it is ready for market.

Vellum, as we have said, is only a superior quality of parchment, and takes its name from the calfskin (the French for calf is *veau*, whence our *veal*) of which it is often made. The word *parchment* is a corruption of *Pergamena*, from Pergamos, where, according to Pliny, it was first made, some two hundred years before Christ. It was known, however, full three centuries earlier. Possibly the invention which Pliny mentions was merely an improved mode of preparing the material. The manufacture became a very important one in Rome about a century before Christ. All the world then used parchment for writing on, and this continued to be the case until the invention of paper from rags.

JOTTINGS.

Paper Fabrics. — In Japan, as we are told, the uses to which paper is put are almost innumerable, and we are beginning to emulate our Asiatic friends in that particular. Paper collars, of both the masculine and the feminine patterns, are now made by the million, and the same material is coming into use for other and more important articles of civilized apparel. A kind of paper has been invented which is very tough and flexible, and can be sewed with a machine, the seams being almost as strong as those of a woven fabric. Petticoats are made of this paper, which are either printed in imitation of certain fashionable styles of the day, or stamped out with open-work which in beauty and delicacy surpasses anything that can be elaborated by the needle. And these really exquisite productions can be retailed at fifteen cents each.

Chintz for bed furniture and curtains is also made of this new material, and likewise embossed table-cloths of very beautiful designs and finish. Imitation leather is another form into which it is put; this can be used for covering furniture, and even for shoes.

New Applications of Electricity. — We read in the papers of the day that certain experiments have

lately been made in heating cars by electricity. The axle of the car is to turn a magneto-electric apparatus, the current of which is to be converted into heat by a contrivance placed under each seat. The plan is indubitably a safe one, as the inventor claims, since the car can never be set on fire by it, even if thrown from the track; but that it cannot be an economical method of warming is obvious on the face of it. The heat obtained is heat from the fire in the engine *diminished* by the amount lost in its transmission through all the intervening machinery. The heat of the fire is converted into mechanical motion, which is converted into electricity, and this into heat again. This plan, however, is no more absurd than one devised in Russia, for which the inventor is said to have received a diamond ring from the Empress. A number of disks attached to the axle of the car are made to rub against surfaces arranged for the purpose, and the heat produced by the friction is to warm the car. As the warming is accomplished "without expense," it is evident that the friction caused by the disks must be of a kind not before known, involving no waste of power. In addition to the diamond ring, a leather medal should have been given to M. Berchau for the discovery of this new variety of friction. A leading London journal laments that this brilliant idea never occurred to an English engineer. We have no doubt that it will lament even more bitterly that it was a Yankee, and not an Englishman, that found out the method of displacing steam by electricity, which was recently described by the New York correspondent of the Boston *Journal*. "To run an engine of 20-horse power would require only a space of 3 feet long, 2 feet wide, and 2 high. The cost per day would be 35 cents. On a steamship no coal would be required, and the space now used for coal and machinery could be used for cargo. The stubborn resistance of electricity to mechanical use heretofore has, it is believed, been overcome. A continuous battery has been secured, and other difficulties removed, principally through the coil of the magnet. If the invention works as well on the large scale as it does on the machinery to which it is now applied, steamships will soon ply the ocean under the new propelling power. A machine of great capacity is being constructed, and will soon be on exhibition in New York. The whole thing, mighty enough to carry a Cunarder to Liverpool, can be secured in a small trunk."

It is unfortunate that the dawning resplendence of this mechanical millennium should be clouded even by a single *if;* but let us hope that this invention, which is evidently a "big thing" for a little one, will not disappoint the New York correspondent and the world when it comes to be tried "on the large scale."

The Oxygen Light versus Kerosene. — The *Insurance Monitor*, speaking of the new oxygen light, says: "We of the insurance fraternity — like the rest — are in search of 'more light' — of the right sort. We pay $2,000,000 per annum for the other kind. We should know our friends from our foes. Naphtha, under all its aliases and applications, is an emissary of the fire fiend, which finds quarter under an insurance policy just in proportion as underwriters are ignorant of its qualities. With pure oxygen we have no quarrel. If this enterprising company sends it around in hogsheads, as they threaten to do, and the hogsheads should leak, or Bridget should leave the bung open, we should only have, instead of an explosion, an improved atmosphere at a cost of $50 per thousand cubic feet for the improvement."

A New Dodge in Photography. — The *Photographisches Archiv*, of Berlin, states that negatives on ground glass give very soft and beautiful impressions. The glass must have rather a coarse grain, and the negative must be taken on the smooth side. The writer adds that the secret of this method is sold in America at high prices under the name of the "Berlin process."

USEFUL RECIPES.

To Make Water-Proof Blacking. — Take an old pair of India rubber shoes (boots or any old India rubber); cut them up and pull off the cloth lining; put the rubber in about a pint of neat's foot oil, and set it on the stove until the rubber is entirely melted, stirring it once in a while, and don't let it boil or burn. It will take about two days to melt the whole. As soon as the rubber is melted, stir in one-half pound of beef or mutton tallow, and one-half pound of beeswax. If it is not black enough, you may add a little lamp-black.

Now to apply it to the boots: wash them clean of mud and blacking; when they are nearly dry apply the water-proof all over them — if the weather is cold, work near the stove. The best thing to use in applying this blacking is one's hands, and considerable elbow grease to rub it well into the leather.

Any one using this application, and then having wet feet, had better give the boots away and buy a new pair, or send the old ones to a cobbler and have the seams attended to.

Isinglass Glue. — Dissolve isinglass in water, and strain it through coarse linen. Then add a little alcohol, and evaporate to such a consistency that when cold it will be dry and hard. This will be found to be more tenacious than common glue, and therefore preferable in many cases.

To "Green" Pickles without the Use of Copper. — Digest the fruit or vegetables for some time in boiling salt water. Then take them out and pour boiling hot vinegar over them. On the third day take them out of the vinegar, boil the latter, and again pour it over them while hot. It is said that this process, a few times repeated, will produce a dark green color, like that obtained by verdigris in the ordinary method of "greening," but of course not poisonous.

To Clean Engravings, etc. — It has been found that ozone bleaches paper perfectly without injuring the fibre in the least. It can be used for removing mildew and other stains from engravings that have been injured by hanging on the walls of damp rooms. The engraving should be carefully moistened and suspended in a large vessel partially filled with ozone. The ozone may be generated by putting pieces of clean phosphorus in the bottom of the vessel partially covered with water; or by passing electric sparks through the air in the vessel.

OXIDATION OF IRON USED IN BUILDING.

Iron has come to be extensively used in the walls of buildings, for the purpose of tying or bracing the masonry, and it has been taken for granted that in such positions it is practically indestructible. But a discovery recently made in England shows that the metal, when thus built into masonry, may not only rust, but also in the process of rusting act as a lever to pry apart the blocks of stone which it was intended to bind together. The following account from the London *Builder* is exceedingly interesting in a scientific point of view, and it ought to be carefully pondered by the architect: —

"The question of the mode in which iron suffers from oxidation, when included in masonry, appears likely to attract fresh attention. It is a subject on which those persons who are familiar with the repairs, or even with the demolition of old buildings, are not altogether without experience. But especial value attaches to the discoveries made on the recent occasion of the examination and repair of the tomb of King Henry VII., in Westminster Abbey, from the fact that both the date of erection, and the subsequent history of the monument, are so distinctly ascertained.

"After the cleaning of the statue of the Countess of Richmond, to which much public attention was directed, last May, the curators of the tombs proceeded to examine the central monument of the Abbey, that of King Henry VII. and his queen, standing, as is well known, in the chapel founded by that sovereign, under the protection of a richly wrought *grille*.

"Not only did the effigies appear to be coated and partially corroded in consequence of long neglect, but the altar tomb itself gave symptoms of dilapidation and decay. Joints yawned and cracks menaced, and the general appearance was such as is often produced, in similar structures, by subsidence of the foundations. The effigies were therefore carefully removed, and carried into the Eastern apse, or smaller chapel, where they were cleaned, and that with great science. The altar tomb itself was reverently taken to pieces, with a view to its replacement in its original integrity. It soon appeared that no subsidence had occurred. On the contrary, the tomb had been built on the finished pavement of the chapel, and the portion of this pavement which had thus been protected from wear was in a condition of great and original splendor, being enriched with a diapered pattern, partly polished, and partly pounced or frosted.

"The actual cause of the dilapidation of the tomb then appeared. It was nothing but the oxidation of the only pieces of iron which had been employed by the builders. All the fittings were of copper, with one exception. At each corner of the tomb, as many of our readers will remember, sits a boy angel, in gilded copper. To keep these figures in their place, copper bolts were employed, which passed through the upper portion of the ornamental work, and were secured by attachment to four plates of iron, which were built into the tomb itself under the slab on which the effigies rested. These four iron plates, notwithstanding their protection, first by the work of the tomb itself, and secondly by the building which sheltered the tomb from the chief vicissitudes of atmospheric temperature, had developed, on either side of each, solid plates of rust, of from three to four times the thickness of the orignal iron. The slow formation of this oxide had acted as an irresistible wedge, driving the fabric asunder, and threatening in course of time the entire overthrow of this noble monument.

"Specimens of these plates of oxide, as well as one of the original iron plates, were exhibited at the meeting of the Royal Archæological Institute, on the second of July last. The dangerous metal has now been replaced by plates of copper; and the tomb has been restored to its original beauty. But the lesson as to the conduct of iron when included in masonry or in mortar, even under circumstances which might be presumed to be more than ordinarily favorable, is not one of which any prudent architect or engineer will lose sight.

OLIVE OIL AND COTTON-SEED OIL.

The *Manufacturers' Review* states that immense quantities of partly bleached or "yellow" cotton-seed oil are now consumed in the adulteration of olive oil. Indeed, it is hard to find a pure olive oil in the market, except in first hands. If this were the whole story, we need not be particularly disturbed about it, for the cotton-seed oil is quite as palatable as the olive oil, and it is not improbable that, when people generally become more familiar with it, they will use it for culinary purposes, in preference to the latter. When cooled, moreover, it deposits a solid fat, which is quite equal to good sweet butter, and may hereafter prove a rival to that vaccine product.

But this is *not* the whole story of the adulteration to which we have referred. When a considerable proportion of the native oil is added to the imported article, the greenish tint of the latter is destroyed, and *stearate of copper* is added to restore it. This, like many of the salts of copper, is a poison, and so the sophisticated oil becomes more or less deleterious to health.

To test olive oil for this adulteration, take a small quantity of it, and add to it an excess of aqua ammonia; if it turns blue, the presence of copper is proved.

To test the oil for the admixture of the cotton-seed oil,

put a little of it in a test-tube, add a few drops of solution of nitrate of mercury, and shake it. If the oil is pure, it will become solid, so that it will not run out, even when the tube is inverted. The cotton-seed oil, treated in the same way, becomes only semi-solid. The thickness of a mixture of the two oils, when the nitrate is added, will depend upon the proportion in which they are mixed. If there is more than 10 per cent of the cotton-seed oil, the mixture will not become entirely solid.

Again, most vegetable oils, when shaken in a test-tube with a little sulphuric acid of the specific gravity 1.432, and allowed to stand till the two liquids have time to separate, show a black or brown rim at the boundary of oil and acid, while the latter generally has a dirty brown color; but in the case of cotton-seed oil, there is no such black rim, and the acid assumes a pure red tint. If, therefore, a reddish color appears in the acid when olive oil is tested by this method, it shows that cotton-seed oil has been employed as an adulteration.

HARNESS BLACKING.

The *Manufacturer and Builder* (which we generally find thoroughly trustworthy in its recipes) gives the following methods of making harness blacking:—

Mix 4 ounces of hog's lard, 16 ounces of neat's-foot oil, 4 of yellow wax, 20 of ivory black, 16 of brown sugar, and 16 of water. Heat the whole to boiling, and stir it until it becomes cool enough to handle; then roll it into balls about two inches in diameter.

A cheap and good blacking may be made as follows: Soften 2 pounds of glue in one pint of water; dissolve 2 pounds of soap (Castile is best) in one part of warm water; after the glue has become thoroughly soaked, cook it in a glue kettle, and then turn it into a large pot; place the pot over a hot fire and pour in the soap-water, slowly stirring until all is well mixed; then add a half-pound of yellow wax cut in slices. Let the mass boil until the wax is melted, then add half a pint of neat's-foot oil and a sufficient quantity of lamp-black to give it color; let it boil for a few minutes, and it will be fit for use.

For restoring a soiled harness the "French polish" is used. The ingredients are 4½ pounds of stearine, 6¾ pounds of turpentine, and 3 ounces of ivory black. Beat out the stearine to thin sheets with a mallet, mix it with the turpentine, and heat over a water-bath. Stir it continually while heating, and when it is thoroughly heated throw in the coloring matter. Turn the whole into another pot, and stir until it is cool and thick: if not stirred, it will crystallize and the parts will separate. When used it must be warmed, and a small quantity rubbed on the leather with a cloth. Use but little at a time, and put it on very thin. After it has partially dried, rub with a silk cloth, and a polish will be produced equal to that of newly-varnished leather. It may be used also for carriage-tops, straps, etc., and will in no way injure the leather.

To Deodorize Bisulphide of Carbon.—This may be done by keeping the carbonic disulphide (as it would be called in the new nomenclature) for twenty-four hours in contact with powdered corrosive sublimate. The mixture should be continually agitated. It is then to be carefully decanted, and distilled from a little inodorous fat with the aid of a water-bath. Thus purified, the bisulphide has an ethereal odor, and is suitable for the extraction of odorous oils, etc.

Agricultural.

CORN-FODDER FOR MILCH COWS.

We copy the following from the editorial columns of *Hearth and Home* (one of our most able and interesting exchanges), for the purpose of making some comments upon the important subjects brought under discussion:

"We have received an address by Dr. Nichols, delivered last autumn at Greenfield, Mass. Dr. Nichols is the well-known conductor of that excellent monthly, the Boston Journal of Chemistry, who unites to his chemical pursuits very great interest in the practical operation of a farm, now under his management, in the neighborhood of Boston.

"His address is devoted chiefly to water in its agricultural relations. He notes the great percentage of this element in muck and in common barn-yard manure, and the fallacy of estimating their values by weight or bulk.

"As water enters largely into the composition of milk, he advises juicy food for milch cows. In this connection, we are sorry to observe, he declares against maize in drills or sown broadcast for dairy purposes. He even goes so far as to say: 'This is a kind of food for animals not profitable to raise.'

"We are fully persuaded that in this few farmers who have availed themselves of this resource for eking out the parched pastures of September will agree with him.

"We give the doctor the benefit of his explanation of this peculiar doctrine:

'It is not so because the maize-plant is not rich and succulent, but because the conditions under which it is grown are unfavorable to its perfect and healthy development. The natural juices of the plant are richly saccharine at maturity, when grown in hills in open space, with plenty of air and light; but grown in mass, in close contiguity, this principle is almost wholly wanting. To test its comparative value with the green stalks taken from the cornfield, I fed to my herd of cows in August a weighed quantity of the 'corn-fodder,' so called, night and morning, for one week; they were then changed to the field corn-stalks, and the gain in the milk product at the end of the week was a little more than eight per cent, and there was also a manifest improvement in quality. As a rule, all vegetable productions grown under conditions where the chlorophyl, the green coloring principle of plants, cannot be produced in all its richness of tint, are abnormal, immature, worthless. The absence of this principle in the whole of the lower portion of the corn-plant grown in drills, or from broadcast sowing, indicates its watery, half-developed character.'

"And upon this, the doctor goes on to recommend millet, green oats, and clover; but does the doctor propose to sow all these so sparsely as to give free sunshine to the stalks from the bottom up, and so ensure that 'chlorophyllic' development which, he says, is alone compatible with healthful food?

"We can easily believe that the maximum of nutriment in any given plant may be best secured by giving ample space and unchecked flow of sunshine all around it; but that such method is compatible with the economies of practical farming, we are slow to believe; nor can we join Dr. Nichols in counting broadcast or drill-sown corn 'worthless' for food. We have found it to be eaten uniformly with great avidity; and quite as uniformly to ensure a large and full flow of milk."

Remarks.—When we find that our views or opinions upon matters of husbandry do not coincide with those of an observer and farmer, so keen, sensible, and practical as the editor of *Hearth and Home*, the decision is that we must subject them to re-examination to discover the probable error. This matter regarding the value of green-corn fodder, raised in the usual way, as summer feed for milch cows, has provoked much discussion in the agricultural journals, and there is found a decided conflict of views among farmers. It will be observed that our statements are based upon the results of fair and extended experiment, and therefore differ somewhat from opinions which are not thus supported. Mr. Mitchell has, however, found upon actual trial, that "the use of the fodder ensures uniformly a large and full flow of milk." Now, has he ever "weighed and measured" the lacteal products, before and after putting his herd of cows upon it? If he has, the error in results must be sought for in the different conditions under which the plants have been produced. The maize plant, grown in drills in close contiguity, or in mass from broad-cast sowing, is necessarily, almost, or quite, an abnormal growth. Light and air, so essential to healthful plant life, are excluded from a large portion of the stock and leaves; consequently, when cut, they are blanched and watery, like the sprouts which appear upon our tubers and roots when stored in warm cellars. Now, grains and grasses differ in physical structure from the corn plant. Most of them do not rise to a corresponding altitude, and they do not have long, broad leaves to serve as a kind of roof to keep out the sunlight. Moreover, grasses begin to mature much earlier than corn; they have a briefer life. The saccharine and nitrogenous principles begin to flow through the microscopic canals in their structure, before maturity is attained, and hence they contain more nutriment in a green state. The great struggle, the life-work of a plant, is to produce seed to secure the elements of reproduction. A week or two before the seed-forming climax is reached, grasses contain all the rich nutrient principles they are capable of assimilating, and this is the proper time to cut and dry them for food. It is to be further observed that grasses and grains grown in the shade, or where they are crowded together in thick masses, are vastly inferior in quality to those grown under more favorable conditions for access of air and sunlight. The hay, grown on a field that produced three tons to the acre, has not so high a money value as that where but two tons is the product. We grant it may sell at as high price in the market, but every farmer knows it is not worth as much.

If the corn plant is raised under favorable conditions,—not unduly crowded,—and is cut and fed to cows at an early stage in its growth, we do not think even then it will sustain the animals so effectively, and cause so copious a flow of good milk, as any one of a dozen other green crops. At any rate, our careful experiments point to this conclusion. The good husbandry of Mr. Mitchell, at Edgewood, undoubtedly supplies to his animals the corn fodder in its best possible condition, and hence he obtains what, without perhaps giving the matter special attention, he regards as satisfactory results. Notwithstanding all this, we are confident that he cannot contemplate those little patches of pale, sickly "corn fodder" seen upon farms all over New England without disgust. The object of the farmers seems to be to obtain the biggest possible pile of something that "cows will eat," from the most narrow bit of land. This being the object, the end is better reached by sowing corn broadcast, than in any other way. With respect to the nutriment thereby secured, we think it will be quite as well for the farmer to take his thirty cows from the parched pastures in August, and drive them to the nearest brook, as to place before them huge heaps of this watery vegetable production.

BREVITIES.

The Utilization of Sewage.—The advantages, economic and sanitary, of the utilization of sewage are admirably illustrated on a model farm at Madras, where the sewage of Perambore Barracks and an adjacent village is conducted and distributed by an open earthenware conduit over a field reclaimed from an old swamp with stiff clay subsoil. Unfavorable as was the

ground, the yield of grass and vegetables is wonderful, —guinea-grass being produced at the rate of 88 tons of fresh grass, or 29 tons of hay, per acre, and native vegetables thriving luxuriantly. Still more gratifying are the facts that the health of the district has greatly improved, and that the experiment will soon be extended to two other localities near the city.

Sugar Beet Culture. — A French agricultural paper says that the culture of the beet is worth as much to a country as a fertilizer as it is for its product of sugar, the pulp being more valuable than the saccharine material extracted.

Encouraging to the Hens. — The consumption of albumen in certain industries is enormous. In France the calico-printers are the largest consumers, and the demand for their use is steadily on the increase. The print works of Alsace alone consume annually more than 150,000 kilos. of dried albumen, representing rather more than 37,000,000 of eggs, or the production of 250,000 hens; add to this the consumption of the printing works of other parts of France and of other countries, and there is very little doubt th t annually some 150,000,000 eggs are used for that purpose alone.

A NEW INSECTICIDE.

M. Cloez, as the *Revue Horticole* states, has invented a new poison for plant-lice and other small insects. To prepare it, put 3½ ounces of quassia chips and 5 drachms of powdered stavesacre seeds into 7 pints of water, and boil it down to 5 pints. Strain the liquid when cold, and apply it to the plants with a syringe or watering-pot. The preparation has been thoroughly tested in France, and has been found very efficacious.

The *stavesacre* is the *Delphinium staphisagria*, a species of larkspur. The seeds contain *delphinia*, a very poisonous alkaloid. They have sometimes been used to destroy vermin on animals, and also as an anthelmintic.

Water at Sixty Dollars the Ton. — Farmers can hardly afford to pay sixty dollars a ton for common water, and yet we fear they often do pay that exorbitant price for it. Here is the analysis of a popular "*superphosphate*," which is sold largely in all parts of the United States.

Soluble phosphoric acid,	8
Insoluble " "	7
Ammonia,	3
Organic and volatile matter,	30
Bone phosphate of lime,	30
Moisture,	20
Sand and insoluble matter,	2
	100

In this mixture, which is sold at sixty dollars a ton, there is twenty per cent. of *moisture* or water. If the water is removed from one ton of it by the simple process of drying, there will remain but 1600 pounds of the fertilizing material. The loss is therefore one-fifth of the whole amount. Now we do not think it best that all the moisture should be driven off from commercial manures, as in a perfectly dry state they would be inconvenient to use, but it should be taken into account by venders and purchasers. It is certainly a very important item. The moisture in guanos and phosphates varies from 15 to 25 per cent. The quantity should in all cases be known, and the weight deducted when sales are made. Let the price be made upon all fertilizers in a dry condition.

Strawberry Culture. — A very interesting and practical little manual upon strawberry culture has recently been published in this city by J. E. Tilton & Co. It is written by J. M. Merrick, Jr., who has had a large experience in cultivating the delicious fruit. Until we looked over this book we had no idea of the number of varieties of strawberries which have been produced in Europe and in this country. Seventy pages of the book are filled up with a catalogue of these varieties. There is great confusion existing in relation to species in the strawberry family, and notwithstanding so formidable a list of varieties is presented, we doubt if the number of species exceeds a half dozen. The zeal and industry displayed in producing new seedling strawberries, grapes, etc., is certainly wonderful, and perhaps commendable. We doubt, however, if absolutely better varieties than some we now have, will ever be discovered. If we get a very delicate morsel in the shape of a new berry, it is so tender or sensitive it dies even with most careful nursing. Mr. Merrick is quite favorably disposed towards the "President Wilder strawberry," which is a new variety with a long name. We know nothing of this berry, and shall hardly seek its acquaintance, so long as Hovey and a few others drop such satisfactory sweetness into the mouths of those who hang around our tables in June.

A Good Authority on the Value of Corn Fodder. — We are pleased to learn from a communication which appears in a recent issue of the *Republican Statesman*, that the veteran farmer and intelligent experimenter, Levi Bartlett, Esq., of Warner, N. H., fully coincides with us in our views upon green corn fodder. Mr. B. says, that "Dr. N. is unquestionably right in his views respecting the small nutritive value of the usually late and thickly planted corn for fodder." He recommends as substitutes, in addition to those we have named, the cabbage, the rape-plant, and sweet corn grown in hills. Sweet corn is a very valuable plant, and one too much neglected. Mr. Bartlett says, "plant early, and commence feeding as soon as the ears have fairly formed; continue the feed until there is danger of frost; then cut and shock it, and feed to the cows in milk." These are excellent suggestions, and we commend them to the attention of our farmer readers.

Some New Birds. — Through the Peabody Academy of Science, we have received some birds, new in the United States, which it is thought may be domesticated, and become profitable to raise, both as regards meat and eggs. They are natives of Central and South America, and are classed, we believe, by naturalists, as belonging to the pigeon family. They are also related to the ancient Dodos, the celebrated bird which at a comparatively recent period existed in Mauritius. We have two varieties, one called *Palvons*, the other *Paulheils*, and both are very beautiful. In form, they in some respects resemble the turkey, but are not as large. They are nearer in size to the common guinea hen, and the egg they produce is also about the same size. We have not as yet allowed them the "largest liberty" at Lakeside, but with a little "clipping" shall soon venture upon the experiment of "letting them run." It is doubtful if more beautiful domesticated birds exist than Mr. and Mrs. Paulheil. Their plumage, to be sure, just now, is a little shabby, but as an entirely new dress is in course of rapid completion, they will soon be "presentable." If they prove hardy, prolific, and of easy control, they will be a most desirable addition to our list of domesticated birds.

THE FRUITS OF CALIFORNIA.

Dr. Prime, of the N. Y. *Observer*, makes the following observations regarding the fruits of California :—

"But the glory of California is in its pears and grapes. The former grow with a luxuriance and rapidity, and with such abundance of large and luscious looking fruit bending the trees to the earth, that, on entering any of the fruit orchards, a stranger is compelled to break out continually in astonishment. All varieties of pears, if not actually indigenous to the soil, have found in California their true home, and, many of them at least are as delicious as they are finely developed. Some specimens of this fruit, in years past, have been a wonder in the East, where they were sent; but there are a few more left. Pears have become so abundant — even the choicest varieties — that they have actually become a drug in the market; and Bartletts which will weigh a pound, and which blush, when you look at them, like a young maiden, will scarcely pay for sending them to market. I was at a ranch, not an hour's distance from San Francisco, containing all kinds of fruit and pears of every variety, and such fruit as was never seen in any other country, hundreds of bushels, the owner of which informed me that he should leave it all to rot upon the trees, as it would not pay for the picking.

"Grapes grow everywhere in the State with the greatest luxuriance and spontaneously. They require no sort of training; they are trimmed annually almost to the level of the soil, leaving a small stump, and before the season is over. such a burden of the finest of fruit is seen and in clusters like the grapes of Eshcol, as can now scarcely be found anywhere else on earth. The choicest of foreign grapes, which at the East are matured only in graperies by artificial heat, here revel in the open air. I believe all visitors in California, if not the citizens, unite in pronouncing the grapes the finest of its fruit, and they grow in such profusion that all classes may have them at this season as an article of their daily diet. Figs and pomegranates grow with the same luxuriance; the former, as in Oriental countries, producing three crops in a season. The fig-tree grows with astonishing rapidity. I have seen, even among the mountains, and still more in the broad valleys, fig-trees twenty or twenty-five feet in height that could not be more than ten or twelve years old, and covered with the second crop of the largest and finest figs. It is surprising to see so little account made of this fruit, which, in other countries, is an important article of food, and which is more nourishing than any of our native fruits. But the taste for it must be acquired, and it is evident that it has not been extensively acquired in California.

"I have made a more extensive enumeration of the fruits of the State than I intended, although it is only the commencement of a catalogue. Almost anything that will grow in any clime grows here, as if this were its native soil, and in such perfection of form and magnified proportions as can scarcely be approached elsewhere: but with the notable exceptions which I have made, and some, perhaps, which I have omitted, the fruit is not equal in flavor to much of the fruit of our own clime.

Something New in the Cultivation of Corn. — We find the following in the St. Louis *Journal of Agriculture*: "An intelligent and reliable neighbor of ours, who has for many years been making experiments with corn, has discovered an importance and value in replanting corn, which is quite novel and worthy of publication. We have always thought that replanting corn was of little consequence, but this gentleman says it is of so much consequence, he replants whether it is needed or not — or rather, he plants, two or three weeks after the crop is planted, a hill about every fifteenth row each way. If the weather becomes dry during the filling time, the silk and tassel both become dry and dead. In this condition, if it should become seasonable, the silk revives and renews its growth, but the tassel does not recover. Then, for want of pollen, the new silk is unable to fill the office for which it was designed. The pollen from the replanted corn is then ready to supply the silk, and the filling is completed. He says nearly all the abortive ears, so common in all corn crops, are caused by want of pollen, and that he has known ears to double their size in this second filling."

To Make Cows Give Milk. — The agricultural editor of the *Bee-keepers' Journal* vouches for the following, handed him by a friend:—

"If you desire to get a large yield of milk, give your cow, three times a day, water, slightly warm, slightly salted, in which bran has been stirred at the rate of one quart to two gallons of water. You will find that your cow will gain twenty-five per cent. immediately under the effects of it, and she will become so attached to the diet as to refuse to drink clear water, unless very thirsty, but this mess she will drink almost at any time, and ask for more. The amount of this drink is an ordinary water-pailful at each time, morning, noon, and night. Your animal will then do her best at discounting the lacteal."

Boston Journal of Chemistry.
BOSTON, JUNE 1, 1870.

PROSPECTUS.

VOLUME V. of the JOURNAL, commencing July 1, 1870, will be increased in size, each number containing not less than *twelve pages* of reading matter. It will be printed from stereotype plates, on the finest book-paper; and we shall continue to make it the *best and cheapest scientific journal in the world.* *The terms for the* JOURNAL *will be one dollar per year; single numbers, ten cents.*

The JOURNAL will be, as it has been, independent, unbiased, careful, and reliable. No individual, corporation, or organization is rich or influential enough to suppress its opinions, or in any way control its influence. It will continue to expose frauds, schemes, and speculations, which profess to originate in or grow out of progress in science and art. The great and growing evil of *adulterations* in articles of food, medicine, fertilizers, and substances used in the arts, will receive special attention, and the nature of the sophistications and adulterations will be fully exposed. We shall present numerous useful practical formulæ, recipes, and scientific suggestions, which alone will be worth many times the price of the publication.

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It will continue to be of *special service*, as it will keep them informed of the nature of all new remedial agents, all new discoveries in chemical and medical science, all new principles or processes connected with toxicology and pharmacy.

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It will impart information upon the important subjects of the chemistry of plant-growths, and the nature and preparation of fertilizing agents.

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All intelligent readers, men and women, everywhere, the *Boston Journal of Chemistry* will supply information and instruction of the highest importance and value.

The JOURNAL has, at the present time, a large army of friends, and these we ask to aid us in extending its circulation. Our patrons know how instructive and useful it *has been* in the past: we assure them it will be even *better* in the future. Cannot each one send us a new subscriber, to commence with Vol. V.?

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To any person who will send us the name of one new subscriber, with $1.00, we will send a fine mezzotint *carte de visite* photograph of the late George Peabody. For two new subscribers, with $2.00, a *cabinet* size photograph of the late George Peabody. For three, with $3.00, one copy of the JOURNAL free for one year, or a Petite Microscope. For five, with $5.00, a set of twenty carpenter's tools in a hollow handle. For six, with $6.00, one copy of Dr. Nichols' Chemistry of the Farm and the Sea; Rolfe and Gillet's Hand-book of the Stars, Hand-book of Chemistry, or Chemistry and Electricity; or the Nursery Magazine. For ten, with $10.00, one copy of Dr. Lord's Ancient States and Empires; or Oliver Optic's Magazine; Our Young Folks; or, The Riverside Magazine. For twelve, with $12.00, Tilton's Horticultural Magazine. For sixteen, with $16.00, one copy for one year of either of the four dollar Magazines mentioned in the list following; or a * Boy's Tool Chest, thirteen inches long, eight inches wide, and eight inches high, with a complete set of Carpenters' tools, saw, plane, etc. For twenty, with $20.00, the N. Y. Journal of Psychology, or the Philadelphia Medical and Surgical Reporter. For twenty-five, with $25.00, a fine * Set of Croquet implements. For eighty, with $80.00, a * Complete set of Chemical Apparatus, suitable for all the experiments described in Rolfe and Gillet's Handbook of Chemistry. For one hundred, with $100.00, one * Cutter Clinical Microscope; or, a fine * Waltham Watch, in a silver case.

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END OF VOLUME FOURTH.

THE present issue ends the 4th Volume of the Boston JOURNAL OF CHEMISTRY. The paper was commenced in July, 1866, as an experiment, and without any expectation, on the part of its editor or publishers, of establishing a popular journal of science upon a permanent basis. But its success has been complete, and we do not hesitate to say that we believe, upon its fourth anniversary, it *has a larger circulation than any journal of its class published in Europe or in the United States.* It has, thus far, been continued under many disadvantages, which it is hoped will in a measure be overcome in the future. During the past four years, the editor, while pressed with business cares, and many exacting duties, has carried it through, almost unaided and alone. If we had not been cheered by constant words of kindness and encouragement, and by a patronage which may in all fairness be regarded as unparalleled in the history of journalism, the paper would long since have passed into other hands. Since our patrons have done so much for us, we are determined to do all we can for them. The new volume will commence under favorable auspices. Able assistance has been secured in each department, and improvements will be introduced, which we hope will prove acceptable to our readers. The JOURNAL is to be considerably enlarged, and the price will be one dollar per annum.

"PEN PALSY."

A CORRESPONDENT sends us the following extract from "Good Health," and asks our opinion on the subject:—

"We have had recently several cases of paralysis of the hand and arm, from the elbow, which have evidently been induced by the use of steel pens. One young lady who had been engaged in copying for some years, became unable to use the right hand. . . . . While Rev. Dr. Walker was President of Harvard College, he had a lame arm brought on by using steel pens."

The late President Felton, of Harvard College, stated in a public lecture that several of his acquaintances had been permanently injured by the use of steel pens. At that time, quite a number of similar cases were reported in the papers, and "Bill's anti-nervous penholder" became popular in certain quarters as a prophylactic device. This penholder differs from the ordinary kind in being made entirely of wood, so that there is no metallic "conductor" between the steel pen and the fingers. We confess that we have never seen any satisfactory evidence that the steel pen is responsible for the so-called "palsy." The thing seems very improbable, from a scientific point of view, if not impossible. We like the wooden penholders, but we have thought that the relief which the pen-paralytics have found in using them is due to the fact that, being of greater diameter than the common kind, they cramp the fingers less, while at the same time they are easier to hold, especially when the fingers perspire.

A MODEL SCHOOL FOR YOUNG LADIES.—We regard Bradford Academy, as now conducted, with its new and magnificent school building, a model of excellence in everything relating to the education of young ladies. The new structure is so complete, convenient, and elegant, that all friends of education who desire to learn regarding the nature of modern improvements in school buildings, should visit and inspect its arrangements. This building was formally dedicated May 11, when the chairman of the building committee, Dr. George Cogswell, of Bradford, delivered it into the hands of the Board of Trustees, every part having been completed. The exercises were exceedingly interesting. The cost of the structure, furniture and apparatus is about $150,000, which has been raised by private subscription. The situation of the Academy is delightful, commanding as it does a full view of the valley of the Merrimac for many miles, and also the city of Haverhill upon the opposite bank of the river. Parents who have daughters to educate, and who desire to place them where everything will be done for their health and happiness, and for their mental and moral training, should send them to Bradford Academy.

EDITORIAL NOTES.

CALIFORNIA DIAMONDS.—Diamonds have been found in several localities in California, but as yet they have been of small size and value. One, found at Cherokee Flat, was valued at fifty dollars in the rough, but that was an exceptional instance. Some maintain that diamonds may be looked for wherever gold abounds, and that the only reason why they have not been obtained more frequently in California is because the miners have not known enough to detect them. When first dug up the precious gem is covered with an opaque crust, which hides its brilliancy and its crystalline form. Such pebbles might lie in every field without being recognized. This matter is beginning to attract considerable attention in California, and if diamonds are really abundant in that region, they will not long escape the Yankee eye.

NEWSPAPER SCIENCE.—Our readers will recollect that we have several times had occasion to notice the startling statements on scientific subjects which we find in the papers of the day. A reverend writer, who, like the Bishop of Western New York, writes D. D. after his name, has been enlightening the patrons of a Presbyterian journal out West on the developments of modern science. Among the *dicta* he lays down we notice the following: "No simple substance exists in nature." It has been generally accepted as a fact that many of the chemical elements—which are "simple substances," so far as our present knowledge goes—are found uncombined in nature; but since, according to our philosophic divine, "true science is founded on *faith*" (not, of course, on *sight*), we must assume that chemists

have erred in trusting the evidence of their eyes on this point.

Again, this reverend gentleman tells us that recent geologists have demonstrated that "granite never was a metal," etc. He intimates that the contrary view has been an accepted "geological dogma," but we have never happened to meet with it. The worthy Doctor is right, however, in rejecting it. The non-metallic character of granite may be considered as settled beyond a doubt. We have the impression that the honor of this discovery belongs to the eminent chemist who, as we stated in our last number, has proved that the electric light is "essentially different" from the calcium light. With what new thing in science he will *next* astonish the world, we will not presume to predict.

The *Panama Mail* quotes the following from *El Siglo*, a Mexican journal, of March 2d, 1870: —

"The Panama Railroad Company has found itself compelled to double the force of its telegraphic batteries, on account of it being the custom of the monkeys — so numerous in that part of the world — to congregate and practise gymnastic exercise upon the telegraph wires. It is believed that the shock will be so strong that there will not be an acrobat in those woods able to resist its effects."

We regret that the writer does not inform us what kind of batteries are used on that line. They must be very different from anything employed for telegraphic purposes in this part of the world, if, when "doubled," or multiplied to any extent, they can send a current over the wires which a monkey of acrobatic proclivities cannot withstand. Or, are the quadrumanous gymnasts of the Isthmus peculiarly sensitive to the "shocking" effects of current electricity administered in that way?

A New Use for Jute. — Not long ago, at Liverpool, a hundred bales of jute were purchased for shipment to America, for the purpose of being dyed and sold as "ladies' back hair." It is said that it was not a single instance of the kind. If we may believe what we are told concerning the quality and condition of some of the foreign *hair* imported for a similar purpose, the substitution of jute would be preferable as "a choice of evils."

This vile fashion of wearing false hair was introduced into England only about three centuries ago; in 1572, according to the old chronicler Stow. Shakespeare appeared to have had a great antipathy to the practice. In the *Merchant of Venice* (iii. 2) Bassanio includes it among the shams that deceive the world: —

"So are those crisped snaky golden locks,
Which make such wanton gambols with the wind
Upon supposed fairness, often known
To be the dowry of a second head;
The skull that bred them, in the sepulchre."

In *Love's Labor Lost* (iv. 3), Byron says: —

"O, if in black my lady's brows be deck'd,
It mourns that painting, and usurping hair,
Should ravish doters with a false aspect."

See also *Timon of Athens* (iv. 3): —

"Thatch your poor thin roofs
With burdens of the dead."

In the sixty-eighth Sonnet he refers to the good old times,

"Before the golden tresses of the dead,
The right of sepulchres, were shorn away,
To live a second life on second head, —
Ere beauty's dead fleece made another gay," etc.

Decidedly Cool. — Herr Rudorff has been making experiments upon the refrigerating powers of certain salts, and the most remarkable appear to be the sulpho-cyanides of ammonium and potassium. Of the former 133 parts added to 100 parts of water reduced the temperature from 12° C. (53.6° F.) to —18° (almost exactly *zero* F.); and of the latter 150 parts added to 100 of water sent the mercury down from 11° C. (51.8° F.) to — 24° C. (—11.2° F.) The salts should be in a fine powder, and be stirred into the water by a glass rod, and the water should be contained in a thin glass vessel surrounded by loose cotton.

The State Board of Health. — The London *Lancet* speaks with much admiration of the Massachusetts Board of Health, quotes at length from the opening address of its chairman, remarks the comprehensive views of American Legislatures as shown in the founding of such a board, and commends several of the features and plans of the organization to the imitation of English sanitarians. The *Advertiser* hopes that the proposition to extinguish this Board after six months' work will never be heard of in London. Fortunately for the honor and the welfare of the State, this backward step was not taken.

Counterfeit Worcestershire Sauce. — Three men have been arrested in Philadelphia for making a counterfeit of this English sauce. The sales of the genuine article in this country amount yearly to about a quarter of a million of dollars, but it is said that those of the counterfeit greatly exceed that amount.

Coffee and Civilization. — It has been said that the relative civilization of a country may be measured by the amount of coffee which it consumes. That is going rather far, perhaps, but there can be no doubt that there is some ground for the opinion. A New Orleans journal finds a confirmation of this in the fact that the negroes of the South have come to use a good deal more coffee since emancipation compelled them to *think* as well as work.

The Air as Affected by Cities, etc. — In an official report Dr. Angus Smith, who is Inspector under the British Alkali Act, gives much interesting information as to the effect of large cities, and especially of manufactories, in contaminating the atmosphere. His principal conclusions are as follows: —

"The rain from the sea contains chiefly common salt, which crystallizes clearly.

"The sulphates increase inland before large towns are reached.

"The sulphates rise very high in large towns, because of the amount of sulphur in the coal used, as well as decomposition.

"When the air has so much acid that two or three grains are found in a gallon of the rain water, or forty parts in a million, there is no hope for vegetation in a climate such as we have in the northern parts of the country.

"Free acids are not found with certainty where combustion or manufactures are not the cause.

"In Manchester, in 1867, the maximum acidity of the rain was 7.39 grains per gallon, and the minimum 0.31 per gallon."

Cologne Cathedral. — *Every Saturday* (which grows better and better with every number) gives an admirable double-page picture of Cologne Cathedral, as that "perfect flower of Gothic architecture" will be when completed. It is *not* already completed, as the paper intimates; so that Satan — who, according to the old legend, vowed that it should never be finished — is not baffled yet. In 1848, when, on the six-hundredth anniversary of the beginning of the work, the nave of the church was dedicated, many English and American papers stated that the edifice was complete. But the two lofty spires had not then risen above the roof, and, though the work has been going on steadily ever since, they are still some two hundred feet short of their intended height, which is five hundred feet or more.

The First Printing in America. — Every year or two the following statement goes the rounds of the papers: "The first printing in America was done at Cambridge, Mass., in 1639." It has just now started on its travels, and appears likely to make the usual circuit of the literary world without being challenged. As it is not true, we feel bound to show it up. The first book printed in *America* was done at Mexico, in the year 1544, and was entitled *Doctrina Christiana para los Indios.* The first printing in *British* America was at Cambridge, in 1639, when an almanac and the *Freemans Oath* were issued. The first *book* published in the Colonies was printed the next year (1640), and is known as "The Bay Psalm Book." It was a metrical version of the Psalms, prepared "for the use, edification and comfort of the saints, in public and in private, especially in New England."

Poetry had been written, though not printed, in New England at even an earlier date. The Reverend William Morrell, who came to Plymouth in 1623, and returned to London the next year, wrote a poetical description of the new country *in Latin.* The first verses in English by a colonist were probably written about 1630. The author's name has been lost. They begin thus: —

"*New England's annoyances, you that would know them,*
Pray ponder these verses, which briefly do show them.
The place where we live is a wilderness wood,
Where grass is much wanting that's fruitful and good:
Our mountains and hills and our valleys below
Being commonly covered with ice and with snow:
And when the northwest wind with violence blows,
Then every man pulls his cap over his nose:
But if any's so hardy and will it withstand,
He forfeits a finger, a foot, or a hand.
. . . .
Instead of pottage and puddings, and custards and pies,
Our pumpkins and parsnips are common supplies;
We have pumpkins at morning, and pumpkins at noon;
If it was not for pumpkins, we should be undone."

We do not know that antiquarians have traced the phrase, "some pumpkins!" so far back as these old colonial times, but it is evident that it would have been peculiarly significant in a day when the fate of the Commonwealth depended upon that homely vegetable, if we may believe this bucolic minstrel.

Oxygen and Combustion. — A newspaper writer says: "Strange as it may appear, considering its universal connection with combustion, — as that phenomenon is known outside of the laboratory, — oxygen, of all created elements, is the only one that will not burn!"

Since ordinary combustion consists in the union of the burning substance with oxygen, the latter really burns as well as the former. We commonly speak of the oxygen as a *supporter of combustion* and of the other body as a *combustible*, but the distinction, though convenient, is a wholly arbitrary one. A jet of oxygen may be made to burn in an atmosphere of coal-gas, just as a jet of coal gas burns in oxygen or in the air. In either case, the burning takes place where the two come together, both are burned, and of course both are supporters of the combustion. But even if we take the above statement as the writer meant it, there are "created elements" (nitrogen, for instance) which will no more burn than oxygen will.

Protection of Lead Water Pipes. — A paragraph is going the rounds of the scientific journals and the newspapers generally, to the effect that Dr. Schwarz, of Breslau, has found a simple way of protecting lead pipes from the action of water, by forming on their inner surface an insoluble sulphide of lead. This is done by filling the pipes with a warm and concentrated solution of sulphide of potassium or of sodium, which is left in contact with the lead for about fifteen minutes. This may be a new thing in Breslau, but more than two years ago we suggested in the Journal a similar process as, on the whole, the best that we knew for the purpose. The directions we gave were as follows: dissolve one pound of sulphide of potassium in two gallons of water, and let it remain in the pipe twelve hours, or until the inside is thoroughly blackened. The same recipe was given in Rolfe and Gillet's "Handbook of Chemistry," published in 1868. The use of a warm saturated solution, as Dr. Schwarz directs, would do the work in shorter time, which might be more convenient in some cases.

LITERARY NOTES.

W. J. Holland, of Springfield, Mass., has published *Personal Beauty, how to preserve it in accordance with the laws of health, by D. G. Brinton, M. D., and Geo. H. Napheys, M. D.* If every young lady and gentleman in the United States who desires to be *beautiful* should buy this book, the publisher and authors would receive a generous compensation for their labors. We have examined the work quite carefully, and are free to say that it is a very interesting and useful treatise. It is written, or compiled, by two cultivated and distinguished physicians of Philadelphia, and whatever they are willing to associate their names with, must be reliable and worthy of attention. The work treats upon matters connected with sanitary rules, medicines, cosmetics, the symmetry of the human figure, the literature of beauty, etc., and is quite exhaustive upon these topics.

Henry C. Lea, of Philadelphia, sends us *Tanner's Manual of Clinical Medicine, revised and enlarged by Dr. Tilbury Fox.* It is a *handy book* for the practitioner, and contains in a small space a large number of facts and suggestions of the highest usefulness. All modern discoveries and improvements in medicine and surgery are treated of in its pages.

Messrs. Charles Scribner & Co., of New York, have recently published a work upon *American Political Economy* by *Prof. Francis Bowen*, of Cambridge. The judgment we may form of a work of this nature is hardly worthy of consideration, as it treats of a department of study and research considerably removed from that which we have been led to investigate; but there is evidence in the book that much thought and study have been bestowed upon it. It will undoubtedly be of interest and value to the political economist.

The same publishers have issued two more volumes of their "Library of Wonders," which we have so often commended, — *Wonders of Italian Art* and *Wonders of the Human Body*. The latter is a popular manual of physiology, well written and well illustrated. Two more volumes of the very neat and cheap edition of Froude's *History of England* are now ready.

Hours at Home promises, for its June number, a paper on "Sun Spots," by the lady astronomer, Miss Maria Mitchell.

The Rural Carolinian is an excellent monthly magazine, published by Messrs. Walker, Evans, & Cogswell, at Charleston, S. C., for two dollars a year. It well deserves the success it appears to be winning.

The American Supplement of the reprint of the *Chemical News*, published by W. A Townsend & Adams, New York, is to be doubled in size. This supplement, edited by Prof. C. F. Chandler, adds not a little to the interest and value of the journal.

The Five-cent Metric Standard. — We are informed that the five-cent coin, which our Uncle Samuel has issued as a popular standard of the metric system, is by no means of uniform weight. A correspondent, who has weighed a good many of them, finds that different specimens vary as much as three grains. In one instance thirty-nine heavy ones balanced forty light ones. "Undoubtedly," as he remarks, "the intention was to make the new coinage a key to the metric system of weights and measures, but it is evident that accuracy has not been obtained."

The apparent variation in the *diameter* of the coin we have explained in a former number of the Journal.

Medicine.

ON THE SLEEP PRODUCED BY CHLORAL.

We have not seen any observations regarding the *nature* of the sleep resulting from the use of the hydrate of chloral, yet it is a point of much interest, and worthy of study. In the numerous experiments made with the agent in our own case, and from experiments made upon others, we are led to think that the sleep is peculiar, certainly unlike natural sleep in its general influence upon the system. It is doubtful if the recuperative action upon the brain in a large degree corresponds with it. The curtain of the mind seems to be fully drawn; there is no dreamy condition, nothing akin to somnolentia, in the sleep produced by chloral. The insensibility, although apparently entire, is less profound than in healthful, natural sleep. A slight noise awakens the patient, and the wakefulness is perfect, although it may not last but for a moment. At one time, having taken 30 grains of the agent, and fallen asleep, a loose blind moved by the wind thumped against the house. The awakening was instantaneous and complete; no lingering drowsiness was felt, and yet in perhaps half a minute insensibility was resumed. The sleep has no interval, or season of insupportable drowsiness; there is no swaying to and fro, between the conscious and unconscious condition; sleep comes like the sudden darkness when a bright light is extinguished in a room in the night-time. If sleep is simply the suspension of the operation of the senses, if it is nothing but unconsciousness, then we have no difficulty in defining the exact influence of chloral; but we incline to the opinion that in natural sleep there is a peculiar physical or mental condition existing independent of the insensibility. The morning after a night of sleep induced by chloral, there is no headache, no nausea, no unpleasant feelings whatever, but an indefinable sense of lightness, an exhilaration, which is not like that produced by stimulants. The impression is that there has been a pleasant state of unconsciousness without or with imperfect sleep. The body and the mind are *refreshed*, but not, in kind or degree, like that which results from natural, healthful slumber. It may be that chloral does not positively produce sleep, but a prolonged, peculiar anæsthesia, which serves many of the purposes of sleep. Manifestly, we know at present but little regarding the precise nature of the effects produced upon the functions of the mind and body by this drug. We know enough, however, to feel convinced that it is a most important addition to materia medica, and that it is better calculated to relieve a large class of suffering patients than any agent hitherto suggested.

PHYSIC IN FRANCE.

We glean a few items from the recent French correspondence in English journals.

Chloral is still in great favor with the Paris doctors. The amount used is considerable, as doses varying from half a gramme (7.7 grains) up to three and four grammes are given. In one case, three doses of four grammes each were given during one night; but the patient hasn't woke up yet.

Among novelties in trade, we note artificial manna, clean, white, and not easily distinguishable from the natural product; and artificial linseed-meal or marshmallow poultices, which promise to have a large sale.

The Frenchman wants but little physic here below, but wants that little nice. Hence the utmost skill of the pharmacist is exerted to make medicine palatable, if not positively delicious; and the result is all sorts of syrups, wines, elixirs, granules, and purgative lemonade, as refreshing as one would get at a *café* on the Boulevards. A delicately flavored draught often proves very profitable to the maker, for, like a good brand of wine, it soon becomes famous with epicurean invalids. Americans, who, like Britons, are much addicted to medicine, even in the nauseous forms in which it is furnished them at home, indulge in it extravagantly when they find it "not bad to take," and are therefore the best customers of the Parisian *pharmaciens.*

The *shops* of the apothecaries in France are very much inferior to those in England, and to ours. With a very few exceptions in Paris, they are small, meanly furnished, and dirty.

St. Claire Deville and some other scientific men have been trying experiments upon the degree of atmospheric pressure that a man can endure. They lately invited a company of friends to take breakfast with them in a boiler, under a pressure of three atmospheres, but were glad to open the safety valve before the meal was finished.

THE ORIGIN OF BLOOD-LETTING.

According to Pliny, the practice of blood-letting had its origin in Egypt. He tells us that the hippopotamus, when it becomes too fat and unwieldy, bleeds itself by pressing a vein of the thigh against a pointed reed; and that physicians took the hint of the operation from the corpulent pachyderm. The story has been laughed at as a mere fable without even the semblance of a foundation; but modern naturalists have observed on the skin of the hippopotamus a red exudation, which might easily be taken for blood. This fact may be considered as a confirmation, or, at least, as an explanation of the Egyptian story. As Dr. Lankester has suggested, either the Egyptian priests saw this red exudation, and imitated it with the practice of bleeding, or the Egyptian laity noticed the blood-colored sweat, and connected it with the practice of bleeding then in vogue, because they "could not understand that their wise men could discover a remedy untaught."

The red sweat of the river-horse is *not* blood, but merely perspiration colored by a pigment secreted in the skin. It has been examined with the spectroscope, and does not give a blood spectrum; and with the microscope, which shows no blood corpuscles, while it does show other corpuscles with pigmentary granules.

CHIT CHAT.

HERE is a quaint anecdote from the biography of Dr. Marshall Hall. Dr. Wilkins had lent Dr. Hall the well-known book, "Body and Soul," and as it was not returned in due time, he sent this note: "Dear Doctor, do send back my body and soul; I cannot exist longer without them." The servant who received the note read it (as servants sometimes will), and horror-stricken rushed into the kitchen, crying, "Cook, I can't live any longer with the Doctor!"—"Why, what's the matter?" "Matter enough," replied the man; "our master has got Dr. Wilkins's *body and soul*, and I don't dare to stay where there are such goings-on!"

What Dr. Hall says of *strychnia* is not bad: "Its least action is that of an invaluable spinal tonic; its mean action is that of an invaluable spinal stimulus, terrific in its effects; its most violent action is that of the thunderbolt!"

As good an instance of "sharp practice" as we have ever heard of, was that of David Phillips, in Ohio, who was acquitted of the murder of a man, on a plea of insanity. He had secured his lawyers by giving them a mortgage on his farm, but now repudiates the mortgage, on the ground that he *was insane when he made it*, according to the showing of these same lawyers!

The difference between rheumatism and gout was forcibly, if not scientifically, stated by the Frenchman who said: "Place the joint in a vise and screw it up until you can endure it no longer; that is rheumatism. Then give the instrument another twist; that is gout." And yet an English writer gives it as a fact, that some people are anxious to have the gout, because they think it fashionable!

A correspondent of the *Michigan University Medical Journal* suggests that hydrate of chloral was the drug which the friar administered to Juliet. Note what Shakespeare makes him say of it:—

"Take thou this phial, being then in bed,
And this distilled liquor drink thou off;
When presently through all thy veins shall run
A cold and drowsy humor, which shall seize
Each vital spirit.
And in this borrowed likeness of shrunk death
Thou shalt remain *full two and forty hours,*
And then awake as from a pleasant sleep!"

ALCOHOL AND ANIMAL HEAT.

PROF. BING, of Bonn, has been investigating the influence of alcohol upon animal heat, and the conclusions at which he has arrived are as follows:—

"That the heat of the body is always lowered by alcohol, and that alcohol preserves life in febrile affections, where the temperature rises very high, by its antipyretic properties.

"That extreme depression of the vital powers in febrile cases is most frequently dependent upon the temperature of the blood, and passes off when it falls.

"That the number and strength of the contractions of the heart always rise under the use of alcohol. Whenever, therefore, such an effect would be injurious, alcohol would be an improper remedy.

"That in all probability alcohol lowers the temperature, by the retarding influence which it exerts over the oxidizing process."

WRITING PRESCRIPTIONS.

DR. MONOD, in the *Bulletin de Thérapeutique*, urges physicians to use no abbreviations or figures in writing prescriptions, but to write everything out in full. Instead of

Tinct. op. deod., f℥iss,

he would have

Deodorized tincture of opium, one-and-a-half fluid drachms.

He adds: "I am certainly not the first to express the wish that prescriptions be written so as to avoid errors; God grant that I be the last." To which if there were any hope of it, we would say, Amen!—*Phila. Med. and Surg. Rep.*

MEDICAL LATIN.

THE constant use of the dog-Latin of prescriptions appears to make some of our medical brethren oblivious of the purer Roman tongue as they learned it in their student days. We have seen in several instances *per oram* for *per os*, and the leading article in a Western medical magazine, for April, has for its motto "*Cano Arma et Viri*,"—a perversion of the familiar *Arma virumque cano*, which is worse in its way than Punch's recent translation of the same, "Our arms and strength are in the cane."

AN EXPLOSION.—A druggist in Massachusetts writes, that in attempting to rub up in a wedgwood mortar a mixture of four parts of chlorate of potassa and one of tannin, he got an explosion which blistered his hands, and did considerable other damage. It is quite probable that in the mortar, or in one or both of the ingredients, sulphur was present, which forms with chlorate of potassa a detonating compound dangerous to prepare. The two articles named would not, when mixed, spontaneously explode.

MEDICAL PROPERTIES OF EGGS.—The white of an egg has proved of late the most efficacious remedy for burns. Seven or eight successive applications of this substance soothe pain and effectually exclude the burn from the air. This simple remedy seems preferable to collodion, or even cotton. Extraordinary stories are told of the healing properties of a new oil which is easily made from the yolk of hens' eggs. The eggs are first boiled hard, and the yolks are then removed, crushed, and placed over a fire, where they are carefully stirred until the whole substance is just on the point of catching fire, when the oil separates and may be poured off. One yolk will yield nearly two teaspoonfuls of oil. It is in general use among colonists of South Russia as a means of curing cuts, bruises, and scratches.

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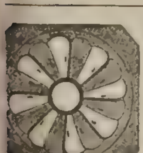

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(See Fig. 15.)

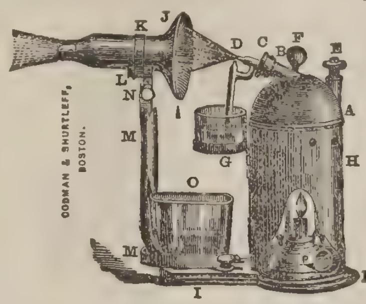

Fig. 15. The Complete Steam Atomizer. For Inhalation, &c.
Pat. Mar. 24, 1868, and Mar. 16, 1869.

It consists of the sphere-shaped brass boiler A, steam outlet tube B, with packing box C, formed to receive rubber packing through which the atomizing tube D passes, steam tight, and by means of which tubes of various sizes may be tightly held against any force of steam, by screwing down its cover while the packing is warm; the safety valve E, capable of graduation for high or low pressure by the spring and screw in its top, the non-conducting handle F, by which the boiler may be lifted while hot, the medicament cup and cup-holder G, the support H, iron base I I, the glass face-shield J, with oval mouth-piece connected by the elastic band K with the cradle L, whose slotted staff passes into a slot in the shield-stand M M, where it may be fixed at any height or angle required by the milled screw N.

The waste-cup, medicament-cup, and lamp are held in their places in such a manner that they cannot fall out when the apparatus is carried or used over a bed or otherwise.

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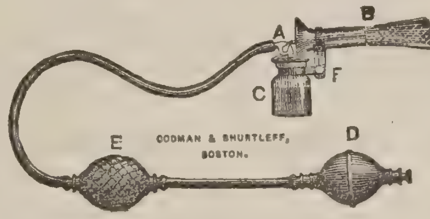

Fig. 5. Shurtleff's Atomizing Apparatus. (Patented March 24, 1868.)

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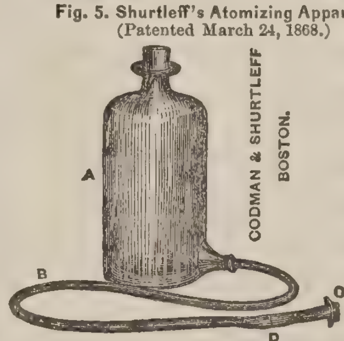

Fig. 6.—Nasal Douche. With Two Nozzles,—$2.00.

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WITH HIS FORMULÆ.

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LIGHTNING-RODS.

There is much doubt felt and expressed by owners of buildings respecting the full measure of protection alleged to be secured by the use of "lightning-rods." It is asserted by many that the hazard is increased by the employment of rods, and that more buildings are injured with than without them. Of course these opinions and prejudices are entertained by those who do not claim to have any special knowledge of electrical science, but are influenced by what they hear and read. The confusion and doubt which prevail are largely due to the absurd statements and claims of a class of men known as "lightning-rod peddlers," who, at the commencement of every warm season, start out from our cities with wagons filled with rods of iron, copper, steel, etc., and bushels of glass "insulators," "gold-tipped points," and all kinds of strange and whimsical devices to excite the wonder and secure the confidence of the people in the rural districts. These men are drilled by their employers, the owners of new patents, to talk glibly about "electrical fluids," "discharges," "insulation," etc., and to depreciate every device but their own. Many house-owners have been so influenced by these charlatans, as to be led to remove from their buildings rods to the extent of a half dozen different kinds in the course of as many years. The expense, annoyance, and doubt thus created are detrimental to the interests of property holders and to the cause of correct science. The careful decisions of science at the present time respecting lightning-rods, may be presented as follows:—

1st. Rods correctly constructed and applied to buildings afford nearly, if not quite, perfect protection.

2d. The kind of rod most efficient is essentially like the one which was suggested by Dr. Franklin nearly a hundred years ago, and which is now often seen upon old buildings. It is made of iron, from three quarters of an inch to an inch in diameter, and is continuous, without joints, "insulator" attachments, or a multiplicity of "points." This rod can be made by any blacksmith, and put up without assistance from peddlers or lightning-rod patentees. It may be fastened to the building by iron eyes, painted black to preserve from rust, and have a sharp platinum point for a termination above the chimney, or gable. One is enough for an ordinary sized house; for large buildings, like barns and stores, two may be used.

3d. The earth connection of the rod is a *very important* matter. If there are gas or water pipes near the building, have the rod securely fastened to a band of copper, and let this pass around the iron pipe. If there are no pipes at hand, have the rod terminate in a well, or if that is not accessible, dig a deep hole in the earth, so as to reach permanent moisture, pour in a bushel of charcoal, and carefully bury the end of the rod in this. Three or four copper, points may be affixed to the end, radiating horizontally. This form of conductor accords with the principles of electrical science as at present understood.

ABOUT QUICKSILVER.

In adapting material things to the uses of man, it was doubtless regarded as necessary that one mineral substance should be constituted so as to remain in a *liquid* state under all ordinary conditions. The metal thus provided for us is quicksilver or mercury. We remark that it is liquid under *ordinary* conditions of temperature, for it should be understood that under extraordinary conditions, *all* metals are liquid. It is well known that the atoms of iron, steel, copper, platinum, etc., which are associated in heavy, refractory masses, are not so immobile, or fixed, as they appear to be, for when submitted to high temperatures they run like water. Subject quicksilver to a temperature sufficiently high to render iron *liquid*, and it instantly becomes *vapor*, and will float away like steam. Iron, when subjected to a heat capable of liquefying platinum, will itself become vaporized, and platinum in its turn is vaporized by a higher heat, and so all the metals are physically changed under the influence of heat. There is not a solid substance upon our globe, not a mineral or metal, that has not existed probably for millions of years in the aeriform state, a condition resembling steam or air. If quicksilver is carried within the Arctic Circle, it no longer remains liquid, but becomes solid, and can be hammered, like lead or copper. The ordinary temperatures under which man flourishes upon our planet, are alone favorable to the existence of this singular liquid metal. Is not design clearly discernible in this? Is it not clear, in order that certain arts and art processes of benefit to the race should be established and carried on with facility, that a heavy, dense, liquid metal, like quicksilver, was needed? Possibly the world *could* have got along without it. Our non-mercurial barometers and thermometers might have been invented, the photographic process discovered, and impalpable gold dust separated from its parent rock through some other agency. It must be admitted, however, that quicksilver has served an important, if not indispensable end, in originating and perfecting these instruments and processes. There are plenty of pretentious charlatans, who are busy declaiming against its usefulness or safety in medicine; but, nevertheless, mercury *is* a most important therapeutical agent. Like all good things, its employment, if directed by ignorance or carelessness, may result in injury rather than benefit; but wisely and judiciously used, it subserves important curative ends,—ends hardly reached by any other known agent. The popular prejudice, engendered by designing quacks, against the use of mercury in medicine, is not founded upon justice or intelligence.

The amount of quicksilver which the various mines of the world are capable of furnishing is very large,—much larger than is demanded for any purposes to which it is at present applied. The quicksilver mines of California alone could furnish fifty times more than is consumed in the whole world, and the same may be said of the old Almaden mines of Spain. The discovery of a new quicksilver mine in the United States, no matter of what extent or richness, would possess but little more value than that of a common clay bed, if it was attempted to be worked in competition with existing mines in California and Spain. The price would immediately run down to a point so low, that its extraction must cease. At present the quicksilver trade of the world is substantially an armed truce between Spain and California. By a kind of tacit understanding between the controllers of the products from the two sources of supply, Spain is allowed to furnish the London market and nearly the whole of Europe. Until within a few years it had the great Chinese market also, but California, by adroit management, has driven Spain out of the Celestial Empire, and now claims that as her territory. In the present attitude of the trade, if California should ship 10,000 flasks to London and offer it at a reduced price, Spain would ship 10,000 to New York and

down would go the price there. On the other hand, if Spain sends a ship-load to New York, California goes to London, and so very shortly the whole business would end in ruin. To maintain remunerative prices, there must be but a limited amount distilled, and there must be special markets for the products of the two rival mines. We have spoken of California as if possessed of but a single mine. This is not to be understood as literally true. California has several mines of considerable importance, but the operations of the one known as the "New Almaden," are much the most extensive. Great as are the resources and wealth of the New Almaden quicksilver mining company, they could not continue business for a single year, if they did not accede to a combination with the weaker New Idria and Redington companies. This combination now controls the production and price of quicksilver, and when they agree that it shall go higher or lower, it fluctuates accordingly. It is, however, for their interest to keep the price uniform, and not unreasonably high, and so there is found but little variation in quotations in the great central markets.

The total annual supply from California is not far from 50,000 flasks, or about 3,000,000 pounds. This is used in metallurgy, manufacturing, and art processes. The largest quantity is used by the gold miners in the amalgamating process at the various mines. A considerable amount is used by manufacturing chemists in preparing calomel, "blue pill," mercurial ointment, and various mercurial salts and plasters. The Chinese make from quicksilver that beautiful pigment, *vermilion*, which is so largely employed by painters and colorers, in all parts of the world. It is singular that this half-civilized people are able to prepare a chemical compound from quicksilver, which is superior to, and which commands a higher price than the same salt produced in Europe and the United States, where the arts are carried to the highest perfection. English and American vermilion, as found in the market, is far inferior in brilliancy and quality to the Chinese.

One of the most curious properties of quicksilver is its capability of dissolving or of forming amalgams with other metals. A sheet of gold foil dropped into quicksilver, disappears almost as quickly as a snow-flake when it falls into water. It has the power of separating or of readily dissolving those refractory metals which are not acted upon by our most powerful acids. The gold and silver miners pour it into their machines holding the powdered gold-bearing quartz, and although no human eye can detect a trace of the precious substances, so fine are the particles, yet the liquid metal will hunt it out, and incorporate it into its mass. By subsequent distillation it yields it into the hands of the miners, in a state of virgin purity. Several years ago, while lecturing before a class of ladies upon chemistry, we had occasion to purify some quicksilver, by forcing it through chamois leather. The scrap remained upon the table after the lecture, and an old lady, thinking it would be very nice to wrap her gold spectacles in, accordingly appropriated it to this purpose. The next morning she came to us in great alarm, stating that the gold had mysteriously disappeared, and nothing was left in the parcel but the glasses. Sure enough, the metal remaining in the pores of the leather had amalgamated with the gold, and entirely destroyed the spectacles. It was a mystery, however, which we could never explain to her satisfaction. There is much that is interesting in the history and nature of quicksilver, but we have not space at present for its further consideration.

THE STEREOSCOPE.

A FRIEND, who was interested in the article on the stereoscope in our February number, has sent us a well-written communication in which he discusses certain points in the theory of the instrument more fully than we did. To insert it, however, would be giving more space to the subject than we can afford at present. In these brief papers on "familiar science," an exhaustive treatment of any topic would be impossible. All that we aim to do, all that we *can* do within the limits we fix for ourselves, is to give the main facts and principles in a familiar way. To attempt more would be to defeat our own purpose, which is to interest and instruct the many who have had no special training in even the elements of science. We address unscientific readers, not scientific students. If, as not unfrequently happens, these familiar outlines of a subject awaken a desire to know *all* about it, we have simply prepared the way for a more thorough course of scientific reading or study. If the inquirer wants us to refer him to the best *books* for his purpose, we are always happy to do so, but we cannot make the JOURNAL a substitute for the books.

In reply to those who have asked us what *form* of stereoscope is best for common use, we would say that the one devised by Dr. Holmes, and improved by Mr. J. L. Bates, of Boston, is unquestionably superior to any other pattern. A little more than a year ago, one of these instruments got into English hands, and was exhibited at the meeting of a photographic society in London as "a very ingenious stereoscope of American manufacture, combining completely all the excellences of the most expensive instruments." The *British Journal of Photography* devoted two articles and a cut to the "Yankee notion," but the editor evidently had not heard who invented it. This was rather funny, as it had been familiar in this country since 1861. In July of that year Dr. Holmes referred to it in an admirable article on "Sun Painting and Sun Sculpture," in the *Atlantic Monthly;* and a detailed history of it may be found in the *Philadelphia Photographer* for January, 1869, in a racy letter from the "autocrat" drawn forth by this British "discovery" of his seven-year-old invention.

As neither Dr. Holmes nor Mr. Bates took out patents for their improvements in the stereoscope, this form of the instrument is now made by many parties. Owing to the use of bad lenses, or bad adjustment of tolerable ones, not a few of these instruments are regular "eye-twisters." A perfect stereoscope should cause no more trouble to the eyes than looking through good window-glass.

Occasionally we meet with stereographs, the halves of which are misplaced — the right-hand picture put on the left side, and *vice versa*. If the reader remembers what we said in our former article concerning the difference between the two pictures, he will readily see that they are misplaced if he examines them closely. In such a case, of course, he has only to cut the stereograph in two, and transpose the halves.

FORCE, THE EQUIVALENT OF MATERIAL MOTION.

THAT the chemical molecules of all substances have a definite and determinable motion which is the source of that form of force which we call heat, is sufficiently evident from the law of *Petit* and *Dulong*, which, when the necessary eliminations are made, may be regarded as rigorously exact, and is therefore accepted as the basis of a *mechanical theory of heat;* the law may be announced as follows: —

The specific heat of all substances multiplied by their respective atomic weights is a constant quantity.

If we accept the sensation of heat as the manifestation of otherwise inappreciable molecular motions, it is not difficult to form a rational conception of it as a form of force readily convertible into sensible motion, or mechanical force. And as, through the agency of the steam-engine, heat is now employed as the principal motive force throughout the civilized world, and, moreover, as heat and light are the motive forces from which result all, or nearly all, *natural* phenomena which come under our observation, including the growth and decay of vegetable and animal organizations, it is interesting to trace the material motion of which they are the indications, through the whole, or even through a part of its cycle of changes.

It would obviously be absurd to attempt to assign a rational *cause* for the *origin* of matter; and in like manner it would be absurd to attempt to assign a cause for the *initiation* of motion. We accept the existence of both matter and motion as a primal fact, and cannot imagine as possible either their coming into existence or their going out of existence. Visible matter may, and frequently does, escape ordinary observation, and may yet be proven to be present and undiminished in quantity; and in like manner sensible motion may disappear and yet, from the principle of the conservation of forces, we *know* that it continues undiminished in quantity.

The essential characteristic of matter is *inertia*, and its universal condition is *motion*. It follows from the conservation of forces that the same amount of motion that now exists in the universe, always existed, and always will exist. Contiguous portions of matter may be *relatively* either in motion or at rest, yet the sum-total of motion is, and forever must be, invariably the same.

The recognition of a universal non-gravitating ether which is capable, as the luminiferous ether is known to be, of imparting motion to, and of receiving motion from, the molecules of ponderable matter, enables us to comprehend the *apparent* annihilation of motion, and to understand that

what appears to be destruction of motion is only a transfer from a tangible form to an intangible form of matter.

When, for instance, the atmosphere radiates its heat into space, the motion which constitutes the heat is not *destroyed* or lost, but is transferred to the universal ether in space; and as the tension of this universal ether is so great that a wave is transmitted through it with a velocity of two hundred thousand miles per second, it is obvious that no amount of local radiation to it can sensibly affect the *amount* of motion, in even a limited portion of the ether, for any considerable period of time.

Not only is the ether which pervades infinite space eternally in motion, but the molecules which constitute every form of tangible matter, as we have already remarked, are proven to be in constant and rapid motion among themselves, each substance having molecular motion peculiar to itself. Two substances having dissimilar molecular motions may therefore be brought in contact so that their molecular motions shall *interfere*, and a compound molecule will result, the motion of which will be *less* than the sum of the motions of its constituents. This difference of motion is *not* so much motion *destroyed*, but it is so much motion *transferred* to the surrounding medium, and manifests itself in the form of heat in contiguous bodies. And this heat, if developed in a suitable body, as in aqueous vapor, for instance, or in any permanent gas, may, through the agency of the steam-engine, be converted into mechanical force; or, through the agency of vegetable or animal organizations, into the *vital* forces.

All forms of force, therefore, or at least the mechanical and vital forces, result from molecular motion, and are the equivalents of the *inertia* of the molecules multiplied into their *velocities*.

J. E. Hendricks.

Des Moines, Iowa.

HENRY CAVENDISH,

OR HOW A CHEMIST LIVED AND DIED.

A correspondent of the *N. Y. Observer* gives some interesting facts concerning that great but eccentric philosopher, Henry Cavendish. He was the son of an English nobleman, born in 1731, and living a retired life, known only by such men as Sir Humphrey Davy and Lavoisier, and to them only by his brilliant discoveries, and on his death leaving more than a million sterling to his relatives. We make the following extracts from the article in the *Observer*: —

HOW HE LIVED.

"Cavendish House still stands in Clapham, and when the writer visited it, twelve years ago, remained as its owner left it nearly half a century before. In external appearance it was the mansion of an English gentleman. One sees a thousand like it. But to its arrangements within, the whole world could not, perhaps, furnish a parallel. Anvils and forges, files and hammers, grindstones and tempering troughs, furnaces and huge bellows, had converted the paneled and wall-frescoed drawing-room into the shop of a blacksmith. In the spacious dining-room chemical apparatus occupied the place of furniture. Electrical machines, Leyden jars, eudiometers, thermometric scales and philosophical instruments, were distributed through the chambers. The third story, save two bedchambers — one for the housekeeper, the other for the footman — had been fitted up for an observatory. The lenses and achromatic glasses, tubes and specula, concave mirrors and object prisms, and the huge telescope peering through the roof, were still there as their owner had left them. Furniture there was not. All appliances of housekeeping were absent. Comfort, as we understand it, was no element of life in Cavendish House. It was the residence, simple and pure, of a philosopher. It is said of the eccentric occupant that he was so shy of the female sex as instantly to dismiss any chambermaid who appeared in his presence, and that he ordered his dinner daily by a note to the housekeeper left on the hall table.

"At the age of forty, a large accession came to his fortune. His income already exceeded his expenditure. Pecuniary transactions were his aversion. Other matters occupied his attention. The legacy was, therefore, paid in to his bankers. It was safe there, and he gave it no more heed. One of the firm sought to see him at Clapham. In answer to the inquiries of the footman as to his business, the banker replied that he wished to see Mr. Cavendish *personally*. 'You must wait, then,' responded the servant, 'till he rings his bell.' The banker tarried for hours, when the long-expected bell rang. His name was announced. 'What does he want?' the master was heard to ask. 'A personal interview.' 'Send him up.' The banker appeared.

"'I am come, sir, to ascertain your views concerning a sum of two hundred thousand pounds placed to your account.'

"'Does it inconvenience you?' asked the philosopher. 'If so, transfer it elsewhere.'

"'Inconvenience, sir? By no means,' replied the banker; 'but pardon me for suggesting that it is too large a sum to remain unproductive. Would you not like to invest it?'

"'Invest it? Eh? Yes, if you will. Do as you please. But don't interrupt me about such things again. I have other matters to think about.'"

HOW HE DIED.

"Without premonitory disease, or sickness, or withdrawal from daily duties, or decadence of mental powers, or physical disability, he made up his mind that he was about to die. Closing his telescope, putting his achromatic glasses in their several grooves, locking the doors of his laboratories, destroying the papers he deemed useless, and arranging those corrected for publication, he ascended to his sleeping apartment and rang his bell. A servant appeared.

"'Edgar,' said Cavendish, addressing him by name, 'listen! Have I ever commanded you to do an unreasonable thing?'

"The man heard the question without astonishment, for he knew his master's eccentricities, and replied in the negative.

"'And that being the case,' continued the old man, 'I believe I have a right to be obeyed.'

"The domestic bowed his assent.

"'I shall now give you my last command,' Cavendish went on to say. 'I am going to die. I shall, upon your departure, lock my room. Here let me be alone for eight hours. Tell no one. Let no person come near. When the time has passed, come and see if I am dead. If so, let Lord George Cavendish know. This is my last command. Now, go!'

"The servant knew, from long experience, that to dispute his master's will would be useless. He bowed, therefore, and turned to go away.

"'Stay, — one word!' added Cavendish. 'Repeat *exactly* the order I have given.'

"Edgar repeated the order, promised obedience once more, and retired from the chamber."

The servant did not keep his promise, but called to his master's bedside Sir Everard Home, a distinguished physician.

"Sir Everard inquired if he felt ill.

"'I am not ill,' replied Cavendish, 'but I am about to die. Don't you think a man of eighty has lived long enough? Why am I disturbed? I had matters to arrange. Give me a glass of water.'

"The glass of water was handed to him; he drank it, turned on his back, closed his eyes, and died.

"This end of a great man, improbable as are some of the incidents narrated, is no fiction of imagination. Sir Everard Home's statement, read before the Royal Institution, corroborates every particular. The mental constitution of the philosopher, puzzling enough during his life, was shrouded certainly in even greater mystery in his death."

HOUSEHOLD RECIPES.

Good Yeast. — A small handful of hops boiled in a quart of water. With it boil until done five medium-sized potatoes, pared. Now make them smooth with one and a half pints of flour. Pour in the water strained from the hops. Stir this until it is a thin batter, adding hot water if too thick. Let it stand until little more than milk-warm, then add a teacupful of good brewer's yeast. Let it stand in a warm place eight or ten hours, when add a tablespoonful of salt and two of white sugar. Mix well, set it away in a stone jar or jug, and it is ready for use.

Washing Fluid. — The following has been tested for more than five years with perfect satisfaction. Dissolve $1\frac{1}{4}$ pounds of washing soda and $\frac{1}{4}$ pound of borax in a gallon of water, by boiling. When the solution is cold, add about half a teacupful of aqua ammonia (spirits of hartshorn), and put it up in well-corked bottles. Use a cupful to each pailful of water in washing.

Tomato Ketchup. — The following recipe is highly commended, and will soon be "in season:" —

Tomatoes	$\frac{1}{2}$ bushel.
Salt	6 oz.
Allspice, ground	6 drachms.
Yellow mustard, ground	1 oz. $5\frac{1}{2}$ drachms.
Black pepper, ground	3 oz.
Cloves, ground	6 drachms.
Mace, ground	3 drachms.
Cayenne pepper, ground	2 drachms.
Vinegar	1 gall.

Cut the tomatoes to pieces, boil and stew in their own liquor until quite soft. Take from the fire, strain, and rub through a middling-fine hair sieve, so as to get the seeds and shells separated. Boil down the pulp and juice to consistency of apple butter (very thick), stirring all the time; when thick enough, add the spices, stirred up with the vinegar, boil up twice, remove from the fire, let cool, and bottle.

Fly Poisons. — The following will kill the flies, but not the babies that happen to get hold of them:

1. Boil a quarter of an ounce of small quassia chips in a pint of water. Strain, and add a gill of molasses.

2. Mix together one part of black pepper, two of brown sugar, and four of cream.

English "Ginger Pop." — This popular British beverage is made as follows: One and a half ounces of the best ground Jamaica ginger, one ounce of cream of tartar, one pound of sugar, and two sliced lemons: to all of which add four quarts of boiling water, and a half pint of yeast; let it ferment for twenty-four hours, strain and bottle it. In a week or two it will be ready for use.

Bottling Fruit Juices. — A certain amount of sugar is dissolved in the juice of the fruit, the white of an egg added then to each gallon of solution, and the whole heated to boiling. The froth which will rise, and which will contain all the impurities, is removed by means of a spoon, and the clear fluid boiled down, until it contains about two pounds of sugar to the quart. It is then mixed with half an ounce of sulphite of lime to the gallon, when, after bottling in the ordinary way, it will keep for a year and longer.

The Arts.

NEW THINGS IN THE ARTS.

Green Dyes. — Although green is the most common color in the vegetable world, science has not succeeded in obtaining a green dye-stuff from plants. It is well known that the green color of leaves is due to a compound called *chlorophyl*, but this substance has not been obtained in a form practically useful. There are aniline dyes which afford a green directly, but, with this exception, the color is produced in an indirect way by mixtures of yellow and blue. It appears, however, that the Chinese prepare a green dye, called *lo-kao*, from the bark of a species of *rhamnus*, or buckthorn, which from its behavior is considered to be identical with *chlorophyl*. The European consuls in Chinese ports have obtained some information with regard to the manufacture and use of this substance, and a silk-dyer of Lyons has shown that a similar compound can be got from European species of *rhamnus*, but in such small quantities that it will hardly pay to extract. Experiments made at Lyons with the Chinese dye prove that it can be used to advantage in spite of the exorbitant price — about $107 a pound — which the natives charge for it. The green color obtained from it shows even better by artificial light than by day. As sunlight is a requisite in the preparation of the dye, it is likely to prove a very fast color under exposure to the air and the sun.

Household Steam-Engines. — We may yet have steam-engines to do our kitchen work, and the "servant girl question" may thus at length find a satisfactory solution. We learn from *Les Mondes* that engines of *one tenth horse-power* (about one "Biddy" power) are made by Mignon and Rouart, 149 rue Oberkampf, Paris. This power is obtained with a consumption of 700 litres of coal gas (which is equal to 600 grammes, or about 21 ounces, of coal) per hour. Over a hundred of these little machines are in use, and their owners bear testimony that they work well. Cannot our Yankee inventors get up something of the kind? Such engines would soon be in great demand for mechanical purposes, where a small power is required, and we do not see why every household should not come to have its steam-engine to help out in many kinds of domestic labor.

Preservation of Wood from Fire and Decay. — Dr. Reinsch, whose name has for some time been associated with investigations of this kind, renders wood (which must be unplaned) non-combustible by the following process: It is first soaked for twenty-four hours in a solution of 1 part of silicate of potassa in 3 parts of pure water. After being dried for several days, it is again soaked in this liquid, and again dried. It is then painted with a mixture of 1 part of cement and 4 parts of the liquid just described. Three such coats of paint are put on, each being thoroughly dried. The paint should not be prepared in large quantities at once, as it soon becomes dry and hard. Wood thus treated is not only incombustible, but will not decay underground.

Preserved Meat. — At a lecture in Vienna, last month, Dr. Stein showed a large tin canister containing butcher's meat preserved by Appert's method, and prepared by himself in 1851. On opening it, the meat, though nineteen years old, was found to be as fresh and as well-flavored as when it was first put up.

The "Paper Age." — *Appletons' Journal*, commenting upon the new applications of paper mentioned in our last number, says: —

"But if petticoats and table-cloths, curtains, etc., can be made of paper, if a material like leather can be produced from this substance, why may we not expect in time to have our coats and trousers made of it? Why may we not be able to go about 'paper clad' — with paper hat, in paper shoes, with paper coat and trousers, furnished without in paper, and fortified in our pocket-books with Uncle Sam's good-looking paper money? The cost, moreover, of such an outfit [without the pocket-book] would be so trifling that luxurious people could have an entire new suit every day, and even economical persons adorn themselves afresh as often as once a week. The 'paper age' promises to revolutionize our social habits in not a few particulars."

A New Use for Water-glass. — Silicate of soda is now used to restore the leather coverings of machine cards and cylinders to their original smoothness and pliability, after they have been long in wear. The surface thus renewed is much more lasting than that obtained by means of gum arabic and similar substances.

To Incrust Window-glass with Jewels. — Dissolve dextrine in a concentrated solution of sulphate of magnesia, sulphate of zinc, sulphate of copper, or other metallic salt. Strain the liquid, brush a thin coat of it over the glass, and dry it slowly at the ordinary temperature, keeping the glass level. This coating will bear some rubbing. It may be varnished with any alcohol varnish, to protect it. The effect produced is that of an incrustation of diamonds, sapphires, etc., according to the color of the salt used.

WHAT THE WORLD WEARS.

Fur, cotton, wool, and silk are the chief materials out of which clothes are made. Prof. Vater, in a lecture on "Clothing," suggested that it would be interesting to indicate by colors upon a map the distribution of these over the earth. If we use brown for the regions where fur and leather clothing is used, about half of the habitable globe would bear that color, for these materials prevail in Siberia, Northern Europe, two thirds of North America, and the Southern extremity of South America, and as they indicate at the same time the lowest degree of civilization, it would also show to what a small portion of the world higher culture is restricted. The color for animal wool would occupy the next largest space; if we select yellow for this, all Europe, the Cape of Good Hope, and the United States of America, as far as they are inhabited by the Caucasian race, and the similarly populated parts of Australia, would have to be dyed yellow. It is evident that this includes the most enlightened nations of the world. The domain of cotton, which we may color with purple, will be of about the same extent; embracing a great part of China, both Indies, Persia, Asia Minor, the whole coast of Africa, with the exception of the Cape, Mexico, Central America, and the coasts of Brazil, Peru, and Chili. Cotton would indicate the second rank of civilization. All the other fibres used might be designated by a fourth color, say by green, and with it we should have to mark the silk districts of China and the entire interior of Africa and Australia; though these last might be left uncolored, as the people wear little or no clothing of any kind.

Roman Remains in Paris. — Several months ago, we spoke of the ruins of the old Roman baths (known as the *Palais des Thermes*) as the oldest building in Paris. The remains of the amphitheatre since discovered in the *rue Monge*, are considerably more ancient, dating back to the first half of the third century. The edifice was 142 yards in diameter, and could contain 15,000 spectators. The portions of the foundation now brought to light, are built of stones beautifully hewn and fastened together with Roman cement. Stone cages for wild animals have been uncovered, in perfect condition; and slabs of stone are found bearing the names of the patrician families who owned the seats, or "boxes." Among the things discovered in and about the ruins, are articles of jewelry; pins of iron, gold, and bronze; fragments of sculptured marble; glazed and painted pottery; bronze and silver medals of Hadrian and other emperors; urns, vases, etc.; and several skeletons. The government has already taken measures to preserve this interesting relic of ancient days.

MANUFACTURE OF NITRO-GLYCERINE.

In the manufactory of M. Mowbray about 150 litres (33 gallons) of nitro-glycerine are produced daily. The apparatus employed is a large horse-shoe reservoir, of about three feet in height and fifty feet in length, which is filled with a refrigerating mixture of ice and common salt. In this tank are placed, at a distance of two feet from each other, stoneware vessels of 4 to 5 litres capacity, the necks projecting about 2 or 3 inches only above the freezing mixture. The mixture of nitric and sulphuric acids is poured into the vessels, and the glycerine made to enter, drop by drop, from a reservoir placed two feet above the earthenware jars. To agitate the mixture M. Mowbray employs cold air. For this purpose a glass tube is plunged into each vessel, and by a caoutchouc tube and tap, is placed in communication with cold compressed air. When the reaction occurs, the temperature rises, and red vapors are evolved; the workman moves the glass tube through the mass of liquid, which, being traversed by the current of air, is promptly cooled, at the same time that the nitrous vapors are carried off.

Forty-two kilogrammes of glycerine yield ninety-four kilogrammes of nitro-glycerine. The product is perfectly limpid and colorless at 9° C.; below this temperature it is congealed, and then resembles bruised ice, in which state it is not explosive, and can be transported without danger. M. Mowbray's nitro-glycerine dilates by congelation, while the ordinary nitro-glycerine contracts under the same conditions; this is explained by the presence of vapors of hyponitrous acid in the latter, which are absent in the former.

Agriculture.

SHORE PENCILLINGS AT LAKESIDE, NO. 1.

As we sit in the shade of the trees on the shore of the beautiful Kenosa at Lakeside, we take our pencil and put upon paper the thoughts upon nature, rural life, agriculture, horticulture, etc., which naturally come to us while thus at rest and alone. We are not quite alone, however, for we have the pleasant company of the birds and the squirrels that flutter and chirp about us. How beautiful is this scene upon this glorious June morning! The lake shimmers and sparkles in the light, as the sun climbs the opposite hills and pours its slanting rays through the rich foliage upon the peaceful waters. The sky is of the deepest blue, and the earth is carpeted with the intensest green. Wild flowers are scattered in profusion everywhere; the buttercups and the dandelions with their tints of yellow, blending with the green, give to the landscape a richness of coloring which no painter can imitate. The drops of dew, not yet dissipated by the warmth of the sun, rest upon the grass and the shrubs, and glisten like the purest gems. The transparent waters of the lake afford to the eye a clear look into its depths, and its pebbly bottom is seen far away from the shore where we are sitting, and we can watch the movements of the perch and pickerel foraging for their morning meal. The earth is in its holiday attire; the waters, just escaped from the icy bonds of winter, are joyous as an infant when it awakes from the sweetest slumber; the air is laden with the odors of flowers and the songs of birds. Rest, rest, peaceful rest — of this let us have our fill. Let us forget the city, its noise and dust, and the bargainings and wranglings of restless men; let us commune with Nature, study her lessons, observe her laws, and thus be made wiser, happier, better. A friend from the city the other day, lounging by our side under the trees, asked if we did not think that those who were permitted to enjoy much of rural life would have some deductions made from the happiness of the life beyond. This was a random thought presented in jest, and prompted doubtless by the satiety of enjoyment which those only feel who emerge for the first time from winter life in the city. Such excursionists into the country have rather exaggerated notions of the inequality with which enjoyment is distributed among men, and their estimate of the pleasures of rural life is based upon the brief hour they pass under the trees. The difference in amount of absolute enjoyment in this world is very much less than is supposed. Every man regards his neighbor as having at his command sources of happiness denied to himself. The poor man envies the stately mansion, the horses and carriages, and the luxurious table of the rich. The rich man would give all his possessions to buy the health, the sweet slumber, and the freedom from care that his poorer neighbor enjoys; and so we recognize the wisdom of Providence in establishing the immutable law by which happiness is meted out in about equal measure to all who seek it with pure motives.

Happiness depends much upon the sensibilities, and very much upon how we educate ourselves We may live in the midst of the most beautiful manifestations of nature, and through insensibility or sordidness, be incompetent to enjoy them. It is true, also, that in order to enjoy city or country life, it is necessary that we experience some of the toils, inconveniences, and vexations of both and be able to escape from the one or the other at will. By contrast with the brick walls and the hurly-burly of the city, the country seems a paradise; but for those tied to the country, and compelled to toil in the fields, the city possesses extraordinary attractions. From our present point of view rural life appears beautiful, and the language of poetry is quite inadequate to describe the peacefulness and delights of the scene. *We* are under the trees, with the glorious lake before, and the farm behind us. Over yonder, in the meadow, is Mike, a genuine Hibernian, in a straw hat, and a striped shirt with sleeves rolled above the elbows, showing brawny arms, which under the influence of sun and air have acquired a hue like that of hemlock-tanned leather. He has milked his tenth cow this morning, and driven the herd to the hill pasture, where they are now busily at work nipping the white clover blossoms fresh with dew. We have sent him to the meadow to pull up by the roots some burdock plants, the seeds of which during the winter washed in from the highway. Mike declares this to be "sweaty work," and "terrible for the back." From the experiment of extracting a half dozen of the long-rooted plants, we conclude he is more than half right.

Let us "interview" Mike and learn his opinion regarding rural life, farm work, etc. "Well, Mike, this is a fine morning; what a happy fellow you must be, out here in the green meadows, with the birds making music for you, and the winds filling you so full of sweet scents as even to mask the odor of that old pipe, the stem of which has found its way out through a hole in your pocket. Tell us, Mike, what you think of these beautiful scenes, and farming matters in general." "Indade, sir, the mornin' is a fine one, to be sure, but I haven't heard any birds; and as to the air, it is good enough, what there is of it, but if there was more of it 'twould cool me off a bit; and as to the scents, they don't trouble me. Farming, sir, is hard work, airly and late, dig, dig, all the time; what with the cows, and the milkin', and the weeds to pull, and corn to hoe, there is small time to take a whiff from the ould pipe. Fine gintlemen, that can lie on the grass all day, don't know what farming work is, beggin' your pardon, sir, for bein' so plain with you."

And Mike's plainness is excusable. He don't hear the birds sing. nor smell the sweet odors of flowers. A plug of tobacco has a more grateful fragrance to him than buttercups or violets; and as to the air, it is only fine, when there is enough of it to cool his sweaty brow. A visit to the city, after haying, is an event to which he looks forward as the one great thing in the future. But after all, Mike is happy; he has but few wants, and fewer cares. If his back aches at night, from using the hoe, or swinging the scythe, it is "all right" in the morning after six hours of sound slumber. Although insensible to the beautiful things in nature, compensation is made for this, in the harmony with which the physical mechanism works, and in the robust health enjoyed, and in the narrowness of the world in which he moves, which affords no scope for ambition, and gives rise to but few artificial wants.

But our pencil wanders off upon topics which we can as well consider when the frosts are upon us, and the light from the winter fire dances upon the parlor walls. Let us turn our eyes towards the farm, and notice what the warm sun and the rains are doing for the crops. The rye field, although a small one, is indeed magnificent in its luxuriance. Yesterday the rule was applied to the stalks, and many of them were found to measure quite six feet and a half. This is pretty well for winter grain upon the first of June. We think the average height would be six feet, so perfect and uniform is the growth. The corn is up, and looking green and vigorous. It is now being subjected to the first weeding process. Potatoes, we are sorry to say, fail with us. We have laid our neighbors and friends far and near under contribution for varieties of seed, but at harvest time it is all the same. Every variety takes the disease, and a month or two after being dug, they are but a filthy mass; and so we strike potatoes from our list of crops. The grass never looked better, and it is hardly possible for anything to occur now which will prevent farmers from turning a heavy swath in July. The reclaimed meadow, upon which we have not allowed an ounce of barn-yard manure to be placed, is thick with verdure, and a crop of three tons to the acre may reasonably be expected. Three years ago the product of this field was not worth a single dollar. The experimental field of one acre, upon high land, which has been for seven years nourished solely by chemical fertilizers, is promising us an abundant yield. No acre at Lakeside has given such rich returns for the amount expended upon it as this.

The show of fruit is really wonderful. The spring has been like one of those old-fashioned seasons, when apples and pears hung from every bough, and the farmer was obliged to bring out his stakes and prop up his over-burdened trees. But a cloud rests upon our apple prospects. The terrible canker-worm has made its appearance at Lakeside, and the filthy thing can be seen spinning down from the limbs, and the green leaves are blasted as it were by fire. We hope our six hundred beautiful trees, loaded with fruit, will not be entirely destroyed, this season. The grapes and pears are in fine condition. The vineyard of Concords and Delawares is full of blossoms, and the vines never looked better. Five years ago, when it was planted, the ground was dressed liberally with a compost composed largely of bone dust and ashes, and no fertilizing substance has been since applied. We shall wait and see how soon the vines will falter under this treatment. The prospect for abundant harvests of all the grass, cereal, and fruit crops was never better, and let us hope that nothing will occur to blast our pleasant anticipations.

GRAPE VINES ON THE STUMP.

Dr. Channing gives, in the *Providence Journal*, an interesting *resumé* of William J. Flagg's book, "Three Seasons in European Vineyards," recently published by the Harpers. The object of Mr. Flagg is to awaken an interest among our grape growers in the new method of training vines which is practiced in Europe. We do not know how far this system may be adopted with advantage in this country. It is important that the method should be understood, and the system thoroughly tried by competent vine cultivators.

"The *souche* culture of the vine converts it into a shrub in summer, and into a stump smaller than a cabbage in winter. No stake or trellis is ever required. Two or three shovelfuls of earth, in the autumn, cover out of sight a vine twenty years old. Three fourths of the labor and expense of the present method of cultivation are saved.

Souche training is no mystery. At the end of the first year the young vine is cut back to a stump about nine inches high, leaving at its top, if possible, two canes reduced each to two eyes in length, which are to become permanent arms of the future *souche*. At the end of the second year the pruning is so performed as to give to this stump of nine inches, from three to six short arms. At the end of the third year the *souche* is so trimmed as to increase the number of short arms to six, if that number has not been previously obtained. The pruning is subsequently uniform, year by year, leaving one or possibly two canes of the preceding year's growth (cut back to one or two eyes each) at the end of each arm. Care is taken to balance the souche on all sides by symmetrical arrangement of the arms. When too much old wood accumulates upon them they are carefully cut back so as to restore the original compact form.

The greatest product is obtained from vines *en souche* when they are set out five feet apart in each direction, (1,600 plants to the acre.) This allows the plough and cultivator to be used in field culture. One precaution needs to be observed. This is seasonably to remove the suckers which spring up around the stump. The ground should also be kept clean of weeds. The winter trimming is rapidly done by shears. The European practice of progressively stripping the vine of leaves to aid the ripening of the grape is not adapted to our climate. Even the pinching in of the growing canes and laterals has been probably carried to excess in New England.

The grape vine on the stump can be cultivated in the garden, wherever a raspberry or blackberry can be set. Mr. Flagg especially recommends for the souche our short jointed varieties, carrying stiff canes. The trimming and perhaps height of the stump will probably vary within certain limits with different varieties.

In New England and the north of the United States, *souche* culture promises the means of easy winter protection for our best varieties, which we have long needed. A mature vine, reduced to such dimensions in winter that a stove-pipe hat can cover it, can be buried out of harm's way by plough and spade with the greatest ease. The compactness of the grape, *en souche*, in summer makes it easy, also, to apply the sulphur cure (fully illustrated in Mr. Flagg's book), at the first approach of mildew or *oïdium*. The protection from extreme cold and from disease thus afforded makes it at once practicable to cultivate *en souche* in our fields many of the early ripening European varieties. Undoubtedly our Allyn's hybrid is better than the European Sweet Water or Chasselas, and the Delaware is not excelled in its class. The Crevelling and Adirondack rank high among black grapes. But all of these, and even the hardiest of our native grapes, are much benefited in this latitude by winter covering such as the *souche* invites.

The vineyards of the south of France, now occupying a million and a half of acres, have been kept from time immemorial *en souche basse*. This is true also of much of Burgundy, of Cognac, Medoc, and Sauterne.

The soils of many of the celebrated French wine districts are sandy or gravelly, and contain an unusually large proportion of lime and iron. Stones in the soil are considered no disadvantage, though natural or artificial drainage is always indispensable. Valuable grapes are cultivated sometimes on soils so poor that they will bear hardly a crop of mullens. The finest French wines come from the poorest soils, the quality being in inverse ratio to the quantity. Thus an acre hardly yields more than 150 gallons of the choicest grape juice. The yield of Medoc and the Côte d'Or of Burgundy is only 250 gallons to the acre, while in rapidly descending scale of quality are products of grape juice of 1,000, 2,000 or even 3,000 gallons to the acre. This is illustrated by the story of the vineyard of Clos Vougeot, the seat of an old monastery. From 80 acres the monks obtained only 1,200 gallons of very choice wine, the product of vines 400 or 500 years old. The French revolution dispossessed the monks, and their secular successors obtained from new vines on the same ground no less than 18,000 gallons of the poorest and sourest wine. Young, and recently manured vines are considered in France on a par, and unfit to produce good wine. In Sauterne they manure once in 3 years; in Medoc once in 7 to 10 or even 20 years. To diminish the yield and perfect the fruit, the vines are sometimes crowded to the extent of from 10,000 to 25,000 on a single acre. A common number is 4,444, that is three feet apart in each direction.

In this country we want to obtain the largest possible product of ripe grapes, but we have much to learn from European experience. Our grapes frequently remain sour and never ripen from the excessive use of stimulating manures, which induce overgrowth and overbearing. We think that young vines in New England are frequently ruined by the rich artificial soil in which they are set, or by a subsequent surfeit of animal manures. Mineral manures, such as lime, plaster, ground bone, and oxides of iron, need less caution. Not the least advantage of the *souche* is the severe compulsory winter pruning to which it will subject many of our varieties. A few varieties, like the Rogers hybrids, are perhaps too rampant for this severe treatment, but they are varieties which thrive with the least amount of care. With many varieties it will be desirable, even on the *souche*, to reduce the number of bunches one half to secure good ripening.

A WORD FROM NORTH CAROLINA.

A gentleman of distinction, a subscriber to the Journal, residing in the western part of North Carolina, writes us a letter in which he speaks enthusiastically of the beauty, healthfulness, and agricultural advantages of that section. We give a few extracts from the letter, as we think they may be of interest to our readers:—

"There are doubtless good men among the patrons of your paper who would like to help us make this western North Carolina what nature intended it should be — the home of a refined and energetic population. Massachusetts is always ready to contribute her share of men; but there is *choice* even among her sons, and I hope to have them from the class who take and read the Journal, as such must be worthy and intelligent. South Carolina has done much for this section, and scattered through the country are some of her best representatives. See to it, so far as you can, that those who come from your State compare favorably with these moulded by Huguenot influences. Only the wealthy class from the South have come here, for the region was not of easy access, and they sought it for its beauty of scenery and climate — its summer climate. Your people are just learning that it is a delightful *winter* resort.

"Whether for summer or for winter, our climate is unequalled on this continent. The scenery is magnificent. Let your New York readers just step into Anthony's on Broadway, and look at the views of this region taken by Barnard. As I write, the Black Mountains, the highest east of the Rocky, are in full view, twenty miles away, and without leaving my room, I can see landscapes more varied and more charming, than have met my eye in journeys of thousands of miles through lands famous for their beauty. Our mineral resources are immense, and the forests of oak, poplar, chestnut, mountain maple, and black walnut, are of vast extent. The water power, too, is abundant. The soil is black and rich, from the valleys to the tops of the hills, excellent for grass, or grain, or fruit. I am well acquainted with Massachusetts and New York, having lived in those States when a boy, and for thirty years I have made my home in the South, and have rode or walked over South Carolina, Georgia, Florida, and all the Atlantic line of States; and for scenery and agricultural advantages, this section surpasses all I have seen elsewhere.

"The place has peculiar attractions for the invalid, and especially for the consumptive. We are elevated some 3,000 feet above the adjacent country, to the west of the Blue Ridge, as you will see by the map. We have all the products and comforts of the Temperate Zone, while we are in the midst of a warmer region, and we thus enjoy all the advantages of both.

"To all who come among us we extend a hearty welcome, and I hope that many from your section may be tempted to come."

GLEANINGS.

To destroy insects on plants, water them with a very weak solution of phosphoric acid. While it kills the bugs, it helps the plants by adding to the soluble phosphates in the soil. It is predicted that it will come to be extensively used in agriculture.

M. Lecouteux, in *Cosmos*, gives an account of experiments made near Paris, where a daily quantity of sewage-water amounting to 6,000 cubic meters (over 210,000 cubic feet, or 6,000 tons' weight) was run over a surface of 6 hectares (nearly 15 acres) of what used to be a barren soil, which has thus been converted into a very productive market-garden. The soil absorbs and retains all the suspended matter of the water, and the experiment is every way successful.

The XIX Century, published in Charleston, S. C., in commenting upon the advertisements of some of the Northern florists, remarks:—

"Let us say just here, that all seeds, vegetables as well as flowers and fruit, have to be acclimated, and the seedsman and florist who gets the largest per cent. out of the two or three hundred millions which the South now makes in cotton, will be he who comes among us, and starts a flower farm in the heart of the South. If some flowers can be hot-housed into beauty up there, what can be done here? Our sun and soil wait for the man who wishes to make his fortune in so easy a way."

To find how many bushels there are in a box or bin, multiply the number of solid feet in the same by 45 and divide by 56. The quotient will be bushels, since one solid foot (1728 cubic inches) is $\frac{45}{56}$ of a bushel, or $2150\frac{2}{5}$ cubic inches. For example, if we wish to find how many bushels a box, 8 feet long, 4 wide, and 2 deep, will hold, multiply 8, 4, and 2 together, and we get 64, the number of cubic feet in the box; multiply 64 by 45 and divide the product by 56, and we get $51\frac{3}{7}$, the number of bushels it will hold. The rule is a simple and convenient one, and farmers should make a note of it.

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, JULY 1, 1870.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, Boston Journal of Chemistry, 150 Congress Street, Boston, Mass." Mr. George S. Chase, who during the past year, has managed its business affairs, will still continue in charge of the correspondence, advertising, and other matters connected with the publishing department.

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

THE JOURNAL GIVEN AWAY.

On receipt of the publishers' price of any one of the following riodicals, we wil send *both the* JOURNAL *and that periodical* for one ar. This offer applies to those persons only who are not already bscribers to the periodical selected.

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OUR FIFTH ANNIVERSARY.

THE dress in which the JOURNAL appears upon its fifth anniversary, is one which we are confident will be pleasing to its patrons. It is printed from stereotype plates cast from new type, and the paper is of superior quality manufactured expressly for it. In order to secure the highest excellence and greatest accuracy, in the mechanical department of the JOURNAL, we have placed it in the hands of Messrs. H. O. HOUGHTON & Co., of the celebrated Riverside Press, Cambridge, who will hereafter both print and publish it. The business affairs of the JOURNAL are now of such magnitude as to demand the special attention of experienced publishers, who will conduct them with efficiency and promptness. The editorial charge continues in the hands of Dr. Nichols, who will be assisted by Wm. J. Rolfe, A. M., of Cambridge, one of the authors of those excellent treatises upon Chemistry, Natural Philosophy, Astronomy, etc., known collectively as the "Cambridge Course of Physics." Mr. Rolfe is a thorough scholar and an accomplished writer, and will add greatly to the interest and usefulness of the JOURNAL.

It will be observed that we make no change in the general tone and aims of the paper. Its success is due to its open, frank, fearless discussion of all scientific and collateral subjects, and to the brief, plain, practical character of its teachings. It will continue in the future as it has been in the past. The increased space so long needed, which is now at our disposal, will enable us to give more attention to the departments of Agriculture and Horticulture, in their relations to chemistry and the allied sciences. It is well known to our readers, that the editor during the past seven years has been engaged in a course of scientific experiments in husbandry at " Lakeside Farm," in Essex county, thirty miles from the city. The time has arrived when results may be fairly considered, and they will be presented in our columns from month to month, with the hope that some new and useful ideas may be imparted, and the great interests of Agriculture thereby promoted. The claims of our medical readers must not be overlooked. We doubt if any strictly medical, or other publication, in the country has so large a patronage from this class as our own has. It is safe to say that *one sixth* of all the physicians in active practice in the United States, are readers of the JOURNAL. It is not alone for any medical news or information imparted, that we receive this large support from physicians, but because we treat upon subjects of great interest to cultivated men of every profession. Physicians wish to know what is transpiring in the world of science and art, outside of their special vocation, and it is a relief for them to turn from the study of "cases," and the care of the sick and suffering, to the consideration of matters relating to agriculture, inventions, art processes, and the problems and discoveries which are connected with the *Science of Home Life.* More space will however be devoted to Medical Chemistry and Pharmacy, and all that is new in these departments will be promptly noticed.

Although ours is a *chemical* journal, we have not hesitated to discuss topics properly belonging to the several departments of physical and natural science. Interesting facts, and new discoveries in Astronomy, Optics, Natural History, Mechanics, etc., will continue to receive attention in our columns, so far as our limits will permit. The JOURNAL, while maintaining the accuracy and upholding the dignity of true science in every department, will strive to present topics which are designed for general reading, in a familiar way, so as to be readily understood by every one. Some of the most distinguished scientific gentlemen in the country have promised to aid us, and we hope to make the JOURNAL a welcome visitor in every family to which it gains access.

THE "WATER GAS" PLAGUE.

OUR friends in the Southern and Southwestern States have been sadly afflicted during the past six months, with an epidemic, which may properly be called the "water gas plague." Those sections have suffered severely, because so few of the people have had the affection, or found exemption from it through "vaccination." In this city, and in New York, many of the capitalists and "easy dupes" have had the "plague," and its effects have been truly dreadful. A large number of cases proved fatal, and those patients who recovered are so "poor" that their friends scarcely know them. The water gas plague is carried from city to city, and from town to town, by vicious men who make a business of spreading the infection. The Southern gentlemen have "caught it" from two or three "peddlers" from the North, with "carpet bags" filled with "recommendations," "deeds," "rights," etc. One scamp from this section appears to have infected large numbers, who are now very indignant concerning his transactions, and for a remedy are sending "cases" to lawyers in this city. The best remedy, or rather a certain *prophylactic* (a doctor's word meaning a preventive remedy), is the BOSTON JOURNAL OF CHEMISTRY. No one who patronises the JOURNAL will be likely to suffer from the "plague." It exposes the "water gas" and other humbugs so often and so thoroughly, that peddlers of these commodities find it difficult to enter dwellings or workshops to infect the inmates. If by any means admission is gained, they are "kicked out" promptly and without ceremony. We would again state to our readers that all inventions and devices, by which it is claimed that water or steam is decomposed and burned, have no practical or money value. Chemical art and discovery have thus far failed to produce any machine or device, by which this end is reached. Beware of all charlatans, who offer for sale "water gas" machines, "water gas," "liquid gas," or any thing of the kind. They are all worthless.

A NEW THEORY OF ANIMAL HEAT.

THE following extract from the *New Jerusalem Messenger* has been sent us by a correspondent: —

"A learned Yale College Professor lectured in the hall of the Cooper Union lately, before the American Institute. His subject was the 'Correlation of Physical and Vital Forces,' and in the course of his remarks he ventured upon this statement: —

'The heat which is produced by the living body is obviously of the same nature as heat from any other source; it is recognized by the same tests; it may be applied for the same purposes. As to its origin, it is evident that since potential energy exists in the food which enters the body, and is there converted into force, a portion of it may become the actual energy of heat. And since, too, the heat produced in the body is precisely such as would be set free by the combustion of this food outside of it, it is fair to assume that it thus originates. To this may be added the chemical argument that while food capable of yielding heat by combustion is taken into the body, its constituents are completely, or almost completely, oxidized before leaving it; and since oxidation always evolves heat, the heat of the body must have its origin in the oxidation of the food.'

"This assertion he supports by another, namely, that the carbon and hydrogen contained in the food daily consumed by a human being would, if burned out of the body, produce the same or a greater quantity of heat as that given out by the body which consumes them. This is a specimen of that kind of reasoning which deservedly brings scientific men into contempt with the public. Undoubtedly, food taken into the system is oxidized; but to say that vital heat originates in this oxidation is as absurd as to say that love does. When a man gets angry or excited, and his blood boils, his face flushes, and his whole frame is on fire, as we say, is that phenomenon the result of the oxidation of carbon? Is it not rather the result of spiritual forces acting in and through the body, and only incidentally consuming the carbon and hydrogen contained in it?"

In our last number, we alluded to the "scientific" lucubrations of a Western Doctor of Di-

vinity in a religious newspaper, but they are thrown quite into the shade by the above, which, in fact, outdoes anything that we have met with in the same line — with possibly one exception, to be mentioned before we get through.

"Undoubtedly food is oxidized," but it is absurd to say that "vital heat originates in the oxidation," although, as the lecturer had stated, and as every schoolboy knows, "oxidation *always* evolves heat." Does our clerical friend mean to say that this heat is lost or wasted in some mysterious way, and that the heat which manifests itself is generated in its stead "by spiritual forces?" If so, it is a very striking illustration of the simplicity and economy of the Divine methods of working.

Does the writer really not know the difference between a fact and a metaphor? When "the blood boils" and "the whole frame is on fire," is the figurative "heat" at all like the vital heat, which he treats as a similar "phenomenon?" When a man gets angry, spiritual forces are undoubtedly acting through his body; but that there should be in *that* case an "incidental" consumption of carbon and hydrogen, appears to us quite as "absurd" as that animal heat should be directly produced by burning the same substances.

We intimated above that we had met with *one* thing in print which is richer in its way than the extract from the *New Jerusalem Messenger*. It is the following, which actually appears as an advertisement in an English paper: —

"British science having been for some time suspected of owing much of its reputation to the indifference of the general public on philosophical subjects, the truth or accuracy of which it has had no special means of acquiring practical information, or has been more or less blinded by an overweening confidence in the supposed skill of paid officials or royal professors, several gentlemen have made it their business, at a great cost of time and labor, to investigate the grounds on which the various Astronomical and Geographical Societies have based many of their principal theories. The *assumed* convexity or curvature of the earth's surface is found to be as gross a delusion as its supposed orbital and axial motion — that it is nothing but a stationary plane of hill and dale and level, over the face of which the sun and moon and stars revolve; that Ptolemy and the ancient Greek philosophers were the only truthful and trustworthy authorities on matters of astronomical science, and that the later theories of Galileo and Sir Isaac Newton are directly contrary to Scripture, to reason, and to the positive evidence of our senses. Those who require or are disposed to accept further particulars, are requested to communicate with ——, enclosing three stamps, for pamphlets and postage; with lists of larger works on this subject. Literary and Philosophical Societies will do well to disabuse their minds of the impression that they can much longer resist and resent the growing demand for a thorough revision and reconstruction of their antiquated and erroneous systems."

Thanks to Editors and Publishers. — We are under great obligations to the medical, agricultural, scientific, and secular press throughout the country, for the many kind and complimentary notices which they have given the Journal during the past four years. Inasmuch as these commendations have been unbought and unsolicited, they have afforded us much gratification. We shall endeavor, so far as we can, when opportunity offers, to make some return for these acts of kindness. The publishers and editors who have sent us, in the way of exchange, their able and expensive journals, have received but a poor return for what they have given. There has appeared to us such manifest injustice in an exchange upon even terms with most journals, that we have not, we think, in a single instance solicited it. The press — secular, scientific, agricultural, etc. — in every section, have been pleased to copy from us frequently and liberally, and full credit has been given in most cases. We hope conductors of journals will continue to find in our columns matter worthy of being presented to their readers.

EDITORIAL NOTES.

Valuable Information. — The following is among the "Answers to Correspondents" in a New York city paper (*not* "Punchinello") of a few weeks ago: "Nelson. — It is said that the human hair is vegetable. It certainly assumes the appearance of an animal when it turns to a snake, or something that looks and acts serpentine." We trust that "Nelson" will continue to draw from this fount of scientific wisdom, and that the other readers of the paper may still be so fortunate as to get a share of what "slops over."

A scientific exchange states that a solution of carbonate of ammonia will restore spots discolored by acids, "and indeed *all* spots, *whether produced by acids or alkalies*." We hardly need say that this method of restoring the color will fail in all cases where the spot is caused by alkalies, and in some instances where it has been produced by mineral acids, — nitric, for instance.

Another journal, usually very careful in its statements on scientific matters, informs its readers that a pitcher of water, if kept in a sleeping-room, will absorb *all* the noxious products of respiration, but the water itself will become unfit for use. One would infer from the paragraph (which we have mislaid, or we would give it in full) that a pitcher of water in a close room is a sufficient substitute for ventilation. Of course, neither a pitcher nor a tub of water would answer any such purpose.

Does Light put out Fire? — There is a popular notion that it does, but, like many such notions, it is a mere superstition. Prof. Tomlinson recently made a series of experiments upon candles of different sizes and weights, in dark chambers and in daylight and sunlight. He found that the increase of temperature led to increase of consumption of material, and *vice versa*; and "the whole result may be stated that, in any case, the difference is so small that it may be referred to accidental circumstances, such as temperature and material; the final conclusion being that the direct light of the sun, or the diffused light of day, has no action on the rate of burning, or in retarding the combustion of an ordinary candle." Several years ago, Prof. Horsford, and other experimenters in this country, obtained similar results.

Another old Superstition spoiled. — The popular belief that the eye of a dead animal bears the impress of the last object upon which it looked in life, has been investigated in cold blood by scientific men in Germany. Thirty animals were killed and examined by the philosophers, and the result was as fatal to the superstition as it was to them. In no case was there the slightest evidence in its favor.

An Old Lady. — There is a woman living in Virginia who is said to be 115 years old. She is the widow of a Revolutionary soldier, and enjoys good health, though her hearing is quite gone and her sight somewhat impaired. Her mental faculties are unaffected by age. We regret to add that the old lady both chews and smokes tobacco. Some benevolent person should send her one of the "anti-tobacco tracts," in which the danger of shortening one's years by the use of the weed is duly set forth. Her address, as given in one of the medical journals, is Mrs. Chloe Flatford, Dumfries, Prince William County, Va.

Singular Coincidence. — Arthur's *Home Magazine* for June has an article on "Women as Chemists," which happens to be the same, word for word, as one which appeared with that title in the Journal for April. If it were not given as original in the Philadelphia monthly, we should really believe that we wrote it. As it is, we cannot help referring to it as a remarkable coincidence.

A Popular Cyclopædia. — A good cyclopædia is a library in itself. It gives many volumes in a few, and their contents are not only condensed but classified for ready reference. If one cannot afford to buy the larger cyclopædias in ten or twenty volumes, *Zell's Popular Cyclopædia*, now publishing in numbers and to be completed this year, is a cheap and really serviceable substitute. Into two goodly quartos it will compress an epitome of the whole world of human knowledge. The editorial work is ably done, and the illustrations and the general mechanical execution are much to the credit of the publisher.

LITERARY NOTES.

Of our foreign exchanges there is none that we value more highly than *Nature*, the weekly illustrated journal of science published by Macmillan & Co. London. We are glad to know that its first half year has proved "an emphatic success," and that it begins its second volume with the prospect of rapidly increasing popularity and usefulness. It ought to have a large sale in this country. By special arrangement with the publishers (through their branch house in New York) we can furnish any person, who is not already a subscriber to *Nature*, with that periodical *and the* Journal for $5.00 per annum, which is the regular price of the former alone for American subscribers.

Scientific Opinion is another English journal whic we read with great interest. It is just what it clain to be — "a weekly record of scientific progress : home and abroad." Every number contains one more illustrated articles. The address of the pu lishers is 74 *Great Queen St., London, W. C.*

The Popular Science Review is a quarterly mag zine, published by Robert Hardwicke, 192 *Piccadil London, W.* Each number has several long pape on scientific topics of popular interest, from some the ablest writers in Great Britain, together with carefully compiled summary of intelligence in t various departments of science, etc.

Science Gossip is an entertaining monthly fro the same publisher. It is mainly devoted to bota and zoölogy, and is copiously illustrated.

Several valuable reports, by Prof. C. F. Chandl the Chemist of the Metropolitan Board of Healt New York, have been published in neat pamph form by the Appletons. The one upon the "G Nuisance in New York" is a detailed history of two years' fight between the Board of Health an gas company that persisted in making its purificati process a nuisance to a large portion of the ci Incidentally, the various methods of purifying g are described in detail, and their comparative mer thoroughly discussed. The reports on "the qual of the milk supply," upon "the water supply," a upon "kerosene oil," are briefer but not less valual in their way.

Mr. Jas. Campbell, 18 Tremont St., has publish Volume I. of *The Journal of the Gynæcological*

ciety of Boston, including the numbers from July to December, 1869. The book of four hundred pages, with its excellent typography and tasteful binding, will make a handsome, no less than a useful addition to the physician's library. The second volume will soon be ready in the same style.

The Chemical History of the Six Days of Creation, by Prof. John Phin, offers a new solution of an old problem — the reconciliation of the Mosaic cosmogony with modern science. The author does not assume "that we have reached the ultimate results either of scientific research or of biblical exegesis," but he believes that the biblical record, as interpreted by the best scholarship of the day, is in perfect harmony with the most recent developments of science. The book cannot fail to interest even those who do not fully accept the theory it advocates.

Messrs. Hurd and Houghton have published *The Nation*, by E. Mulford, a profound philosophical disquisition upon "the foundations of civil order and political life in the United States." Somebody has remarked, that, though we are a nation of politicians, we have produced no important work on political science, with the single exception of "The Federalist." This book of Mr. Mulford's must be counted as a second exception, if we endorse the verdict of our ablest critics. It is a work to be studied, and one that will richly repay study. The publishers have given it a dress in keeping with its standard character.

Messrs. Scribner & Co., have issued the third volume of their edition of *Mommsen's History of Rome*, which we have already commended, and have reduced the price to $2.00 a volume. The latest addition to their "Library of Wonders" is *The Wonders of Architecture*, and it is one of the best of the series. A careful revision of the translation would improve it here and there, though it is quite up to the average of English work in that line. We note a few errors of the type, as "the cathedral of *Bruges*" where that of *Bourges* must be meant, etc. Messrs. Nichols and Hall have all these books of Scribner's at their new quarters, 32 Bromfield Street.

To our Medical Exchanges. — In order that the thousands of physicians who take the Journal may know what is to be found in the professional journals of the day, we purpose giving regularly a list of the more important articles in our medical exchanges. Our limits will not permit us to give their "contents" in full, but we hope to be able to call attention to whatever is most valuable in each number. It is desirable, of course, that we should receive the periodicals regularly, and as promptly as possible.

☞ We would suggest to our friends that they preserve the numbers of the Journal for binding. We have put the advertising pages outside the reading, that they may serve as a cover for the protection of the latter until the volume is complete. In binding they can be left out (it will be noticed that they are paged separately), and you then have a volume of solid reading, fully equivalent to an ordinary octavo of four hundred pages. Even with the cost of a good binding added, it will be a very cheap book for the household library. We intend to publish a title page and index for the volume at the end of the year, and to make arrangements for binding it at reasonable rates.

☞ One of the most delightful popular lectures upon science which we have attended for a long time was delivered by Prof. Gray of Cambridge, at Haverhill, Mass., a short time since. His subject was the "Fertilization of Flowers by Insects," and the plain, practical, instructive way it was presented left a pleasing impression upon the mind of every listener. Like Tyndall in England, our distinguished botanist is willing to draw from the rich storehouse of his mind important facts, for the elevation and improvement of the masses.

☞ We have found Mr. Bernard Quaritch, 15 Piccadilly, London, to be a most efficient and faithful Agent for selecting and purchasing foreign books. He has executed many orders for us very satisfactorily, and we commend him to those of our readers who wish to pick up books in the London market.

☞ We are pleased to notice that Dr. Packard's *Guide to the Study of Insects* is receiving the commendations of the scientific press, and of distinguished naturalists in Europe. The *Popular Science Review*, *Nature*, *Scientific Opinion*, etc., bestow upon it high praise. It is, indeed, a work of which we have reason to be proud. Dr. Packard is connected with the Peabody Academy of Science, at Salem, Mass., and the book is published at the "Naturalist's Book Agency" in that city.

ATOMS.

A telegram was lately sent from London to Teheran in Persia, 3,700 miles, and an answer received, in thirty seconds. — Out of 120 students in the Michigan Agricultural College, 8 are young women. — In Pennsylvania a sheet of iron has been rolled, three feet long and a foot wide, weighing but three ounces. It is thinner than common writing-paper. — A Yankee paper-mill has made a sheet of paper 25 *miles* long, 46 inches wide, and weighing about 5 tons. — To write on a photograph, use a solution of one part of iodide of potassium in two parts of water, with a steel pen. It will make white letters on the dark ground. — Collodion is recommended as a varnish to stop up the pores in the shell, and thus prevent eggs from decaying. — England spends a hundred millions of dollars annually for beer. — The *Gas Light Journal* thinks that magnesium will soon be sold at a shilling (24 cents) an ounce retail. — The richest gold mine in California yielded last year a profit of $340,000. — Cornell University is going to send a scientific expedition to Brazil. — After a trial of a year and a half, and the eating of two hundred and fifty horses, it has been decided in Prussia that horseflesh is wholesome. — Another asteroid, the 110th of its class, has been discovered by M. Borelli, at Marseilles, and it is proposed to christen it *Lydia*. — The Pennsylvania pedagogue who is ninety-six years old deserves to be ranked among the "old masters." — A German professor finds that, if you take out a frog's brain, and then rub a wet finger down his back, he will croak as if pleased. Frogs must be very easily pleased. — The illuminating power of coal-gas is increased by heating it, and diminished by cooling it. A given quantity produces more light in a single burner than in several. — When Adam and Eve ate of the tree of knowledge, did they take the "higher branches?" — Though it is said that the lower animals have not the vices of man, there is no doubt that some insects are backbiters and that most quadrupeds are tale-bearers. — Do not have your water-pails painted inside; and for the outside a coat of varnish is better than paint. — Over *twelve millions* of eggs were carried in a single train on a Western railroad the other day. What a mess it would have made if that train had smashed up! — Switzerland, though noted for its manufactures and its inventions, has no patent laws. — A great Polar expedition for 1871 and 1872 is preparing in Sweden. Somebody has lately suggested that the Pole be *removed* by the first expedition that reaches it, so that people may not be tempted to go in search of it any more. — Speaking of the Pole reminds us that out in Minnesota they have "raised" ice thirty-three inches thick, and so transparent that you can read a newspaper through it. — Philadelphia has 179 miles of street railways. — Railways of two or three feet gauge are gaining favor in Great Britain. — In South America they are carrying telegraph lines across from Chili to Buenos Ayres, and by cable to Montevideo, whence another land line is to extend to Rio Janeiro. — A message was lately sent, as an experiment, from New Orleans round through the Atlantic and Western States to its starting-point, in about three quarters of a second. It passed over 4,800 miles of wire, through eighteen States, and through nine "repeaters." — £200,000, or about a million of dollars, was received at the London Custom House as duty on tea in a single week not long ago. — "Sweet and low, sweet and low!" is a line of Tennyson's which *Punch* thinks may be an appropriate quotation on account of the fall in the price of sugar, due to a reduction of the duties. — It is proposed to try the experiment of introducing certain Indian palms — as the date, sugar, and cocoanut palms — into the Southern States. — Counterfeit fruit jellies are made by flavoring gelatine with the appropriate essences. They liquefy with a moderate heat, and may thus be detected.

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — home science, arts, agriculture, medicine, etc., — will be answered under this head, but *only when the subject is one of general interest to our readers.*

Cement for Aquarium. — "D. M. S." asks for a cement "containing no lime or lead, as these substances kill the fish." We can assure him that the cement described in our May number (page 124), although it contains litharge, is not liable to this objection. We cannot say as much for the recipe published in April, though that had been commended by excellent authority.

"Sun-Dogs." — A friend out West wants to know what these atmospheric phenomena are. We will premise that they do *not* belong to the same zoölogical species as those stellar quadrupeds known as *Canis Major* and *Canis Minor*, and that they have nothing to do with the dog-days. They are otherwise known as *parhelia*, (the singular of which is *parhelion*) or *mock-suns*. They appear at the points where the circles of solar *halos* intersect, and are due to the concentration of the light at those points. These halos are formed by the refraction and reflection of the sunlight, caused by minute snow-crystals high up in the air. The variety of cloud known as *cirrus*, or *curl-cloud*, is probably composed of these delicate crystals of ice or snow. *Halos*, properly so called, are of comparatively rare occurrence, and should not be confounded with the "rings round the sun," which may be seen whenever a light fleecy cloud comes between us and the sun. The latter are known to meteorologists as *coronas*, and never show the *intersecting* circles which are usually seen in the former. They differ also in other respects which it is hardly worth while to enumerate here.

The Upas Tree. — We have received two letters inquiring whether the familiar account of the Upas tree (or "the *Utopia* tree," as we once heard it called in a sermon from a city pulpit) is true or not. The story is a mere fable, which first gained credence in Europe through the narrative of Foersch, a surgeon in the Dutch East India Company's service, published about the middle of the last century. He described the tree as poisoning the air of the whole valley where it grew, so that neither animal nor vegetable could live there. But when Deschamps and Leschenault visited Java, they found that this deadly tree flourished only where vegeta-

tion was most luxuriant, and that it was haunted by birds and insects. In another part of Java, there is a narrow valley, where neither animal nor vegetable life can exist, but this is owing to the exhalation of carbonic acid gas from an old volcanic crater. *Upas* is a Malay word meaning *poison*, and is applied to a variety of vegetable products. The proper name of the so-called Upas tree is the *antjar* or *antiar* (the *Antiaris toxicaria* of Leschenault) which grows in many parts of the Sunda and Philippine Islands. It is a very beautiful tree, and sometimes grows to the height of a hundred feet. From its milky juice, mixed with black pepper and the juices of certain roots, the Malays prepare a poison for their arrows which is very prompt and virulent in its action. Cloth is sometimes made from the fibrous bark of the *antjar*, but unless the fibre has been thoroughly cleansed, it produces a painful itching when worn next to the skin.

Since writing the above we have met with an account of this tree in Pouchet's *Universe*. He states that the juice is not poisonous unless introduced beneath the skin. While Leschenault was examining one of these trees which he had cut down, the exudation from the broken branches flowed over his face and his hands, but without injuring him. But eight drops of the juice, injected into the veins of a horse, killed it directly, and criminals have been known to die in five or six minutes after being pricked in the breast with a lancet dipped in the juice.

Medicine.

CHLORAL HYDRATE NOSTRUMS.

THE great success and the growing popularity of that valuable remedy, hydrate of chloral, have led to the putting up for sale of nostrums called "Syrup of Hydrate of Chloral," "True Chloral Anodyne," "Elixir of Chloral," "Solution of Chloral Hydrate," etc. Now it is important that physicians, and all others interested, should understand that the new agent cannot be mixed with syrup, or other aqueous or spirituous bodies, without soon undergoing spontaneous change which renders it comparatively worthless as a hypnotic. What the nature of this change is, we do not well understand at present. We have specimens of the aqueous solution and syrup prepared two months ago, which have undergone important modifications. In crystalline form, in well-stopped vials, the substance keeps perfectly well, and in this form it is probably permanent. If the nostrums just mentioned contain any of the agent, they are worthless, and may be dangerous.

Physicians should prescribe only the crystals, and should be very certain *that they are pure.* The taste of hydrate of chloral is quite unpleasant, but orange juice completely covers it, and so does peppermint water, or essence of peppermint. If taken in aqueous solution, let the patient be directed to suck the juice of an orange immediately after swallowing the dose, or mix with the solution a little peppermint water, with syrup of tolu. The following is a good formula:

℞	Chloral hydrate,	ʒi.
	Aq. menth. pip.,	℥ss.
	Syrup tolu,	℥ss.
	Aqua,	℥ij.

Dose, from one half ounce to two ounces, as may be required.

The mixture should not be prepared in large quantities, nor be kept for any length of time, for the reasons intimated above.

COD LIVER OIL.

THERE are fashions in medicine as in other human affairs. Some one boldly asserts the efficacy or superiority of a new-fangled medicament, and straightway the "hoi polloi" of the profession prescribe the novelty, or adopt the mode of treatment recommended on no better grounds than Dr. Somebody's *ipse dixit.* Cod liver oil is just now a bright particular example of this sheep-like propensity to follow the bell-wether, whithersoever he may lead. Here have we benighted New York practitioners been prescribing, year after year, oils made by our native manufacturers with such thoroughly satisfactory results, that in the words of an authority than whom there is none higher among us, "I (we) desire no better." Yet we are asked to believe our experience false, and that such oils had, after fair trial, proved worthless as medicines. Moreover, we are told that they are made by a disgusting process, — minutely described before a learned body, — a process which, though applicable, perhaps, to the production of the worst article that could be used in the composition of tanner's "dubbing," it is safe to say never was used in the manufacture of salable medicinal oil. But perhaps this description was only intended as a humorous "suggestio falsi," a sort of preface to the elaborate puff of the oil made by one Möller, a Norwegian, manufactured by an original and elegant process — also elaborately described, and declared to be the only oil fit to be prescribed for internal use.

Somewhat startled by such "bluff" assertions, we took the trouble to inquire for ourselves, and discovered that the best American oils are made by a process the same in all essential particulars as that of Möller, minor differences being in favor of Yankee ingenuity. Moreover, according to the official report on the International Exposition of fish products and apparatus connected therewith, held at Bergen, Norway, in 1865, and now before us, Möller's oil was so inferior to that of other manufacturers, that while five of those received medals, and twelve honorable mention, the committee, in awarding him a medal for *the pains he had taken to improve the manufacture*, let him down gently on the subject of *his* oil, by remarking that probably the medallists had taken advantage of Möller's labors, and further improved upon his processes. None of these superior oils, however, have appeared in this country, and one would be almost justified in suspecting that, having ceased to be so much in demand in Europe, Möller's oil is now to be forced on the American market. Such things have happened before, and history — even of drugs — repeats itself.

A comparison of Möller's oil with the best samples of American manufacture, is rather against than in favor of it. It is very bright, but not so "sweet" — so free from all objectionable fish odor and taste, as that made by our first-class houses. When we add that it is sold at nearly double the price of the actually superior native article, we think it scarcely needful to suggest that it is not quite fair to the patient, to make him play the unpatriotic part of purchasing an inferior foreign article at a high price, while a much smaller outlay will command an every way more desirable product of home industry. — *N. Y. Medical Gazette.*

Remarks. We are pleased that so discriminating and sensible a journal as the *N. Y. Gazette* should call attention to the bad character of the foreign cod liver oils. They are usually of a dark brown or reddish color, and of a disgusting odor. As a class, they are filthy and impure, and unfit for medicinal use. Pure, fresh cod liver oil, properly prepared, cannot be of a *brown* color. If it possess that tint, it shows that it has been injured in the process of extraction, or that it is made up of a mixture of various kinds of oils. It is impossible to procure better oil than is produced on the coast of New England, from Cape Cod to Machias in Maine. This is of a light straw color, very limpid and sweet, and not of an unpleasant odor. The process of extracting and clarifying the oil is very simple. The fresh livers are placed in a jacketed pan heated by steam, and when the oil is separated from the "scraps," it is passed through felt bags until it is perfectly nice and clear. To remove a portion of the stearine, it is subjected to refrigerating mixtures in the summer, and the uncongealable portion is drawn off and placed in bottles. This is the oil which affords the best results when used as a medicine, and if patients do not "cry for it," they do not find it impossible to swallow it.

MEDICAL MEMORANDA.

DEATH BY THE GUILLOTINE. — Dumas, in one of his novels, makes the head of a guillotined man, two hours after the operation, not only call out the name of a lover, but actually recognize him by dim candle-light through a sack, while tears of sorrow at the same time drop from its eyes. Novelists not being bound to scientific accuracy in these matters, nobody thought much of this rather astounding "case;" but when, the other day, a French medical man, Pinel by name, asserted that the guillotine was one of the most horrible modes of execution, since the head remained alive for at least three hours afterwards, the matter at once attracted a good deal of attention. It appears, however, that Pinel has been quite as much "indebted to his imagination for his facts" as Dumas was. In a recent communication to the *Society of Legal Medicine*, Doctors Evrard and Beaumetz describe a series of experiments made by them upon a head which was delivered to them five minutes after decapitation. The decision to which they come, is the same as that of the Medical Association of Mayence, in 1803, after a series of similar experiments — namely, that "the sensation of external impression does not persist for an instant after decapitation." The reputation of the guillotine is therefore happily vindicated. It does its work promptly in every sense, and would appear, on the whole, to have some advantages over the gallows.

A QUEER CASE OF POISONING. — War against dogs having been duly declared in Chicago, the policemen were supplied with little pellets of raw beef, with a few grains of *strychnia* enclosed in each. These, in the slang dialect of the police, came to be known as "lunch." A new member of the force, probably from the rural districts, took this term in its literal sense, and waxing hungry in the course of his nocturnal rounds, refreshed himself with several of the official pellets. Feeling symptoms of colic soon after, he resorted to the standard prescription of brandy and peppermint, but as it "instantly didn't do no good," he called in the doctor, who pronounced the disease "apoplexy of the bowels." Fortunately, however, the patient happened to remark that he "felt bully before eating that lunch." This led to an inquiry into the nature of the lunch and a better understanding of the case, and the man is now likely to recover.

APPLES VERSUS DYSPEPSIA. — An eminent French physician ascribes the decrease of dyspepsia and bilious disorders in Paris to the greater

consumption of apples, which he deems an admirable prophylactic and tonic, as well as a very nutritious and easily digested article of food. It is estimated that the Parisians devour one hundred millions of apples every winter.

ELECTRICITY IN THROAT DIFFICULTIES. — Dr. Poggioli, the official physician of the Italian Music Academy, of Paris, has been very successful in the application of electricity to several cases of sore throat and hoarseness among the pupils of the Imperial Conservatory of Music. The pupils thus cured belonged to the class of Delle Sedie, who was much struck by the wonderful results obtained by Dr. Poggioli's new method for the treatment of the voice.

The celebrated Professor, having to appear, a few days afterwards, in "Rigoletto," at a very short notice, and being at the time exceedingly hoarse, sent for Dr. Poggioli, who applied electricity and cured the hoarseness, which otherwise would have prevented Delle Sedie from taking the difficult part he had to perform; the cure was indeed so complete that the great artist sung that evening better than ever, and was throughout enthusiastically encored.

SULPHATE OF IRON IN SUPPURATION. — A child burned all over the body was recently brought to the Children's Hospital of Lausanne. The suppuration from his wounds was so abundant that the ward in which he was lodged became absolutely uninhabitable. M. Joel then placed him in a bath containing two handfuls of sulphate of iron. The cessation of pain was almost immediate; after repeating this bath twice a day, for fifteen or twenty minutes at a time, the suppuration moderated, the fetid odor disappeared, and the little sufferer recovered rapidly.

OSCAR LIEBREICH. — This physician, whose researches concerning chloral hydrate have made him so suddenly famous, is chemical assistant in the Pathological Institute at Berlin.

ETHER INTOXICATION. — We referred in our last number to the prevalent use of ether for purposes of inebriation in certain counties of Ireland. A writer in the Dublin *Medical Press* says that "there is a widely diffused popular impression that ether is used as a stimulant by women of the higher ranks of society." The same writer believes that, in the Irish district just mentioned, the practice is not due to the desire of "getting drunk more cheaply," but to "the laudable efforts made by the Roman Catholic clergy in inducing their flocks to abstain from whiskey. The consumers of ether are said to be nearly all Catholics, and to belong chiefly to the class of small farmers, though the habit certainly prevails among mill hands and other operatives."

The writer believes that there is less danger from the habit than from ordinary dram-drinking, for the two reasons that follow: "If we assume that there is nothing specifically injurious in the action of ether, it will readily be admitted that, having a definite chemical composition, and not being very liable to adulteration with other fluids, it must be an improvement upon the sophisticated alcoholic potations, which, with these people, it has replaced. Again, the affinity of ether for water is so slight that dehydration of the mucous tissue of the alimentary canal, and that apeptic action which so well mark the difference between the effect of ardent spirits and of alcohol in the form of unbrandied wine, cannot be evils attending its ingestion."

The extent of the practice may be inferred from the fact that one Dublin manufacturer has supplied to Belfast alone at least 4,000 gallons yearly. Some towns of less than 3,000 inhabitants use from 250 to 300 gallons a year. The fashion to dates back only about five years.

ORGANIC MATTER IN THE BREATH. — From the account of his experiments in this direction, read by Dr. Ransome to the Literary and Philosophical Society of Manchester a short time ago, we gather the following: The total quantity of organic matter passing out of the lungs in the space of twenty-four hours, the subject being in a state of health, is about three grains. In disease the organic matter varies considerably; in health it is tolerably constant in quantity. On the other hand, the free ammonia in the breath is very variable even in healthy subjects. One of the most interesting results given by Dr. Ransome is the fact that a large quantity of organic nitrogenous matter is thrown off by the lungs in kidney diseases, especially in Bright's disease. A deficiency of organic matter was observed in cases of catarrh, measles, and diphtheria.

SOUTH AMERICAN SURGERY. — Our readers doubtless remember the story of the decapitated Brazilian, who, through a slight inadvertence on the part of the operator, had the wrong head fastened on his neck, but nevertheless did "as well as could be expected," — or rather a good deal better. We think that the Argentine Janus, of whom the following "authentic" account is given by a city paper, must be at least a second cousin of the wrong-headed Brazilian: —

"The following extraordinary narrative comes to Chili from San Juan, Argentine Republic: There existed in San Juan an individual eighteen years of age, who had two heads, both of them provided with a countenance at once expressive and of regular outline, each looking toward the sides of the owner, and being united by the posterior part of the cranium. One of the scientific European commissioners, at present travelling through the Argentine Republic, proposed to operate upon the individual, taking away one of the heads. The proposal was accepted, and the operation successfully performed on the 13th ult., without causing the least pain to the patient, notwithstanding that chloroform was not administered, and the operation lasted six minutes. The operation, and the subsequent cure of the parts, is represented as being something marvellous. The head has been preserved in spirits, and will shortly be exhibited in this country."

CHIT-CHAT.

A MAN condemned to death, in England, has had his sentence commuted, because, as the *British Medical Gazette* expresses it, "any attempt to carry out the sentence would have been attended with great risk." As this mode of punishment is usually attended with considerable "risk," this seems at first very much like a joke. The fact was, that, owing to the cicatrization of a severe burn in his childhood, the man's chin had been drawn down towards his chest, and the integuments of his neck so thickened that it would be difficult to adjust the rope in such a manner as to sustain his weight. As the English law knows no other method of execution but hanging, this lucky deformity of the man's neck proved the means of saving his neck. He may well congratulate himself that he was born a Briton and not a Frenchman. The "operation" by the guillotine would have been attended with no "risk."

According to Dr. Lisle, arsenious acid is likely to prove a great boon to those afflicted with mental derangement. He asserts that its administration, even in apparently hopeless cases, restores about two thirds of the patients to health.

It is an old joke that certain people get their living by *dyeing*, but a Yankee swindler has found out how to do the same thing without an apprenticeship at a dye-house. He takes a room at a hotel, and after a brief sojourn tells a sad story of sudden and unexpected loss of lucre. In his despair he shuts himself up, swallows a white powder, and sets up a groaning which draws a sympathetic throng of fellow-boarders to the spot. The doctor is called in, with stomach-pump and other appliances, and the life of the unhappy man is saved. A purse is of course raised for him, and he soon goes his way to some other city, where the loss, despair, and attempt at suicide are reënacted. His life is saved every time, and the fellow really makes a very good thing out of it.

A late number of the *Moniteur Scientifique* refers to a "liquid iron soap" used as a liniment for burns. It is prepared by heating on a water-bath oleic acid, and gradually adding freshly precipitated peroxide of iron, which readily dissolves. The mixture should be continually stirred. Oleates of other metallic oxides may be obtained in a similar way.

There is much complaint in Paris of the inferior quality of the opium in the market. None can be found that yields more than 5 or 6 per cent of morphia, while the price is 100 francs ($20 gold) a kilogramme (2.2 lbs.) But chloral is the popular sedative of the day, and its use is rapidly increasing. The "hydrated chloral capsules" of Limousin promise to be a favorite form for the administration of the medicine. As we remarked in our last number, Parisians cannot tolerate any physic that is "bad to take."

Figaro tells the following story: Macready, the great actor, wrote almost illegibly, and a box-order which he had given to a friend was sent, for the fun of the thing, to a druggist's as a physician's prescription. The assistant, after mixing some of the ingredients, was posed by the chirography, and took the paper to his master, who readily completed the mixture, and handed it to the customer with the remark that it was an admirable thing for a cough — price, two francs. Of course, the story is a mere joke; but it is a fact that an English physician in Paris, on a Christmas day, wrote a prescription for a plum pudding, with directions to the druggist to send the cataplasm while hot.

A compound isomeric with chloral has just been discovered by two Berlin chemists. It differs from ordinary chloral by having a much higher boiling-point.

TREATMENT OF RHEUMATIC FEVER BY PERCHLORIDE OF IRON.

J. Russell Reynolds, M. D., F. R. S., London, called attention to this agent at the last meeting of the British Medical Association. The marked effects of tincture of perchloride of iron in such diseases as erysipelas and diphtheroid sore throat had induced Dr. Reynolds to try it in acute rheumatism — which agreed with the others in coming under the class of "spreading" inflammatory affections. He had given it in eight cases, with such success as would justify a further trial. Having given brief histories of the eight cases, he directed attention to certain points: 1. The relief of the joint-affections was definite, uniform, and speedy. In four cases it was removed in one day; and the longest period of suffering after the commencement of the treatment was five days. 2. Excluding one fatal case with cerebral symptoms, and another where there was intercurrent pneumonia, the temperature became normal between the second and the seventh days; the mean duration of pyrexia being a little less than five days and a half. 3. Excluding again the two exceptional cases already mentioned, the total duration of rheumatic fever from the outset varied from seven to fifteen days, giving a mean of ten and a half days. 4. The earlier the iron was given, the shorter was the duration of the disease. No headache or other symptom of discomfort was produced by the iron.

Poisonous Hair Dyes and Cosmetics. — We have just received Prof. C. F. Chandler's Report on these and kindred nostrums, to the Board of Health of New York City. Of sixteen preparations for the hair which he analyzed, *fifteen contained lead* in the varying proportions shown in the following table: —

Grains of Lead in one Fluid Ounce.

1. Clark's Distilled Restorative for the Hair	0.11
2. Chevalier's Life for the Hair	1.02
3. Circassian Hair Rejuvenator	2.71
4. Ayer's Hair Vigor	2.89
5. Prof. Wood's Hair Restorative	3.08
6. Dr. J. J. O'Brien's Hair Restorer of America	3.28
7. Gray's Celebrated Hair Restorative	3.39
8. Phalon's Vitalia	4.69
9. Ring's Vegetable Ambrosia	5.09
10. Mrs. S. A. Allen's World's Hair Restorer	5.57
11. L. Knittel's Indian Hair Tonique	6.29
12. Hall's Vegetable Sicilian Hair Renewer	7.13
13. Dr. Tebbett's Physiological Hair Regenerator	7.44
14. Martha Washington Hair Restorative	9.80
15. Singer's Hair Restorative	16.39

For a fuller account of these delectable compounds, as well as of sundry lotions for the skin, "enamels," and kindred cosmetics, see Prof. Chandler's Report, which is given in full in the American Supplement of *The Chemical News* for May, 1870, published by W. A. Townsend and Adams, New York.

Test for Calomel. — Put a little of the suspected calomel on a clean knife-blade, moisten with alcohol, and rub with a cork. Pure calomel does not attack the steel, but corrosive sublimate, or calomel contaminated with the sublimate, produces black spots.

QUITO.

Prof. Orton, in "The Andes and the Amazon" (the best book on that region that has yet appeared), gives the following account of this South American city, which is situated 9,520 feet above the level of the sea, or some 3,000 feet higher than the top of Mt. Washington in New Hampshire: —

"The mean diurnal variation of the barometer is only .084. So regular is the oscillation, as likewise the variation of the magnetic needle, that the hour may be known within fifteen minutes by the barometer or compass. Such is the clock-like order of nature under the Equator, that even the rains, the most irregular of all meteorological phenomena in temperate zones, tell approximately the hour of the day. The winds too have an orderly march, the ebb and flow of an aërial ocean. No wonder watch-tinkers cannot live where all the forces of nature keep time. Nobody talks about the weather; conversation begins with benediction or compliments."

"There are only three small drug-stores in the great city of Quito. The serpent is used as the badge of apothecary art. Physicians have no offices, nor do they, as a general rule, call upon their patients. When an invalid is not able to go to the doctor, he is expected to die. Yellow fever, cholera, and consumption are unknown; while intermittent fevers, dysentery, and liver complaints, so prevalent on the coast, are uncommon.

"The ordinary diseases are catarrhal affections and typhoid fever. Cases of inflammation of the lungs are rare; more coughing may be heard during a Sunday service in a New England meeting-house than in six months in Quito. Asthma is also common in Quito, while phthisis increases as we descend to the sea."

The author considers that the prevalence of typhoid fever is due to filth, want of ventilation, and poor diet.

Of the cinchona-tree, Prof. Orton says: —

"Dr. Weddell enumerates twenty-one species, seven of which are now found in Ecuador, but the only one of value is the C. succirubra (the Calisaya has run out) and this is now nearly extinct, as the trees have been destroyed to obtain the bark. In 1867 only five thousand pounds of bark were exported from Guayaquil. The Indians use the bark of another tree, the Maravillas, which is said to yield a much stronger alkaloid than cinchona."

MEDICINE IN NEW MEXICO.

From an entertaining article on this subject in the first number of the *Indiana Journal of Medicine*, — which, by the way, begins its career in a very promising style, — we make the following extract: —

"According to the popular belief most articles of diet or of medicine, or that may, under any circumstances, be taken into the stomach, are divided into two classes; those which contain heat and those which contain cold. At the same time the human body is supposed to be capable of storing up an indefinite quantity of these two principles, either of which, in excess, gives rise to disease. Accordingly, the science of medicine is narrowed down to determining under what conditions there is an excess of one or the other, and giving the antidote in the form of some substance containing a large proportion of the opposite principle.

"Among the remedies containing *cold* the common black *cricket* is held in high repute. The 'cricket on the hearth' would chirp at his peril in a Mexican house if one of the family chanced to be attack[ed] with fever.

"I once heard a conversation between two Mex[i]cans, which ran about as follows: 'Do you know th[at] Lopez has come down from the mines and is in tow[n] under the doctor's care?' 'No, you don't sa[y] what's the matter?' 'Why, the stupidest thing y[ou] ever heard of. He got sick up in the mines and ha[d] a great deal of heat, and to cure himself he took *t[wo] whole crickets*. It made him so cold that I doubt [if] he ever gets warm again.' 'Is it possible? T[he] stupid fellow! If he had taken one leg it wou[ld] have been well enough, but two whole crickets — what imprudence!'"

SYRUPS FOR SODA AND MINERAL WATE[RS].

Sarsaparilla. — Take of simple syrup, 4 pint[s]; compound syrup of sarsaparilla, 4 fluid ounces; car[a]mel, 1½ fluid ounces; oil of wintergreen and sassafra[s], of each, 6 drops.

Lemon. — Grate off the yellow rind of lemo[ns] and beat it up with a sufficient quantity of gran[u]lated sugar. Express the lemon-juice; add to ea[ch] pint of juice 1 pint of water, and 3½ pounds of gra[n]ulated sugar, including that rubbed up with the rin[d]; warm until the sugar is dissolved, and strain.

Another recipe for lemon syrup is as follows: Dissolve 6 drachms of tartaric acid and 1 ounce [of] gum arabic, in pieces, in one gallon of simple syru[p]; then flavor with 1½ fluid drachm of best oil of lemo[n]. Or flavor with the saturated tincture of the peel [in] cologne spirits.

Orange. — This may be made from the fruit [in] the same way as lemon syrup, or the following fo[r]mula may be used: Dissolve 6 drachms of citric ac[id] in 1 gallon of simple syrup, and add 2 fluid drach[ms] of fresh oil of orange in two ounces of alcohol; or i[n]stead of the alcohol solution of the oil, use the sat[u]rated tincture obtained by macerating the fresh pe[el] for 10 days in sufficient cologne spirits to cover.

The lemon and orange syrups, made from the fru[it], after being strained, may be diluted with an equ[al] bulk of simple syrup. One dozen of the fruit is suf[fi]cient to make 1 gallon of finished syrup.

Ginger. — Mix two fluid ounces of tincture [of] ginger with 4 pints of simple syrup.

Vanilla. — Mix two fluid ounces of extract [of] vanilla with 4 pints simple syrup.

Strawberry, Raspberry, or Pineapple. — Mash the fresh fruit, express the juice, and to ea[ch] quart add 3½ pounds of granulated sugar. The juic[e] heated to 180 degrees Fahrenheit, and strained [or] filtered previous to dissolving the sugar, will ke[ep] for an indefinite time.

Nectar. — Mix 3 parts vanilla syrup with 1 ea[ch] of pine-apple and lemon syrups.

Sherbet. — Mix equal parts of orange, pine-a[p]ple, and vanilla syrups.

Orgeat. — Cream syrup and vanilla syrup, ea[ch] 1 pint; oil of bitter almonds, 4 minims.

Cream. — Take of Borden's condensed milk, [1] pint; water, 1 pint; sugar, 1½ pound. Heat to boi[l]ing, and strain. This will keep for over a week in [a] cool place.

Coffee. — Pure coffee, roasted, half a pound, infused in boiling water, half a gallon; enough is [fil]tered off to make half a gallon of infusion, in whi[ch] dissolve 7 pounds of granulated sugar.

Chocolate. — Baker's chocolate, 4 ounces; d[is]solve in 20 ounces of boiling water, and dissolve [in] this 1 pound of granulated sugar. — *Druggist's C[ir]cular.*

Tonic to be used with Soda-water. — [A] good tonic for the above purpose may be prepared [in] the following way. A tincture is made from —

Brown Calisaya bark	2 pounds.
Gentian	¼ pound.
Well-cleaned orange-peel	¾ "
Alcohol of 60 to 70 per cent.	8 quarts.

This is mixed with 2½ quarts of cinnamon wat[er], when it will present a refreshing and strengtheni[ng] beverage if taken with soda and Seltzer water. — *Druggist's Circular.*

Boston Journal of Chemistry.

Volume V. BOSTON, AUGUST, 1870. Number 2.

Familiar Science.

A DANGEROUS WATER-PIPE.

Attention has been called several times in the Journal to the dangerous character of the *galvanized iron pipe*, when employed for conducting water to be used for culinary purposes. Instances of severe poisoning from the use of this pipe are continually coming to our notice, and we are led once more to caution our readers against it. It is almost a crime for dealers and manufacturers to recommend this zinc-covered iron pipe for water conduit, as they thereby jeopardize the health, and perhaps the lives of purchasers. When this pipe comes from the hands of the manufacturers, it has a fresh, clean appearance, and to those who do not understand the nature of the covering the idea is conveyed that it will not oxidize or rust, like ordinary iron pipes. But this is an error; it will rust even more rapidly than clean iron in most localities. The superficial covering of zinc is rapidly decomposed under the influence of ordinary pond and spring waters, and the oxide, carbonate, and chloride of zinc are formed, which salts are of a deleterious or poisonous character. This covering of zinc on the interior is attacked immediately when water is allowed to flow through, and in some instances we have known it to be entirely removed in forty-eight hours. The insoluble carbonate of zinc is seen to float upon the water in the tea-kettle, and other water vessels used in families, and this has often created alarm, where no suspicions previously existed. We hope the newspaper press throughout the country will caution their readers against the use of this pipe for water supply.

DUST UNDER THE MICROSCOPE.

Among specimens of dust from various localities which we have recently examined under the microscope, one was procured at the Springfield Armory. With a Tolles $\frac{1}{4}$ inch objective, the impalpable dust appeared to be composed mostly of fragments of iron and steel, but under the power of a $\frac{1}{5}$, the dust was seen to be made up of particles of *emery* as well as of various kinds of metals. This came from the polishing wheels used in the works. These fragments, too small to be distinguished by the naked eye, and floating about in the rooms occupied by the workmen, have sharp, cutting edges and jagged points, frightful to look at under a high magnifying power. We presume that but few, if any, find their way far into the respiratory organs, as the barriers which nature has interposed afford almost complete protection against injury from this source. If it were otherwise, many of our industrial pursuits would have to be abandoned, as they would be fatal to life. The dust from shoe factories affords much that is interesting to study. The fragments are all from organized substances, principally from leather. The filaments are twisted and convoluted in a curious manner, and some of them appear like snakes and lizards. The air in shoe factories is constantly loaded with these infinitesimal particles.

CHEMISTRY OF THE HUMAN BODY.

If we could subject the body of an adult person, weighing 154 pounds, to the process of chemical analysis, and then set down the results in the usual way, it would read about as follows: —

	lbs.	oz.	grs.
Oxygen	111	0	0
Hydrogen	14	0	0
Carbon	21	0	0
Nitrogen	3	8	0
Phosphorus	1	12	190
Calcium	2	0	0
Sulphur	0	2	219
Fluorine	0	2	0
Chlorine	0	2	47
Sodium	0	2	116
Iron	0	0	100
Potassium	0	0	290
Magnesium	0	0	12
Silicon	0	0	2
	154	0	0

The oxygen and hydrogen, for the most part, are combined in the body in the form of water; of this compound there would be about 110 lbs. The carbon is mainly contained in the fat; the phosphorus and calcium exist in the bones; the other minerals, in the juices of the flesh and in the blood. Of course the statements as given are but a rude approximation to the truth, but they are, nevertheless, sufficiently exact to afford a tolerably correct idea of the nature of the substances, and the amounts which enter into the human organization.

From this presentation, it will be seen that the body holds sufficient water at all times (about 14 gallons) to drown the individual, if it were contained in a suitable vessel. Under ordinary circumstances six pints of this water leave the system each day. If we drink largely, of course an increased quantity is eliminated through the excretory organs. This liquid finds its way into the system through the food and drink. Considerably more than half the bulk of all the bread, meat, and vegetables used as food is water. There is no other substance but water which remains unchanged after entering the body. Under the terribly destructive influence of vital chemical action, all other agents and bodies are torn asunder, and from their elements are formed new compounds of most strange and complex natures; water flows through our life; as it flows from mountain cataracts and meadow springs, unchanged and unchangeable, save in its physical aspects and condition. It is made capable of holding in solution all the nutrient and effete principles which enter or which are rejected from the human organization, and it is the medium through which it is built up and torn down. Life and death are alike dependent upon its agency.

Of phosphorus, every adult person carries enough ($1\frac{3}{4}$ pounds) about with him in his body, to make at least 4,000 of the ordinary two-cent packages of friction matches, but he does not have quite sulphur enough to complete that quantity of the little incendiary combustibles. This phosphorus exists in the bones and in the brain, and is one of the most important constituents in the body. Every schoolboy is acquainted with those strange metals, sodium and potassium, for he has seen them flash into a brilliant flame when thrown upon water. The body contains $2\frac{1}{4}$ ounces of the former, and a half ounce of the latter metal; enough for all needed experimental purposes in the schools of a large city. The 12 grains of magnesium would be ample in quantity to form the "silver rain" for a dozen rockets, or enough to create a light which under favorable conditions could be seen for a distance of twenty miles.

Our analysis disproves the old vulgar notion, that the blood of ten men contains iron enough to form a plowshare. The 100 grains of metallic iron found in the blood of a healthy adult would be sufficient to make a good-sized penknife blade, but no useful implement of a larger size. There is one important element associated with iron in the blood, which does not appear in the "analysis," and that is manganese. This element has not been recognized until a comparatively recent date, and its importance has been strangely overlooked. At a future time, under the medical head, we shall call attention to its important therapeutical relationships.

Probably no fact in medical or chemical science is more widely understood than that there is "iron in the blood." As a fact it is no more remarkable than that this fluid holds potassium or sodium, or that the brain is permeated with phosphorus. The popular curiosity and interest regarding iron as it exists in the circulation have been excited by the venders of quack remedies alleged to contain some combination of the element. While there is much that is very absurd in the statements popularly presented, it is impossible to overlook the importance to the well-being of the individual of the few grains of iron found in the blood. If the quantity is diminished from any cause, the whole economy suffers serious derangement. We have reason to believe that when the normal quantity (about 100 grains) is reduced 10 per cent. the system is sensibly affected, and the health suffers. How sensitive to all the chemical reactions going on within and around, is this complex machine which we call the body!

But iron, among the mineral constituents of the body, does not stand alone in its important

relationship. The metals exist combined with other bodies, or they are locked up in the form of salts, which are vital to the economy. There are five pounds of phosphate of lime, one of carbonate of lime, three ounces of fluoride of calcium, three and a half ounces of common salt, all of which have important offices to fill. Not one of them must be allowed to fall in quantity below the normal standard. If the lime fails, the bones give way; if salt is withheld, the blood suffers, and digestion is impaired; if phosphorus is sparingly furnished, the mind is weakened, and the tendency is towards idiocy.

Whence do we obtain these extraordinary metals and mineral substances which are diffused through the body? It is certain that among the dishes found upon our tables, none contain phosphorus, lime, iron, or magnesium, in their isolated condition. In the food we daily consume these minerals are found, and they constitute a part of the materials of its structure. A pound of wheat, of which we make our bread, holds a quarter of an ounce of mineral substances; a pound of potatoes contains the eighth of an ounce; cabbages, lettuce, apples, pears, strawberries, etc., also contain considerable quantities. Beef and other meats contain about four pounds of minerals in each hundred, and in the juices there are certain remarkable agents which are crystallizable, which have an alkaline reaction, and which unite with acids to form salts. These are creatine, creatinine, osmazome, etc. We hardly know where to class these agents, but they are undoubtedly of the highest importance in nourishing our bodies.

In case of deficiency of mineral compounds in the economy, it is possible to supply a part of them by the use of the substances themselves, but there are others which can enter only through the food.

Common salt (chloride of sodium) furnishes directly and readily the sodium salts and compounds. Iron can be supplied to the blood by administering it in various forms and combinations, or by giving the pure metal in powder.

Perhaps lime in some of its soluble forms is assimilable, and the same may also be said of phosphorus, as held in the weaker chemical combinations, as in hypophosphorous acid, and in the alkaline hypophosphite salts. If invalids who need the lime and phosphorus compounds would use whole wheat bread, they would secure the mineral food in a perfectly natural way. In the outer covering of the wheat berry, for some good reason, those elements are mainly stored up, and if we sift out and throw away the bran, we deprive ourselves of a most essential portion of the grain.

In the extract of beef, or in the isolated juice of beef, are found enormous quantities of minerals in a perfectly assimilable condition. In one hundred pounds of good dry extract of beef, made by evaporating the juices, there are contained 21 pounds of the most important agents needed in the animal economy. We would suggest to physicians and invalids the use of this beef extract in all cases where the system is suffering from deficient nutrition, or where there is any weakening of the vital powers through an insufficient supply of the mineral or nutritive agents essential to perfect health.

THE PLANET SATURN.

SATURN is, on the whole, the most interesting member of the planetary society which recognizes the sun as its "head centre." It is the largest of the group, with the single exception of Jupiter, being nearly 70,000 miles in diameter, and having a bulk at least 650 times that of our own little planet. But it is its wonderful system of rings, and its retinue of attendant orbs, that specially distinguish it, and almost raise it to the dignity of a sun. The eight moons, one of which is larger than Mercury and about as large as Mars, are equal in number to the sun's family of planets; and as the sun has, in addition to these, a ring of asteroids or minor planets, so Saturn has a more compact ring composed of myriads of minute satellites circling about itself in intertwining orbits. This complex system revolves round the sun, at a mean distance of about 875,000,000 miles, in a period of almost 30 years. The axis of the planet is inclined at an angle nearly the same as that of our earth, so that it has a change of seasons, as we have; but each season is, of course, about thirty times as long as each of ours. The polar day and night, instead of being only six months long, "drag their slow length" through fifteen of our years. On the other hand, the ordinary "day" of the planet, or the time in which it turns on its axis, is less than half the length of ours, or a little more than ten hours. At its equator, the sun hurries through the heavens and sets five hours after it rose, and after a night of five hours — a night whose sky is lit up by the luminous arches of the ring-system, and by the varied phases of the eight moons — the brief darkness vanishes before the returning dawn.

The ring-system is broad and flat, and is divided, by a gap some two thousand miles wide, into two concentric rings, of which the inner is the broader and brighter. These two rings are themselves divided in the same way, but these divisions, with the exception of one in the middle of the outer ring, do not appear to be permanent. Within the inner bright ring there was discovered, about twenty years ago, a dusky ring, through which the body of the planet can be seen as through a veil of crape. As the divisions between the rings are not absolutely black, it is probable that the little satellites which make up the ring-system are spread throughout its whole width, being crowded thickly together in the bright rings, and scattered more sparsely in the dusky ring and the apparent gaps between the rings.

As the rings are directly over the planet's equator, they are inclined to the plane of its orbit, and of the earth's orbit, by a considerable angle; and as this inclination is preserved throughout the revolution of the planet, the appearance of the rings, as seen from the sun or from the earth, varies remarkably. Sometimes they appear as a broad ellipse, sometimes as a mere line of light barely discernible with the most powerful telescopes, and sometimes they disappear entirely. These phases of the rings are illustrated in the first of the accompanying figures. In two positions of the planet, the plane of the rings passes through the centre of the sun, and only the outer edge is illumined. As the ring is estimated to be about one hundred miles thick, and as this thickness, at the distance of Saturn, would appear no greater than that of a good-sized pin two miles off, the delicate line of light can be discerned only by the best telescopes. The rings were in this position in 1848 and 1862, as marked in the figure. Now, if some time before the rings were situated as in 1848 the earth were at *A*, the plane of the ring would pass between the earth and the sun, so that the dark side of the rings would be turned toward us, and they would of course disappear. The same thing would happen if the earth were at *B* some time after the rings were situated as in 1862.

After passing the positions marked 1848 and 1862, the surface of the rings gradually comes more and more into view, until it is seen as a broad ellipse. This happened in 1855 and 1856, and we have just reached another of the periods when the rings are most favorably situated for observation. The planet, as viewed through a good telescope at the present time, exhibits the general appearance shown in the lower part of our second figure, which represents it as seen in March, 1856. Of course, the side

of the rings now visible is the one that was then turned away from us and from the sun; as will be evident from an inspection of the other figure. The other view of the planet given in our second figure was taken in November, 1852, and will serve to show how gradual are these changes in the position of the rings. It will be about four years before the planet, journeying onward in its vast circuit about the sun, will again appear as in that picture.

It will be observed that the body of the planet, in these two views, is marked with shaded belts parallel to its equator. They are represented rather coarsely in the wood-cut; and, indeed, no wood-cut could convey any adequate idea of their delicate beauty. Under ordinary circumstances the only colors distinguishable on the surface of the planet are white and faint yellow, but under the most favorable conditions of air and instrument these change into well-marked hues of more varied character. The most beautiful picture of Saturn that we have ever seen appeared in an English magazine, *The Student*, as an illustration of a paper on the planet, by Mr. Browning, the optician. It was a steel engraving, exquisitely colored with yellow, orange, red, purple, and blue, but the artist himself declares that it is a very imperfect portraiture of the ringed planet. "The tints I have used," he says, "are the nearest I could find to those seen on the planet, but there is a muddiness about all terrestrial colors when compared with the colors of the objects seen in the heavens. These colors could not be represented in all their brilliancy and purity, unless we could dip our pencil in a rainbow, and transfer the prismatic tints to our paper."

RECIPES FOR HOME USE.

Maple Beer. — To four gallons of boiling water add one quart of maple syrup, half an ounce of essence of spruce, and one pint of yeast. Let it ferment for twenty-four hours, and then strain and bottle it. In a week or more it will be ready for use.

Raspberry Vinegar. — Add half a pint of good vinegar to every quart of raspberries, and let them soak for two or three days; then bruise the berries, express the liquid, and to each pint add one pound of sugar. Boil it for twenty minutes, skim it, and when thoroughly cool, bottle it.

To get rid of Roaches. — Sprinkle powdered borax in the places where they congregate. This is one of the cleanest and safest means of putting an end to their visits.

Cottage Cheese. — Pour boiling water from a tea-kettle spout into the pan containing the loppered milk, beating it all the time with a spoon, until it begins to granulate and the whey separates. About one fourth of the quantity in hot water is usually sufficient. Then empty it into a colander, and let it drain about ten minutes. Pour on a quart or two of cold water, and as soon as this drains off, apply salt enough to give it an agreeable taste. Some persons prefer the addition of sweet cream when served.

To keep Flowers fresh. — Add to the water in which they are kept a small quantity of a solution of carbonate of ammonia and a few drops of one of phosphate of soda. Also cut off the ends of the stems for about half an inch, with a sharp knife, every other day. If these directions are followed, the flowers may be kept as long as if they had remained on the parent plant.

FREAKS OF LIGHTNING.

A correspondent in Chelmsford, Mass., sends us the following account of the pranks played by the electric fluid in a case which came under his personal observation: —

"The lightning entered the top of an old-fashioned kitchen chimney, passing down until it reached the flue in the oven, carefully swung open the oven door, leaped across the kitchen, shivered a board at the sink, and passing down a lead pipe, finally disappeared in a brook from which soft water was brought into the house through the pipe. The main chimney was utterly demolished, as we might suppose it would be by a shell exploded within it. In the oven a brown earthen bean-pot and a tin can of burning fluid stood in contact, just in front of the door, and the bean-pot was perforated on each side at opposite points by an opening, oval in shape, into which I could just insert the end of my little finger. These openings could not have been cut by any tool so smoothly as they were cut by the lightning. Not a brick was displaced in the oven, nor was the can of fluid disturbed, and neither the bean-pot nor can was moved in the least. The lead pipe was melted upon one side as if a very hot iron, three quarters of an inch in diameter, had been drawn over it, but was otherwise uninjured."

SCIENCE AND RELIGION.

The following is an extract from the remarks of Bishop Temple (formerly Head Master of Rugby School) at a recent Exhibition of the Plymouth School of Science: —

"I have a very real conviction that all this study of science and art comes from the providence of God, and that it is in accordance with his will that we should study his works; that as He has given us a spiritual revelation in his Word, so also has He given us a natural revelation in his creation, and that when we look back upon the records of His spiritual revelation itself we shall find evidence enough that He puts a real value on scientific studies; for we know that in the pages of the Bible the wisest of men, supplied with wisdom by God's own order, was the King of the Hebrews, Solomon. And what did his wisdom consist in? We find that he did not confine himself simply to the study of spiritual revelation. He spoke of trees, we are told; he evidently studied botany, far and wide. In fact, he was precisely doing, when he acquired the wisdom which God gave him, what this school is intended to do for you. I am convinced that God's Word has nothing to lose, but everything to gain, by a true and careful study of God's works. The more light we get, the more true discipline of our intellect by the study of all those things that God has scattered in such profusion around us — all their wonderful order and wonderful beauty — so much the better shall we be able, not only to serve Him in our affections, but also understand the meaning of his spiritual revelation. I am convinced that all light, of whatever kind, is good, and comes from God — that all knowledge comes from Him, and can be used in his service — that nothing that really adds to our knowledge of the world is for one moment to be despised; but, on the contrary, it should be the effort of myself, and of all who undertake to instruct our brethren in religious truth, to show that we feel that religious truth and secular truth are not only capable of being reconciled, but really come from the same God, who is the God of all truth."

WHAT IS DONE WITH OLD TEA-GROUNDS IN CHINA.

We notice the practice of hoarding up the leaves of tea, drawn in tea-shops and private families, and disposing of them to parties who make it a business to manipulate and prepare them for the foreign market, has made its appearance in Suchow, and other interior cities, where large quantities may be seen drying on the street any bright day. This method of adulteration has been extensively practiced at Shanghai for many years, and some time since provoked a proclamation from the taoutai forbidding it; as in many other instances, however, the prohibition had only a temporary influence, and instead of abating the evil, has encouraged its removal, or rather introduction, into other cities. The Chinese often wonder why foreigners like some kinds of their tea so highly colored as to require the application of almost deadly quantities of Prussian blue, and refuse to buy unless so medicated. Chinese tea for domestic use is never drugged, but to the uninitiated the marvel is still greater, as to what possible use the exhaustively drawn tea-leaves from the shops can be put either by natives or foreigners. It may be true that much of it is disposed of to the poorer classes with a slight mixture of good tea, but as a general rule, it is designed and prepared expressly for the foreign market. — *Shanghai News Letter.*

A CHEMIST'S VALENTINE.

I love thee, Mary, and thou lovest me.
Our mutual flame is like the affinity
That doth exist between two simple bodies.
I am potassium to thy oxygen;
'Tis little that the holy marriage vow
Shall shortly make us one. That unity
Is, after all, but metaphysical.
O! would that I, my Mary, were an acid —
A living acid; thou an alkali
Endowed with human sense; that, brought together,
We both might coalesce into one salt,
One homogeneous crystal. O, that thou
Wert carbon, and myself hydrogen!
We would unite to form olefiant gas
Of common coal or naphtha. Would to heaven
That I were phosphorus and thou wert lime,
And we of lime composed a phosphuret!
I'd be content to be sulphuric acid,
So that thou mightst be soda. In that case
We should be Glauber's salt. Wert thou magnesia
Instead, we'd form the salt that's named from Epsom.
Couldst thou potassa be, I aquafortis,
Our happy union should that compound form,
Nitrate of potash — otherwise saltpetre,
And thus, our several natures sweetly blent,
We'd live and love together, until death
Should decompose this fleshy Tertium Quid,
Leaving our souls to all eternity
Amalgamated! Sweet, thy name is Briggs,
And mine is Johnson. Wherefore should not we
Agree to form a Johnsonate of Briggs?

The Arts.

THE SPREAD OF INVENTIONS.

Some of our contemporaries have called attention to the rapidity with which certain important inventions have matured and have been spread throughout the civilized world. They refer us to the progress of steam navigation; to the development of photography, and the great industrial importance it has gained in the brief time that has elapsed since the first discoveries of Daguerre and Talbot; to electro-plating and kindred forms of electro-metallurgy, the birth of which dates back only about twenty years; and to the electric telegraph, which, within the memory of even the younger men of the present generation, spun the first thread of that magic network which now spreads through every land and every sea.

Now, it is true enough that these great practical discoveries of the age have spread thus rapidly, but it is only in our own day and generation that this has come to pass, and even now we might note important exceptions to the general rule. If we look back through several centuries, we shall see that improvements in the

arts have travelled very slowly from one land to another. In fact, they have rarely been propagated except by conquest or emigration.

The manufacture and use of sugar were known in Spain in the 9th century, but it was not till five hundred years later that they had reached England. The silk manufacture is even simpler than that of sugar, and yet it required 1,200 years to make the journey from Constantinople to London, and 200 years more to cross the Atlantic to our own shores. The progress of woolen and cotton manufactures around the world was equally slow.

This has been true, not only of "great inventions," but of some of the simplest and most convenient things ever devised. The earliest mention of chimneys, such as are used in our day, is in a Venetian inscription, which states that some were thrown down by an earthquake in 1347. But they could not have been introduced into England until the 16th century, since old Holinshed mentions them among the growing luxuries and corruptions of his day. Forks were first known in Italy towards the end of the 15th century. It was a hundred years before they came into use in France, and nearly a hundred more before they had travelled as far northward as Scotland. Their introduction into England was at first ridiculed as a piece of affectation and effeminacy. In one of Beaumont and Fletcher's plays, "your fork-carving traveller" is spoken of with great contempt, and Ben Jonson, too, joined in the laugh against them.

In repeated instances, the progress of inventions has been thus resisted by the popular clamor, and even opposed by popular violence. The first man who appeared with an umbrella in the streets of London drew down upon himself a pelting shower of mud and stones, which was worse than the rain against which he had spread the new-fangled protection. The old way of making boards was by splitting up the logs with wedges; and clumsy as the method was, it was no easy matter to persuade the world that there was a better. Saw-mills were first used in Europe in the 15th century. In 1663 a Dutchman built one in England, but the public outcry against it was so vehement that he was soon obliged to decamp; and for the next hundred years no one ventured to repeat the experiment. In 1768 a rash adventurer began to erect another mill, but a conservative mob gathered at once and tore it down. Many instances of the kind might be given if we had the space for them.

These facts prove very clearly the utility of the international exhibitions of the products of art and invention which began at the "Crystal Palace" in London, in 1851, and have already become one of the "institutions" of the time. They show that it is well for nations, as for individuals, to come together now and then, for the purpose of comparing and communicating the results of their experiments in the various departments of science and art.

A Big Ship. — The largest merchant ship in the world, next to the *Great Eastern*, is the *Italy*, just built at Govan (Scotland) for the National Steamship Company, and intended for their service between Liverpool and New York. She is fitted to carry 100 first-class and 1,500 steerage passengers.

MEMORANDA IN THE ARTS.

Slating for Blackboards. — The best thing for the purpose consists of pulverized slate or quartz made into a thick liquid with silicate of soda, or "water glass." This may be applied to boards or plaster with a brush, like ordinary paint. It produces a surface which is very much like the natural slate, while it costs much less.

Gold Ink. — Rub genuine gold leaf with honey on a plate of agate or ground glass by means of a flat pestle, until the whole presents a uniform mass, in which no distinct particles of gold can be recognized. This mass is carefully removed into a vessel with water, which will dissolve the honey, and leave the gold in a finely divided state behind. The water has, according to the size of the vessel, to be renewed twice or three times, when all the saccharine matter will have been washed away. The remaining gold is then mixed with a sufficient quantity of a solution of gum arabic, shaken well, and is now ready for use. The writing is to be rubbed, after drying, with a flat piece of ivory, when it will present the lustre of pure gold. Silver ink is prepared in the same way.

Another so-called "gold ink" is made by rubbing scales of iodide of lead with mucilage. If it is not dark enough, add a little iodine. Shake well before using.

Preserving Timber by Charring. — The general belief that the charring of timber promotes its durability, does not appear to be well-founded. Experiments have shown, on the contrary, that the charred timber decays sooner than the uncharred. Two posts split from the same log, one of which had been charred and the other not, were set in the ground side by side, and the charred post was the first to rot. The same fact has been noticed in railroad ties, and other timber exposed to variation of moisture and heat. The charcoal on the surface does not itself decay, but as it is not impervious to water, it permits the moisture to penetrate to the uncharred wood beneath, and decay begins *there*. When this has taken place, the covering of charcoal is of no service whatever.

Water-proofing Woven Fabrics. — The recipes we have lately published have attracted some attention among our readers. One correspondent inquires whether cloth treated with the lead solution can be worn in safety next to the skin. When the fabric is to be used for under-garments, metallic salts should not be used in water-proofing it. The *Moniteur des Fils* has recently given several new processes in which no lead is employed. The following is for woolen goods: —

Dissolve on the one hand $\frac{1}{4}$ pound of white Marseilles soap in two gallons of water, and on the other hand 6 ounces of alum in $2\frac{1}{2}$ gallons of water. Both solutions are heated to about 195° F. The goods are then passed several times through the soap liquor, then through the solution of alum, and lastly dried in the air.

The same proceeding is applicable to cotton goods, but double the above quantities of the various ingredients must be taken. Linen requires three, and silk four times this amount.

The following is for linen, hemp, and cotton fabrics: —

One pound of white soap is dissolved in 13 gallons of water, which must be heated, without however raising it to a boil. $2\frac{1}{4}$ pounds of alum are dissolved in a similar quantity of water. To this solution, $2\frac{1}{2}$ ounces of gelatine are added, which have been previously dissolved in water. Lastly, the solution of soap is mixed with that of alum. Enter the goods and distribute them in the warm but not boiling liquid. When they are thoroughly impregnated, hang them up by one end, and allow the water to drain off.

The following is the same in principle as the one given in our June number, sulphate of lead being formed in the fibre of the cloth: —

Linen, hempen, and cotton goods may be treated 4 hours in a sufficient quantity of water, containing an ounce of sulphuric acid in 2 gallons of water. After the drying of the linen, it is immersed in a liquid, containing half an ounce of sugar of lead in a quart of water, and left in for twelve hours. Drying concludes the operation.

Interesting to Candy Eaters. — At a place called Kaolin, in South Carolina, there is an immense deposit of pure porcelain clay. Thousands of casks of this clay are sent to market, and it is generally understood that the greater part of it goes to the candy manufacturers of New York. The adulteration is a harmless one, but it is a cheat, and is readily detected by the method which we gave in a former number, the sugar being soluble in water, while the clay is insoluble.

COTTON-SEED OIL.

The manufacture of this oil in the United States is increasing enormously, and, according to the *Rural Carolinian*, now reaches the high figure of 90,000 gallons a week. It is chiefly used for adulterating other oils, as linseed, lard, olive, and sperm. Its only other uses are for mixing putty, for which it answers better than any other known oil, and for curing tobacco, in which it has replaced the *bene* oil formerly imported for that purpose. In a former number of the Journal we referred to its mixture with olive oil, and to the probability that it may hereafter become a substitute for that oil for culinary purposes. The crude oil is of a very dark red color, which it derives from a sort of resin, which can be seen in black specks, in the kernel of the seed, with the naked eye, and the presence of this resin causes much trouble in refining the oil. A convention of the manufacturers of cotton-seed oil is about being held in New York city, to consider various subjects connected with the business, and especially to find legitimate uses for the oil. It is claimed that fifty per cent. of it, mixed with linseed oil, is better for painting than the pure linseed, as it dries as rapidly, and gives a coat more elastic and less liable to crack or peel off. As a soap stock, it also does well, when mixed with other oils, but alone it does not harden readily on the addition of salt, as other oils do.

THE ELECTRIC LIGHT AT SEA.

The steamships of the French line between Havre and New York are now furnished with electric lanterns for use at night. A correspondent of the *Telegrapher*, in a visit to Sandy Hook, a week or two ago, heard the veteran Farrell at the telegraph station describe his first introduction to the electric light as thus employed: —

"One night, while on the lookout (as he always is, for he sleeps but four hours out of the twenty-four, and those in the day-time), a thick fog set in, through which he vainly endeavored to get sight of any vessel to the seaward. The fog bells could be heard from their different stations, and the light-houses on the Hook shed their rays dimly but a short distance. Suddenly a great stream of light pierced through the dense fog, forming, as Farrell described it, 'a streak miles in length,' illuminating the highlands — then it shifted across the Hook, and, as it swept athwart the telegraph station, a glimpse of its intense light was perfectly dazzling; then it shot a long way up the harbor, and then over towards Long Island. It appeared to cut the fog in pieces, and seemed to leave a wake of light over the vast region of space through which it traversed.

Farrell was on the point of telegraphing to the city that a large ship was on fire, for never before had such a brilliant light been seen in the neighborhood of the Hook; and, under the circumstances, he would have been justified in so doing, but he is a cautious man as well as prompt. But soon he heard sounds from the steamer which convinced him that it was the St. Laurent, and instead of creating an excitement throughout the country, by announcing 'a steamer on fire below New York harbor,' he simply announced the arrival of the St. Laurent. No one can be more earnest in commendation of this electric light than this old veteran. He says there is nothing like it on the water — that it is the only light that penetrates successfully a dense fog; and no one is better qualified from experience, both at the Hook and also at Cape Race — that home of fogs — than he to judge of the merits of this triumph over the elements of darkness. With this light at its bows a vessel's course can be seen by those on board in the thickest weather for miles ahead — thus rendering collisions with vessels or icebergs almost an impossibility. Perhaps the use of an electric light might have saved the City of Boston from becoming the tomb of so many valuable lives."

Let the Boys have Tools. — We heartily indorse the following, which we extract from an article on "Mechanical Recreations" in the *Scientific American*: —

"Every man who can afford it should supply his boys with tools, and a room where they may be used and cared for. A boy takes to tools as naturally as to green apples, or surreptitious and forbidden amusements; and ten to one if he has a chance to develop his mechanical tastes and gratify them to their full extent, his tendencies to vicious courses will remain undeveloped. Such a result is enough to compensate for all the expense and trouble the indulgence we recommend would entail; while the chances that the early development of his constructive faculties may in this mechanical age be the means by which he may ultimately climb to fame and fortune are not small."

The Introduction of Mahogany into England. — Our new neighbor, *The Cabinet Maker*, tells the following story in the course of an interesting article upon Mahogany: —

"A physician of the name of Gibbons, who resided in London, received in 1724 a present of some mahogany planks from his brother, a West India captain. Dr. Gibbons was then building a house, and he desired his carpenter to work up the wood. The carpenter had no tool hard enough to touch it; so the planks were laid aside. The doctor's wife, after the house was finished, wanted a candle-box, and the mahogany was again thought of. A cabinet maker of the name of Wollaston was applied to; and he also complained that his tools were too soft. But he persevered, and the candle box was at length completed — after a rude fashion, no doubt. The candle-box was so much admired, that the physician resolved to have a mahogany bureau; and when the bureau was finished, all the people of fashion came to see it. The cabinet maker procured more planks, and made a fortune by the numerous customers he obtained. From that time the use of mahogany furniture went forward amongst the luxuries; — and the drawers and bureaus of walnut-tree and pear-tree were gradually superseded in the houses of the rich."

Oxygen Prepared without Heat. — A mixture of the peroxides of lead and barium may be kept for any length of time without being decomposed. If weak nitric acid be added, peroxide of hydrogen is generated, which is immediately decomposed by the oxide of lead into water and pure oxygen.

Agriculture.

A NEW "DODGE" AMONG FERTILIZER MAKERS.

A large number of farmers have made inquiries of us regarding a new fertilizer manufactured by Mr. Dodge Hayward, of — we don't know where; we are asked repeatedly what we "think of it." Well, here is the "*analysis*" of the compound, as found upon one of the packages, and of course we have the means of knowing just "what there is in it:" —

Aqua and organic matter	10.40
Carbonic acid	3.30
Oxide calcium	24.20
Phosphorus	1.00
Soda	12.00
Chlorine	10.10
Sulphuric acid	30.00
Oxide of iron	.60
Silex	8.40
	100.00

This "analysis" is placed upon packages in accordance with the "statute made and provided," and is very *clear*, — to those who understand it. It is not expected that purchasers will understand it. Let us examine it. 1. "*Aqua and organic matter;*" that is, being interpreted, water and peat, or muck. 2. "*Carbonic acid;*" this sounds well, but there is no free carbonic acid in it. Carbonic acid is a gaseous body, and cannot be retained in a powder. 3. "*Oxide of calcium;*" common quicklime. All right. 4. "*Phosphorus,*" one per cent. A very modest amount of this most essential element; but there is no free phosphorus in it. 5. "*Soda,*" twelve per cent. All right. 6. "*Chlorine;*" but there is no free chlorine in it. Chlorine is a gaseous body, like carbonic acid. 7. "*Sulphuric acid,*" or "oil of vitriol." But there is no uncombined oil of vitriol in it; if there were, 30 lbs. in each hundred pounds of the powder would be "death to crops." 8. "*Oxide of iron;*" a pinch in a barrel. All right. 9. "*Silex,*" or sand. All right. Now, let us put these acids, gases, and alkalies *together*, as they ought to be presented, and see what we get, and also see what they cost. The water and peat cost nothing, and are valueless. The carbonic acid, phosphorus, and sulphuric acid are combined with the "oxide of calcium" or common quicklime, and form carbonate, phosphate, and sulphate of lime, or gypsum. The chlorine is combined with the soda, and forms *common salt*. The other substances are of no account. Plainly stated, the mixture is made up about as follows: —

Moist muck	10 lbs.	cost 0.00
Gypsum	45 "	" 0.20
Salt	22 "	" 0.10
Carbonate and phosphate of lime	15 "	" 0.18
Sand	8 "	" 0.00
	100 lbs.	0.48

A very cheap batch this, — hardly worth talking and lecturing about all over the country. Its cost is less than $10.00 the ton, and its fertilizing value — not much. We believe it is sold at $27.00 the ton. The cunning "dodge," practiced by makers of fertilizers in obscurely stating the nature of their compounds, or in presenting the required "analysis," is worthy of notice. Instead of making a plain statement of the simple salts and substances which compose the mixtures offered for sale, they "get up" an elaborate ultimate analysis, which can be understood only by chemists, and often these statements are so "mixed and muddy" as to be entirely unintelligible to them. We shall have something more to say upon this subject at a future time.

THE VALUE OF STRAW AS FODDER.

In the remarks we have made regarding the value of dry corn fodder, it was stated that it has been put in mows with wheat straw in our barns, and that the straw and corn "butts" have been consumed together by our herd of cows, causing a copious and well sustained flow of milk during the winter months. These remarks have led to many inquiries from our farmer readers with regard to the nutritive value of wheat and other kinds of straw. It is certain that straw has been underestimated in this country by grain raisers, and that a source of profit has been to a considerable extent lost from this circumstance. One hundred parts of wheat straw, as produced under ordinary conditions in this country, contain —

Water	13.33
Oil, etc.	1.74
Albumen, etc.	1.28
Sugar, mucilage, extractive matters, etc.	4.26
Digestible fibre	19.40
Soluble inorganic matter	1.13
Insoluble proteine compounds	1.65
Woody fibre	54.13
Insoluble inorganic matter	3.08
	100.00

It will be seen that wheat straw contains about 30 per cent. of assimilable food, or food capable of nourishing animals. It contains as much albumen and proteine compounds as ordinary run hay. Woody fibre is however largely in excess, and there is a far less quantity of sugar, mucilage, etc., than in the hay of our meadows. The kind of straw which approaches nearest to good upland hay is oat straw, cut before it is fully ripe. The order in which the different kinds of straw stand relatively, as regards nutritive value, may be presented thus: —

Oat straw,
Barley straw,
Wheat straw,
Rye straw.

Unquestionably it will be for the interest of farmers in most sections to diminish the amount of straw used for litter, and increase its use for fodder. In many of the Northern States rye straw is of equal value with the best quality of timothy, as it is used largely for bedding horses in towns and cities. Of course, where straw commands such high prices, and is of such ready sale, it would be absurd to feed it to animals. We must not be understood in these remarks as holding to the view that any kind of straw can supersede the use of good hay and grain, but rather that it contains a sufficient amount of the elements of nutrition to make it a valuable substitute for these usually more costly products.

A milk-weed grows wild in California, the fibre of which is as strong as Manila hemp, and as fine as linen. It is believed that it can be utilized.

CLAM AND OYSTER SHELLS.

Having stated, in a note published in the *N. E. Farmer* of this city, that clam and oyster shells were of no value as fertilizing agents, a large army of correspondents immediately rushed to the rescue of the bivalve covering. The following reply was made to these intelligent writers: —

Editors New England Farmer: — I do not question the good intentions of your correspondents, W. H. Y., Mr. Phineas Pratt, and others, who are writing about the great fertilizing value of clam and oyster shells. However honest they may be, it is certain that they are confusing the minds of farmers, and thereby doing much injury to the interests of agriculture. Some months ago I stated in your journal that clam and oyster shells were not manurial agents: that they were composed of carbonate of lime, which is valueless.

This simple truth, which it would seem every intelligent New England farmer ought to understand, has caused this excessive literary activity among some of your patrons. The trouble with your correspondents is that they do not clearly understand the matters they are discussing. No one of your intelligent readers will expect me to make any formal reply to what has been written, as the views presented are too preposterous to be taken into serious consideration.

Mr. Pratt evidently considers *oyster shells* and *bones* of equal fertilizing value. He does not understand the difference between a *carbonate* and a *phosphate* of lime. He says, "where oyster shell beds are, *or* where *bone dust* is used, cabbages grow twenty years in succession," etc. He does not know the chemical difference between *hydrate* and *carbonate* of lime, or between oxide of calcium (caustic lime) and carbonate. Again, he says, "New Jersey owes half its fertility to *burning their rocks* and liming their lands once in seven years." As a statement, this is very absurd. Lime rock and oyster shells are no longer *carbonate of lime* after being *burned*. The carbonic acid is driven off by heat, and oxide of calcium is formed. This is a different agent entirely. The remark that "lime is the great thing wanting to bring back the fertility of the soil," is not true, but it may be noted as showing that Mr. Pratt regards lime (oxide of calcium) and oyster shells (carbonate of lime) as identical. It is certain that Mr. Pratt is not an authority in matters of agriculture involving chemical principles.

W. H. Y. falls into the same errors, and fails to understand the views of the writer he quotes. Neither Liebig, Stöckhardt, Johnston, Way, Boussingault, nor other chemist of any repute, ever stated that clam and oyster shells are manurial agents. The quotations made from two or three of the above named writers, regarding the fertilizing value of *lime*, have no bearing whatever upon the question at issue.

Let it be understood by soil cultivators everywhere, once for all, that clam and oyster shells *are not manurial agents, in any proper sense;* that they should receive no consideration at their hand as substances to be *bought* at any price. Writers who endeavor to make agriculturists believe to the contrary are doing that which is detrimental to their interests. James R. Nichols.

150 Congress St., Boston, *June* 4, 1870.

Colonel Baylor, of Georgia, has been experimenting upon the further utilization of the sweet potato. The results are very satisfactory. The articles produced in perfection are starch, dextrine, a very valuable article which may be called sugar-powder, and also a sweet, delicious vegetable flour.

HINTS FOR THE FARM AND GARDEN.

To Improve Blackberry and Raspberry Plants. — Mix equal parts of sawdust and stable manure, and place around the roots every fall before the snow comes. It tends not only to keep the roots warm during the winter, but the sawdust, by partially decomposing, furnishes a quantity of potash, which is a very requisite food for the growing plant. Grape vines may be treated in the same manner.

French Method of Tomato Culture. — As soon as a cluster of flowers is visible, the stem is topped down to the cluster, so that the flowers terminate the stem. The sap is immediately impelled into the two buds next below the cluster, which soon push strongly and produce another cluster of flowers each. When these appear, the branch to which they belong is also topped down to their level, and this is done successively. By this means the plants become stout dwarf bushes, not above eighteen inches high. In order to prevent their falling over, sticks or strings are stretched horizontally along the rows, so as to keep the plants erect. In addition to this, all the laterals that have no flowers, and after the fifth topping, all laterals whatsoever, are nipped off. In this way the sap is directed into the fruit, which is developed accordingly.

To Measure Corn in the Crib. — Multiply the length, breadth, and height together, in feet, to obtain the solid contents; multiply this product by 4 and strike off the right-hand figure, and the result will be shelled bushels, nearly.

Extempore Measures. — A box 4 inches square and 3.6 inches deep will hold one wine quart (57.75 cubic inches), very nearly. A box 5 inches square and 4.6 inches deep will hold half a wine gallon (within half a cubic inch). A box 8 inches square and 8.4 inches deep will hold a peck; and one 16 by 16.8 inches and 8 inches deep will hold a bushel, or 2,150.4 cubic inches. A box 22 by 21 inches will hold a wine gallon for each half inch of its depth, and may be made as deep as desirable. These measures can be very easily made by any one who knows how to handle tools, and will be found convenient for many uses.

SCHOOLS OF AGRICULTURE.

In the perusal of your article on "A School of Agriculture" some months since, I felt no small degree of pride at observing how far your views therein correspond with those presented by me, sixteen years ago, in the *Geneva (N. Y.) Courier*. I then advocated winter instruction by lectures and experiments, for farmers and their sons, who might come without any positive requirements of preliminary education, and who might return to their own homes to spend the working months of the year. My ideas were coupled with the suggestion, that the Trustees of Geneva College should, with the consent of the Legislature and of all parties interested, abolish their Medical Faculty, organize an Agricultural Faculty, and turn over to the latter the property then used by the former. John Delafield, who was then agitating the subject of an Agricultural College on the east side of Seneca Lake, was readily converted to my views, and promised me his cordial coöperation. I do not mean that my institution was to supersede his (where boys were to be put through a course of three or four years, at an annual charge of $300 for board and tuition of each), but his professors were every winter to give systematic instruction to farmers in the lecture-rooms of Geneva Medical College. My plans were approved by a portion of the Board of Trustees, but they were opposed by Bishop De Lancey; and the death of Mr. Delafield deprived them of his powerful support.

Three or four years ago, while conversing on this subject with the founder of Cornell University, he told me that he hoped to see established in Ithaca such a winter course of instruction for farmers as I had suggested in Geneva. It is in the vicinity of a great university, and with the aid of its faculty, that such a plan could be carried out most efficiently, and with the least money. But I would associate with them a number of thoroughly educated, practical farmers, like John Johnson, of Seneca Co., N. Y., and George Geddes, of Onondaga. Sumner Rhoades, M. D.

Syracuse, N. Y., *Feb.* 1870.

HUMAN BONES AS FERTILIZERS.

The manufacturers of phosphate of lime for artificial manures generally employ for the purpose the bones of animals. In this country, the battle-fields of the late war have furnished large quantities of horses' bones. Sometimes human bones are accidentally collected among the rest; but the care and reverence with which the dead on both sides have been buried prevent such unpleasant occurrences almost entirely. Not long ago, much indignation was caused in England by the report that cargoes of human as well as animal bones were shipped from the Crimea to the British manufacturers. How much foundation there was for the story we do not know. Certainly the objection of civilized people to seeing the remains of their fellow-citizens or ancestors brought into commerce is most natural.

The English manufacturers appear not to be satisfied with the supply of the bones of animals, either because it is not adequate to the demand, or because its scattered sources and the consequent expense of collection leave too little margin of profit. They have at last found a country rich in bones, and possessed of a population not too scrupulous to sell them. The mummy-pits of Egypt, containing thousands of tons of the bones of the ancient Egyptians, are now "worked" on a large scale. The bones are dug out, cleaned and sifted, packed in bags or bundles of two hundred pounds each, slung to the sides of camels, and transported to Alexandria, where they are shipped to England. The business affords a brisk trade to the modern Egyptians, and employs a large number of the population; in justice to whom we should add, that they are probably not descendants of the venerable worthies whose relics they put to such base uses.

It is curious to reflect that the phosphate of lime which once formed the frame of a member of the Egyptian aristocracy should, after a quiet repose of some thousands of years, enter upon a new career of usefulness in a distant land as an excellent manure for turnips and other garden vegetables, which may in turn furnish the necessary phosphate of lime to give backbone to the British aristocracy. Great Cæsar stopping a hole to keep the wind away is nothing in comparison!

What future tradesmen will grow rich, and what future turnips thrive, we wonder, on the tombs of Westminster and St. Paul's, or the vaults of Cologne Cathedral, or the ghastly sepulchre of the Capuchins at Rome? The more carefully the bones of the great or the sainted are preserved, the less likely, it would appear, are they to "rest in peace." — *Manufacturer and Builder.*

Beet Sugar. — Attempts are making to interest English farmers in the culture of the beet for sugar manufacture. In France the manufacture, already enormous, is rapidly extending. A large factory has lately been built not far from Paris, and pipes have been laid for a distance of twenty miles for collecting beet-juice from the surrounding country. This plan works well, and has been adopted in other localities. More than one hundred and fifty miles of such pipe are now in use.

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, AUGUST 1, 1870.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

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On receipt of the publishers' price of any one of the following periodicals, we will send *both the* JOURNAL *and that periodical* for one year. This offer applies to those persons only who are not already subscribers to the periodical selected.

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NATIONAL HYGIENE.

WE are not so much ahead of the ancients in hygienic matters as we sometimes boast ourselves. As a writer in *Nature* reminds us, it is not alone in modern times and among enlightened nations, that "the art of preserving health" has received careful and intelligent study. Ancient Egypt and modern China may teach us certain lessons in sanitary science. The former furnishes us "one of the best instances of the power of cultivation in improving the condition of a country." The inundations of the Nile were in ancient times the source of fertility and health, but are now the cause of pestilential marshes, which make the region one of the most unhealthy on the globe. China, with its crowded population, has learned — what we have not yet learned — *to waste nothing.* There, what is taken from the earth is given back to it, every atom of sewage matter being employed as manure. The land is thus enabled to support an immense population, and to maintain its fertility from century to century.

The writings of Moses are full of admirable hygienic regulations, which were enforced by the severest penalties. These regulations are not only general but specific, "descending to the inmost details of every-day life; giving a regimen admirable in its adaptation to the climate of the countries for which it was intended; directing the burial of excrementa and refuse matter of all sorts in the earth; fixing the laws of marriage, of concubinage, of servitude, and of all social relations." The immunity of the Jews in the midst of the most fearful epidemics has been very remarkable; and M. Michel Lévy, one of the best modern writers on hygiene, ascribes it to their strict conformity to these sanitary regulations.

In ancient Greece and Rome the baths and gymnasia were hygienic institutions, of whose benefits all classes, high and low, regularly availed themselves. The water supply of Rome was more than 332 millions of gallons per day, or (as the population did not exceed a million) at least 332 gallons for each person, six times as much as modern London furnishes.

The writers of those early days had reduced hygiene to a system. Hippocrates gives excellent dietetic regulations for gymnasts, and for the sick. The titles of some of his works are "Food," "The Use of Liquids," "The Diet of Healthy People," "Air, Water, and Localities," and, as has been well said, they entitle him to be considered "the father of experimental hygiene."

Celsus and Galen likewise made hygiene a department of medicine, and treated it ably and intelligently in their writings.

It was not until the rational doctrines of these fathers of medicine were mixed up with the absurdities of alchemy, and their sensible methods were displaced by traditional and arbitrary modes of treatment, that hygiene came to be utterly neglected; and, as a result of the neglect, Europe was visited by frightful epidemics, compared with which the plagues of Athens and of Rome were trivial visitations.

The value of preventive measures in these epidemics was illustrated in the plague of 1719 — the last which was known in Europe. The epidemic was introduced into Marseilles by a ship that had been refused admittance into a Sardinian port. Sardinia was saved from the fearful visitation by this wise action on the part of its monarch, while Marseilles was ravaged by the fatal pestilence. More than 90,000 victims had fallen before its devastating progress was checked.

The mere diffusion of hygienic knowledge among the people does not suffice for the sanitary well-being of a nation. It is only when the government takes the matter into its own hands that the public health can be thoroughly cared for; and hence the necessity of Boards of Health, which may collect information with regard to the statistics and the causes of disease, and suggest how those causes may be removed or reduced to a minimum. Without such *scientific* guidance in dealing with questions pertaining to the public health, legislation is quite as likely to make matters worse, as to better them. When we are sick, we go to a physician — that is, if we are sensible people, — and a nation should act on the same principle, and not try to cure social diseases which it does not understand, with medicines of whose nature and effects it is ignorant. "Doctoring one's self," in serious cases, is poor policy for either an individual or a community.

THE EDITORS AT LAKESIDE.

THE members of the Massachusetts Association of Editors and Publishers, with their wives, are to be our guests at Lakeside in September, at the time of the ripening of fruits. We know of no class of men who are better deserving of a "good time," or who are more capable of merry-making, than Editors. If we are not called upon to repeat the exclamation so often made at Gloucester, "*Multum pluvium! multum pluvium!*" we think a "jolly good time" may reasonably be expected. Opportunity will be afforded for solving a curious "rule of three" problem, which may be presented thus: If a hundred doctors "disemboweled" three bushels of grapes in an afternoon at Lakeside last year, how many will twice the number of Editors "turn into pi" in the same length of time? We must patiently wait for the solution of this important problem, until autumn. Arrangements will be seasonably made for transporting and entertaining the company.

EDITORIAL NOTES.

DIET OF BELGIAN MINERS. — The diet of miners in Belgium, according to official reports, consists of 2 pounds of bread per day, about 2 ounces of butter, 1 ounce of coffee and chicory mixed, and in the evening potatoes and other vegetables to an amount not exceeding $1\frac{1}{2}$ pounds. They have meat on Sundays and holidays, but during the week they drink neither beer nor other fermented liquor. Coffee is their only beverage, with about ten per cent. of milk added. This, with the bread and butter, is all that is taken until the vegetable meal of the evening. This diet is less nutritious even than that of the monks of La Trappe, and is, in fact, below what is generally considered as essential to life and health; yet these workmen are hardy and healthy. The coffee contains but three per cent. of the nutriment in their daily rations, but, since it is pretty well established that this beverage diminishes the waste of the tissues, it may be a very important item in this remarkably meagre diet.

ANOTHER BIT OF NEWSPAPER SCIENCE. — A Boston paper favors us with the following in the way of scientific intelligence: "Astronomers predict that the present will be the hottest season experienced by the present generation. Their reason for this prophecy is the near approach of several planets to the earth." Our readers are aware that it has recently been proved that there is an appreciable amount of heat in the beams of the moon, but no astronomer has been wild enough to dream of detecting any warmth in the rays of the planets. We may add that it is not true that "several" of the planets will be unusually near the earth during the present season. These trivial objections aside, we do not know that there is any serious difficulty in the way of our accepting this "scientific" explanation of the hot weather we have been having.

THE PROGRESS OF REFINEMENT. — Most of our readers probably know that horses have been addicted to the unbecoming practice of going to bed with their shoes on. It will gratify them to learn that there is a prospect of an improvement in this regard. A company in Chicopee, Mass., are making an adjustable horseshoe, which can be taken off at night or when the horse is not being used, as readily as the boots and shoes worn by human animals. The "corks" of the shoes are also adjustable, and new ones can be fitted when the old ones are worn out. Hereafter, all steeds of really respectable character will doubtless insist upon being furnished with the improved style of shoe. The nag that retires to his strawy couch before his pedal

coverings are removed will be met with a unanimous *neigh* if he seeks admission to the "first circles" of equine society.

NATURAL SCIENCE IN SCHOOLS. — Carlyle, in a communication to the Edinburgh *Courant*, says: —

"For many years it has been one of my constant regrets that no schoolmaster of mine had a knowledge of natural history, so far, at least, as to have taught me the grasses that grow by the way-side, and the little winged and wingless neighbors that are continually meeting me with a salutation which I cannot answer as things are.

"Why didn't somebody teach me the constellations, too, and make me at home in the starry heavens which are always overhead, and which I don't half know to this day?

"I love to prophesy that there will come a time when, not in Edinburgh only, but in all Scottish and European towns and villages, the schoolmaster will be strictly required to possess these two capabilities (neither Greek nor Latin more strict), and that no ingenuous little denizen of this universe be thenceforward debarred from his right of liberty in those two departments, and doomed to look on them as if across grated fences all his life!"

We hope that the same "good time" may come on this side of the ocean as well. At present, our teachers are wofully deficient in this regard. Even those who attempt to teach the natural sciences are often only blind leaders of the blind. A man sometimes presumes to give instruction in astronomy when he cannot point out to his pupils such familiar constellations as Orion and the Lion, nor distinguish Jupiter from the Dog-star. We have known of such a case recently in one of our leading high schools, and we fear that it may not be a solitary one of the kind. In this instance, the plan of the text-book, which begins with the study of the constellations — which appears to us nothing more than "beginning at the beginning" — had to be modified to suit the disability of the teacher. But this is a subject that cannot be fairly treated in a brief note, and we shall recur to it in a fuller way hereafter.

WALLACE AND DARWIN. — It is well known that Mr. A. R. Wallace was an independent originator of the theory of "natural selection" with which Mr. Darwin's name has become identified. We took it for granted, therefore, that the new book on this subject by Mr. Wallace (recently published by Macmillan & Co.) was intended to set forth the author's claim to the credit of having enunciated this view of the origin of species, now so widely accepted among scientific men. But when we read the preface of the book we were pleasantly surprised to find that, so far from being an attempt to deprive Mr. Darwin of his laurels, it was a generous tribute to the rival discoverer of the famous "law." We give a few sentences from this preface, to show the modesty and the magnanimity of the man: "The present work will, I venture to think, prove that I both saw at the time the value and scope of the law which I had discovered, and have since been able to apply it to some purpose in a few original lines of investigation. But here my claims cease. I have felt all my life, and I still feel, the most sincere satisfaction that Mr. Darwin had been at work long before me, and that it was not left for me to attempt to write *The Origin of Species.* I have long since measured my own strength, and know well that it would have been unequal to that task. Far abler men than myself may confess that they have not that untiring patience in accumulating, and that wonderful skill in using, large masses of facts of the most varied kind, — that wide and accurate physiological knowledge, — that acuteness in devising, and skill in carrying out experiments, — and that admirable style of composition, at once clear, persuasive, and judicial, — qualities, which in their harmonious combination, mark out Mr. Darwin as the man, perhaps of all men now living, best fitted for the great work he has undertaken and accomplished."

RUSTING OF IRON. — Experiments made by Dr. Calvert, in England, show that moisture and oxygen are not the sole conditions of oxidation, but that carbonic acid must be associated with these in order to produce any marked effect. In dry oxygen, iron does not rust at all; in moist oxygen, very slowly; but in a mixture of moist carbonic acid and oxygen, the rusting is very rapid.

A CHANCE FOR INVENTORS. — A bill offering a premium of $5,000 for the invention of a successful steam plough has passed the Senate of California. The Illinois Central Railroad Company has had a standing offer of $20,000 for such a plough for several years past. Of course, these premiums are but a small part of the pecuniary reward which the inventor of such a machine is assured of.

ADULTERATION OUTDONE. — It is stated on good authority that cream of tartar has been sold in the New York market which did not contain a particle of cream of tartar, being composed of five sixths plaster of Paris, and one sixth sulphuric acid and starch. The very term *adulteration* assumes that there is at least some portion of the genuine article present, however extensively it may have been sophisticated; so that in this case we have something beyond the "utmost art" of adulteration properly so called.

LITERARY NOTES.

THE Second Volume of the *Journal of the Gynæcological Society* of Boston has been published by Mr. James Campbell, 18 Tremont St. The growing popularity of the periodical is shown by the fact that the bound volumes are having a good sale, while the subscription list is steadily increasing. It will be noticed that we furnish the *Journal* with our own for $3.00 per annum, the regular price of the former.

We make a similar arrangement in the case of *The Technologist*, which has now reached its sixth number. It has received emphatic commendations from the press in England as well as at home. The London *Engineering* says that it is "liberal in its tone, extended in its scope, well printed, fairly illustrated, and cheap — very cheap," and predicts for it "a long and successful career." The praise is deserved, and the prophecy a safe one.

The *Chemical History of the Six Days of Creation*, noticed in our last, is from the pen of Mr. John Phin, the editor of *The Technologist.*

Contributions to the Theory of Natural Selection is the title of the new book by Mr. Alfred Russel Wallace, to which we have alluded in our "Editorial Notes" above. It is made up of essays written during the last fifteen years, several of which are now printed for the first time. The titles of some of them are very enticing — "Mimicry and other Protective Resemblances among Animals," "The Philosophy of Birds' Nests," "A Theory of Birds' Nests, showing the relation of certain differences of color in female birds to their mode of nidification," and the like — and the essays themselves will not disappoint the reader who is thus attracted to them.

Macmillan and Co. have also published *The Population of an Old Pear-tree, or Stories of Insect Life*, from the French of E. Van Bruyssel, edited by Miss Yonge. It is piquant in style and graphic in illustration, and will serve to interest the young folks in entomological studies. The translation is better than that of some other French books of popular science that we could name, but it is not so good as it might be. Most of these books seem more "Frenchy" in their English dress than in the original, simply because the version is not properly *toned*, so to speak.

The Private Life of Galileo is much the best account of the man that has appeared in English. Although it purports to be confined to his private life, it contains many interesting details in regard to his scientific labors and his persecution by the Church. It is compiled principally from his correspondence and that of his eldest daughter, Sister Maria Celeste, nun in the Franciscan Convent of St. Matthew, in Arcetri. Many of these letters are charming for their simplicity and their mingled piety and filial devotion. Sister Maria looks after her father's linen collars and sends him cakes and sweetmeats, and while writing about these mundane matters mixes in little sermons in the most artless way. These glimpses of the every-day life of the times, would of themselves make the book very pleasant reading.

The Harpers have at length issued their long-promised reprint of Yonge's *English-Greek Lexicon* edited by Prof. Drisler. It is the first book of its class published in America, and it is so complete and admirable in all respects that it is sure to hold the field for a long time to come without a rival. No classical scholar can afford to do without it. In addition to the Lexicon proper, which has been immensely improved by Prof. Drisler's revision, the volume contains the whole of Arnold's translation of Pillon's *Greek Synonymes.* It is rather singular that no work on Greek synonymes has ever before appeared in this country. Trench's two series on the *Synonymes of the New Testament* have been reprinted here, but they are not properly an exception, as we are speaking of *classical* Greek. Another valuable addition to the original work is Prof. Short's Essay on the Order of Words in Attic Greek Prose.

Prof. F. A. March's *Comparative Grammar of the Anglo-Saxon Language* is also a work which does honor to American scholarship. It has no rival in English, and will at once take rank as a standard and an authority.

Christianity and Greek Philosophy, by Prof. B. F. Cocker, of the University of Michigan, is a profound study of the "relation between spontaneous and reflective thought in Greece and the positive teaching of Christ and his Apostles."

The History of Hortense, the daughter of Josephine and the mother of Napoleon III., is a new volume of "Abbott's Illustrated Histories," a series which we have found to be quite as attractive as fiction to juvenile readers, and, we may add, far more wholesome for them. Smiles's *Self-Help*, the new revised edition of which has been reprinted by the Harpers, is another book that boys always read with great interest, and there are few things that you can better put into their hands.

Hepworth Dixon's *Free Russia* has met with rough treatment at the hands of some of the critics, but it is generally admitted to be a full and trustworthy account of the present state of things in that great country. It is, moreover, a "live" book, and the Harpers have done well to give us an American edition of it. Messrs. Noyes, Holmes, & Co., the new firm at No. 117 Washington Street, have it, with all these other recent books.

☞ *We will send any book noticed in the* JOURNAL *to any address, postpaid, on receipt of the publisher's price, or as a* PREMIUM *for new subscribers, at the rate of* 25 *cents for each name sent us* WITH ONE DOLLAR. The prices of books mentioned above are as follows: —

Wallace's Contributions to the Theory of Natural Selection, $2.00.
The Population of an Old Pear-tree, $1.75.
The Private Life of Galileo, $1.50.
Yonge's English-Greek Lexicon, $7.00.
Cocker's Christianity and Greek Philosophy, $2.75.
March's Anglo-Saxon Grammar, $2.50.
Abbott's History of Hortense, $1.20.
Smiles's Self-Help, $1.00.
Phin's Chemical History of the Six Days of Creation, $1.00.
Journal of the Gynæcological Society, Vols. I. and II., $2.50 each.

ATOMS.

The "sweet tooth" of the world demands an annual supply of sugar amounting to 2,300,000 *tons*, of which Cuba furnishes fully one third. — Ozone may be easily prepared by blowing a current of air through a Bunsen flame into a large beaker. Its presence can be detected by its odor and the usual tests. — The sound of the human voice has been heard three miles over a level plain; a railroad whistle, eighteen miles; thunder, sixty miles; cannonading, eighty miles. — The fruit trade between the Mediterranean countries and New York now employs twelve steamers, of 1,250 tons each. — Baron Liebig has recovered from his late severe illness.—An effort is making to revive the cultivation of the mulberry in England for feeding silk-worms. — The oxy-hydrogen blowpipe is likely to become one of the "modern improvements" in burglary. — Prof. Andral has shown that infants have a lower temperature than adults only during the first half hour after birth. — Zinc is coming into use as a building material, not only for roofing, but for mouldings, etc., both interior and exterior. It is easily worked, and very durable, as the rust on its surface serves as a protection against further corrosion. — According to the testimony of druggists, there are at least one thousand habitual arsenic eaters in Cincinnati. — We are delighted to know that *jargonium* is not to be added to the jargon of chemical nomenclature as the name of a new element, the discovery having proved, like many others of the kind, to be all a mistake. — The first attempts at fire insurance in England were made in the reign of Charles II. — A sun-spot was observed not long ago which had eight times the surface of this planet of ours. — The Russian Government is about to establish an astronomical observatory on the summit of Mt. Ararat. An enthusiastic Englishman is trying to raise funds for an expedition to the same locality in search of relics of the ark. — Capers, after being pickled in salt water and vinegar, are sorted by means of sieves of copper wire, which improves their color, but makes them poisonous, like other "greening" processes of the kind. — They are laying pipes in Paris for the supply of oxygen. — The *Scientific American* is giving a valuable series of illustrated articles on insects, by E. C. H. Day, of the School of Mines, Columbia College. — The "dead weight" of a railroad train, in the way of engine, fuel, water, cars, etc., is from 1,300 to 1,500 lbs. for each passenger, even in a well-filled train; and the great practical problem of the day is how to reduce the enormous amount.— In the month of June, a fire occurred in the Forest of Fontainebleau, near Paris, sweeping over hundreds of acres. — Some 3,000 dwellings are vacant in Montreal, and eighty-seven French families recently left the city for the States in a single week. — At the Oregon State Fair a Chinaman did the best ploughing that was done on the grounds. — During the month of April more than $15,000 worth of fish spawn was exported from New York to England, Scotland, and France; and silk-worm eggs worth $660 were sent to the last named country. — Ohio has made stringent laws against the sale of dangerous kerosene, the seller of the oil being liable to punishment for manslaughter if death results from violation of the statute. — A piece of vegetable charcoal laid on a burn soothes the pain, and if kept applied for an hour cures it completely. — Mexico promises to become a coffee-raising country.

☞ SOME of our old subscribers have not yet informed us whether they desire to renew their subscriptions. If they do, will they please make it known to us by remitting the amount for Volume V.? The receipt of the money will be duly acknowledged in the usual way.

THE IMPROVED FURNACE. — From the tenor of the letters which come to us from all parts of the country, relating to the furnace recently described in the JOURNAL, we fear that our position in regard to it is not sufficiently well understood by our readers. We have distinctly stated that the improvements are for the benefit of the public, and every one is at liberty to avail himself of the advantages which are combined in the furnace. We cannot manufacture or supply it. Our duties are sufficiently numerous and exacting, without assuming any others at present. As regards the making of the furnace at different points in the country, it may be impossible, or impracticable. Small stove manufacturers have not the skill or the facilities to construct it, as it should be constructed, and the large houses, for the most part, have some device of their own which they are anxious to force upon the attention of their customers, as such usually pay large profits. As it is not for the interest of the large stove and furnace makers to have a simple and cheap device become popular, our readers must not expect such to speak approvingly of the furnace. A reliable stove manufacturing house in a neighboring city informs us that they have had patterns made with great care, and will soon have the furnace on exhibition and sale in this city. If it is well made, we will inform our readers, in the next number of the JOURNAL, where it can be procured.

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — home science, arts, agriculture, medicine, etc. — will be answered under this head, but *only when the subject is one of general interest to our readers.*

D. S., UTICA, N. Y. We regard it as a vulgar notion that it is more healthful to sleep in a position with the head to the north. The whims and fancies which are started in the newspapers are endless, and for the most part hardly worthy of attention.

T. G. G., NORWAY, ME. You ask how to reclaim a wet meadow. If it is a bog, dig out the old roots and hassocks, pulverize the peat or muck as well as you can, drain it, and then cover it with a coating of sand from one to three inches deep. The best fertilizer is ashes, or ashes and bone flour, 500 lbs. to the acre. If you can procure "fish pomace," apply half a ton to the acre: we have found it to be excellent upon reclaimed meadows.

C. H. W., BOSTON. You cannot well restore rancid butter to a state of sweetness. It can be improved by the use of various agents, but the delicate sweetness, once lost, can never be restored.

J. H., PROVIDENCE, R. I. The best substitute for barn yard manure, for top dressing for moist grass lands, cheapness being considered, is a compost made of dry "fish pomace," with gypsum, or plaster. To a cord of good loam or soil add 200 lbs. of the fish pomace and 3 bushels of plaster; allow it to ferment well after mixing, and apply in the autumn. This affords splendid results.

D. G., BRYANTSBURG, IND. The most ready way of making the bones available, is to convert them into superphosphate by first burning them in a kiln to whiteness, grinding them in a plaster mill, and then dissolving the powder in sulphuric acid, after the method described in former numbers of the JOURNAL.

W. H. C., GENEVA, N. Y. When will our readers comprehend or understand the nature of kerosene and naphtha? If our correspondent has been an "attentive reader of the JOURNAL from the start," as he remarks, he must have read our statements, several times repeated, that all peddlers and advertisers who claim to have discovered *safe, inexplosive burning fluids and oils*, and who offer them for sale, or recipes to manufacture such, are charlatans and cheats. It is impossible to render the light, cheap naphthas distilled from petroleum safe to use for illuminating purposes, and the travelling and advertising rascals who deceive the public by statements to the contrary ought to be put in the penitentiary.

N. S. F., WINDSOR, N. Y. Coal ashes, from anthracite, contain about 5 per cent. of soluble fertilizing material. The remainder is principally silex, and incombustible substances which are of no special advantage to soils.

I. R. F., MANISTEE, MICH. Use the ashes from the mill freely, and it will prove of great service to your lands.

C. R. C., WINSTED, CONN. The removal of iron stains from cotton and linen is a matter of some difficulty if they have remained on the fabric for some time. Oxalic acid, which is usually employed for the purpose, is liable to injure the fibre of the cloth, if the solution is sufficiently concentrated, and applied long enough to accomplish the end. The following method (which we believe, has never been published in this country) will remove old stains promptly without injury to the fabric: Wet the mark with yellow sulphide of ammonium, by which it will be immediately blackened, and allow it a minute or so to penetrate; then wash out the excess of sulphide, and treat the black spot with cold dilute muriatic acid, by which it is immediately removed. Finally, wash well with water.

"INQUIRER," WHEELING, W. Va., wishes to know what is "the very best recipe for making a polish or gloss for shirt bosoms, etc." Can any of our readers furnish it?

R. C. KEDZIE, of LANSING, sends us $1.00, but forgets to mention his State. There are at least four post-offices of that name, and we have no means of knowing which is meant.

W. H. HARLOW, Postmaster at "Boston Junction," sends us an official notice, but does not give the State. There is no such post-office on our list, nor can we find it in the P. O. Directory.

A FRIEND in VINELAND, N. J., formerly of Waterville, Me., sends 50 cents, but neglects to sign his name.

Such omissions are not uncommon in the letters we receive. In many cases we can find some way of supplying them, but in others we have no clue to guide us. Our friends should be careful to give their address *in full;* and where a change is to be made in mailing the paper, *both the old and the new address* should be given.

Medicine.

THERAPEUTICAL IMPORTANCE OF MANGANESE.

THE medical and scientific journals have recently announced as a "new discovery," that Prof. Polucci, of Italy, has detected the presence of manganese in the human blood. We are surprised at this, since it has been known for at least a quarter of a century that manganese was a normal constituent of the blood, and also that it exists in a multitude of plants and in milk. Indeed, as long ago as 1774, Scheele and Gahn showed that manganese is associated with iron in organic nature. In 1830, Wurzer found it in burnt bones. Millon in 1847, Marchesan in 1848, and Hanon in 1849, stated after much research, that manganese is the constant and natural associate of iron in the blood. The discovery of Prof. Polucci is therefore not very *new.* It is probable, however, that he has made quite extensive researches in this direction, and that the results of other chemists are fully confirmed by them. In 20 analyses of the blood of persons of different sexes and conditions, and in 23 analyses of human milk, the manganese element was constantly observed.

We have long entertained the opinion that manganese is an important therapeutical agent, and that in some cases of chlorosis where iron fails to exert a curative influence, good effects result from the employment of manganese. Physicians are often puzzled to understand why some of their chlorotic patients are benefited by iron, and others not. Now there is good reason to believe that many instances of "impoverishment of the blood," do not so much depend upon a deficiency of iron as of its associate, manganese. It is certain that most cases of the kind commence to improve as soon as manganese is administered. With Dr. Hanon we are almost led to believe that there are two kinds of chlorosis, one arising from a deficiency of iron, the other from a deficiency of manganese.

We believe, also, that, like iron, manganese has a peculiar tonic effect which is independent of its action in supplying deficiencies in the blood, and in this respect it is a useful remedy. So impressed were we two years since with the great importance of a ferro-manganic preparation both pleasant and effective, that we set about making some laboratory experiments with the view of devising one. We succeeded in prepar-

ing a double salt of iron and manganese, which consists of 75 parts of citrate of sesquioxide of iron, and 25 parts of citrate of *protoxide* of manganese. This beautiful preparation is in the form of garnet-colored scales, perfectly soluble in cold water, and almost tasteless. We believe that this combination has never been successfully made before, either in this country or in Europe, although it has been often attempted. The manganese salt is maintained in the form of a *protoxide*, which is an advantage of the first importance. In this ferro-manganic preparation a remedy is provided which meets most effectively chlorotic cases, whether they arise from want of iron or manganese in the circulation. It is worthy the attention of physicians everywhere.

THE MICROSCOPE IN MEDICINE.

THE debt which modern medicine, both theoretical and practical, owes to the microscope can hardly be overestimated, and yet the value of the instrument for clinical purposes is not so generally appreciated by physicians as it ought to be. Many are too ready to sneer at it as a mere plaything, and to deny that it is of real service in the every-day work of a medical man. To such skeptics we commend the following extracts from a chapter on the microscope in a recent work by Prof. Bennett of the University of Edinburgh: —

"Some years ago I was summoned to see a Dispensary patient laboring under bronchitis, who was spitting florid blood. On examining the sputum with a microscope, I found that the colored blood corpuscles were those of a bird. On my telling her she had mixed a bird's blood with the expectoration, her astonishment was unbounded, and she confessed that she had done so for the purpose of imposition.

"A boy was brought to me with an eruption on the scalp, which was of so indefinite a character that its nature could not be determined. He had lately been elected to occupy a vacancy in one of our educational charitable establishments, and the question to decide was, whether the disease was or was not contagious. On examining the scalp with a microscope, I readily discovered the *Achorion Schoenlenci*, or fungus constituting true favus, and as this has been experimentally proved to be inoculable, I had no hesitation in preventing his admission into the school.

"A child was brought to me said to be affected with worms, because it passed yellow shreds in abundance, which, to the naked eye, closely resembled ascarides. All kinds of vermifuge remedies had been tried in vain. On examining the shreds with a microscope, I found them to consist of undigested spinal vessels of plants, and they ceased to appear when the vegetable broth used as food was abandoned.

"An individual was supposed to be laboring under dysentery, from the frequent passage of yellowish pulpy masses in the stools, accompanied with tormina and other symptoms. On examining these masses with the microscope, I found them to consist of undigested potato skins. On inquiry it was found that this person had eaten the skins with the potatoes. On causing these to be removed before dinner, the alarming appearance ceased, and the other symptoms also disappeared.

"An elderly lady conceived herself to be affected with insects continually forming on the skin, which produced incessant itching and tingling. All the hair was removed, and every kind of application was tried without effect. On rubbing the surface she always saw minute white rolls and black specks, which she regarded as insects in different stages of development. The torment and anxiety this caused her for many months it is scarcely possible to conceive. At length she labored under the idea that she was communicating the disease to her husband and daughter, when, at the request of her medical attendant in the west of Scotland, she came to Edinburgh in order that I might investigate and treat it. I had the pleasure of showing this lady, under the microscope, that the white bodies were minute rolls of epidermis or of the cotton cloth with which she rubbed the skin, and that the black specks were portions of dust or soot. Her hallucination being in this way dissipated, she returned home perfectly well."

HOW DOES CHLORAL INDUCE SLEEP?

BY Z. C. M'ELROY, M. D., ZANESVILLE, OHIO.

To the physicist, the human body is presented as a simple dynamic problem. The mechanical, sensory, thermal, emotional, and intellectual phenomena evolved by any living being are due to, or are co-incident with chemical changes of matter, and, most likely, always the decay or oxidation of its tissues. The food eaten must be transformed into organic forms, or tissues, and chemical change of matter must occur, and that always in the interest of decay, simultaneously with the evolution of any of these vital phenomena.

Throughout the domain of physical science, these premises, if drawn from anything else in the universe than the human body, would warrant the induction that the physical and physiological unities of organic life are *form* and *motion:* that is, that the materials of a human body must have definite forms; and motion, or chemical changes, must occur in the molecular structure of the forms, as fundamental conditions for the performance of a function. But until recently, the boldest scientists have hesitated to apply physical methods, and physical laws, towards the solution of the phenomena of organic life. But it is done now, and with results so much more satisfactory than by past methods, that its general adoption cannot be long delayed.

In the investigation of any complexity, when the ultimate units, or simples, have been reached by the physicist, further progress in experiment and induction is beset with fewer difficulties and rewarded with greater certainties or truths as results. From these unities and other known phenomena, probabilities, possibilities, improbabilities, and impossibilities can be predicted with nearly absolute scientific accuracy. Thus, it is scientifically possible, probable, and almost, if not quite, certain, that during the transformation of food into tissue forms, force is conserved, or locked up, as it were, in their chemical structure, to be evolved as the dynamics of organic life by their molecular decay or oxidation. A further induction, with nearly the same scientific accuracy and certainty, would be that the sole power of therapeutic agents would be in the influence they exercise over these physical units of form and motion — sometimes, as by so called caustics, in the destruction of the forms; but mainly over that of motion, or chemical changes, though each finally merges into motion. Neither the empirical experimenter, physicist, or chemist, either by accident or design, has ever been able to produce or construct an organic form, which evolved an organic function; for the records of pathology show conclusively that material form and function are inseparably connected in organized life, and that with loss of form, and precisely to the extent of loss of form, function ceases, and, in most cases, ceases forever. And with motion above or below normal velocity, function is proportionately deranged, and forms endangered.

From these facts and inductions, the only scientific probability or possibility in reference to the modus operandi of chloral in inducing sleep is, that it retards motion, or chemical changes in the forms of the human body, both in the interest of repair and decay, or waste. The chemical changes or motion of matter, upon which the phenomena of life are dependent, are reduced, or retarded to the minimum compatible with their continuance and resumption of normal activity; the machinery, so to speak, is simply held in check, to resume its working, as if no interruption had taken place, after a certain time, and under certain conditions, which is precisely the character of the chloral sleep, as pointed out by Dr. Nichols. It is further scientifically possible, and probable, if not absolutely certain, that the only results any mode of force directly, or indirectly, in chemical combinations of matter, can produce in a living human body are as follows: —

1. Promoting motion, in the interest of repair or decay;
2. Retarding motion, in the interest of repair or decay;
3. Changing the forms of the tissues.

At least, into one or the other, or some combination of these three results, can be merged every effect that can be made to occur in a living human body.

Does a chemical combination of matter promote motion in the interest of decay beyond a certain velocity, it is designated as an active or deadly poison, as strychnia. Does any retard motion below a certain velocity, it is likewise called an active poison, as prussic acid, etc. Does any organic compound, as the virus of serpents, small-pox, scarlatina, etc., or any product of chemical laboratories, as caustics, calomel, etc., change forms, it is called a poison too.

It seems, therefore, sufficient to satisfy scientific accuracy, to refer the modus operandi of chloral, in certain doses, simply to the retarding of motion to the minimum compatible with its resumption, in the shortest time, and with the greatest safety and comfort, — greater indeed than any other known agents.

IMPURITIES IN DISTILLED WATER.

ONE of the intensely interesting questions of the day is the germ theory of disease — that is, that many diseases have their origin from organic germs floating in the air. Another, and in some measure a connected question, is that of spontaneous generation of living organisms. Many accomplished scientific men, physicians, and microscopists have entered into these investigations. Prof. Wyman, of Cambridge, and Pasteur and Pouchet, of France, have studied the subject of spontaneous generation. In their experiments they depend on the purity of distilled water, that is, its freedom from organic germs. Dr. Angus Smith, of Manchester, England, has collected the organic matter of the air, for the purpose of searching for germs. The contents of the air were collected in a large bottle, and washed with a small quantity of distilled water. The microscopic investigation was done by Mr. Dancer of Manchester, a well-known expert at microscopy, who reported a vast number of organic forms as thus collected. Metcalf Johnson has published in the *Monthly Microscopical Journal* several papers on "what he has found in the air."

All these investigations depend finally on the absence from the water of organic matter or germs.

Having undertaken within a few months to ascertain the organic contents of the air in Boston, I commenced by drawing a large quantity of air through a small quantity of filtered water, which, when examined with the microscope, appeared microscopically pure. I found large quantities of organic matter, a very few organic *forms*, and a great many very minute bodies, which, may be, were fragments of organic or inorganic matter, or monads, or germs, according to the fancy or theory of the observer. Not feeling quite satisfied as to the pu-

rity of the water used, I evaporated a drop of it on glass. Placing that under the microscope, I beheld at once a collection of the same organic matter and minute bodies that I first supposed I had obtained from the air. This put an end to the use of filtered water. I then obtained from a friend a sample of carefully distilled water, which had been, however, distilled a month. Testing that in the same way, I found the same things more abundant even than in the filtered water. Another sample, also distilled some weeks, but kept with great care by Prof. J. Bacon of this city, gave precisely the same results. A third trial — on a sample freshly distilled, expressly for me, from a perfect apparatus, entirely copper and tin, the steam nowhere coming in contact with glass — also gave organic fragments, looking like degenerated or decaying epithelial cells, as before, and vast numbers of the minute bodies, $\frac{1}{50000}$ to $\frac{1}{10000}$ of an inch in diameter. Although nothing could be seen by the eye in the water in a bottle (a bottle has considerable magnifying power on its fluid contents), yet there was sufficient deposit from one drop on the glass slide to be distinctly visible.

These results indicate that no reliance is to be placed on any conclusions or inferences to be drawn from any experiments yet reported, as to the existence of organic "germs" in the atmosphere, where the medium of collection or examination was water; and when glycerine is used, we cannot follow any development of the supposed germs to ascertain their nature. The plan proposed by Dr. R. L. Maddox, in the June number of the monthly *Microscopical Journal*, seems to be the most reliable, but even that is not absolutely certain. The question now is, Is it possible to obtain in any manner absolutely (optically — not chemically) pure water?

C. STODDER.

BOSTON, *July*, 1870.

THE "BEAD" ON LIQUIDS.

A DRUGGIST in Sheffield, Mass., writes as follows: —

"It might interest many readers of the JOURNAL OF CHEMISTRY if you would give in it your views of the cause of the phenomenon called 'the bead' in alcoholic liquors. The popular idea, that it is an indication of the alcoholic strength of the fluid, is completely disproved by the fact that common alcohol (90%) shows very little of it, and pure Cologne spirit none at all. I have cursorily examined a number of tinctures, etc., in the hope of tracing some general principle that would account for it: The preparations which showed it most strikingly were tinctures of Capsicum, Cubeb, Lupulin, Senna and Jalap, and Tolu; and also Cologne, made after Parrish's recipe No. 1.

It was marked, though in somewhat less degree, in tinctures of Aloes, Calumba, Cardamom (simple and compound), Hyoscyamus, Kino, Squills, and Valerian.

It was distinct, though not striking, in tinctures of Catechu, Cinchona (*not compound*), Cinnamon, Benzoin Co., Belladonna, Aconite, etc., Krameria, Assafœtida, Aloes, and Myrrh, and Spts. Lavender Co."

Remarks. — We suppose that what is called "bead" or "froth" upon liquids, results from the intermixture of air with the liquid. The "bead" is a minute air-bubble, and is most easily formed by agitating liquids which are of a mucilaginous, soapy, or oily nature. Alcoholic liquors which hold large proportions of water afford the froth readily. Rum made from molasses gives more froth than diluted alcohol of equal strength. The "bead" is an uncertain guide in indicating the alcoholic strength of liquids.

THE MEDICAL MAGAZINES FOR JULY.

WE hoped, as we intimated in our last, to give in this number a summary of the leading articles in our medical exchanges for July, but we have received only a few of them before going to press, and those not in season for a thorough examination.

The New York Medical Journal has elaborate papers on Intra-uterine Medication, by Prof. Peaslee; on the Nature and Treatment of Croup, by Dr. J. H. Hobart Burge; on the Origin of Diabetes, with new experiments regarding the Glycogenic Function of the Liver, by Prof. Lusk; and on the Physiological Effects and Therapeutic Uses of the Bromides, by Dr. Z. C. McElroy.

The American Practitioner, which is one of the handsomest as well as one of the best of our exchanges, has important articles on the Use of Electricity in Medicine, by Prof. Holland; on the Treatment of Pneumonia, by Dr. J. Hale; on the Mineral Springs of Kentucky, by Prof. L. P. Yandell, Jr.; and on Immovable Apparatus in Fractures of the Lower Extremity, by Prof. D. W. Yandell.

The Chicago Medical Journal has papers on Clinical Experiences in Private Practice, by Dr. Z. C. McElroy; on Nasal Catarrh, by Dr. M. F. Potter; a continuation of the translation of Legros and Onimus upon the Influence of the Electric Current on the Nervous System; with much other fresh and valuable matter. It reprints in full Dr. Holmes's poem of "Rip Van Winkle, M. D.," the mingled fun and philosophy of which will be heartily appreciated by our Western friends.

The Northwestern Medical and Surgical Journal is a new monthly, published at St. Paul, Minnesota, by the Editor, Dr. Alexander J. Stone. The first number is very promising.

The Indiana Journal of Medicine has reached its third number, in which we find an excellent paper on the Use of Hydrate of Chloral in Cerebro-spinal Meningitis, by Dr. A. Patton. The Abstracts from Foreign Journals, by the Associate Editor, Dr. G. Bell, are a good feature of this young monthly.

CANCERS CARBONIZED. — Prof. Scott, of New York, has discovered a new method of treating cancer, which promises to supersede the empirical and unsatisfactory remedies hitherto employed. He applies to the surface of the sore the chloride of chromium incorporated with stramonium ointment. This preparation, in the course of a few hours, converts the tumor into perfect carbon, and it crumbles away. Specimens of cancers thus carbonized were shown at a meeting of physicians at the N. Y. Medical University, and were examined with much interest. They had the appearance of charcoal, and were easily pulverized between the fingers. The remedy causes little or no pain, and is not poisonous. It is not stated whether it is the protochloride or the sesquichloride of chromium which is used. It is the latter which is usually meant when the "chloride" is spoken of. As the report of Prof. Scott's paper in which he gives an account of his discovery speaks of this chloride as "a new salt" of chromium, it may be that it is neither of those just mentioned; for they are by no means "new" to chemists.

BOSTON MEDICAL AND SURGICAL JOURNAL. — We congratulate the publishers and the readers of the B. M. and S. Journal, that a change has been made in its editorial conduct. Dr. Parks has retired, and is succeeded by Dr. Francis H. Brown of this city, a gentleman of rare culture and scientific attainments, a physician who brings to the editorial chair much professional experience, and a candid, discriminating mind. He has the efficient aid of Dr. H. H. A. Beach, and in charge of these two accomplished gentlemen we predict for the Journal a decided increase in patronage and influence.

FOREIGN NOTES.

M. Viennet, the French author, has sent the following note to Dr. Gannal, the inventor of a new process of embalming: "Your prospectuses annoy me. During the last two days I have received no less than four of them, — one, as peer of France; a second, as member of the Academy; a third, as member of the Legion of Honor; a fourth, as a taxpayer. You doubtless reckoned on having four corpses to embalm. There will be only one, however; and that I will take good care to preserve from your tender mercies, having this day inserted a clause in my will to deprive you of the possibility of this little benefit. Thanks for so many kind attentions."

Alphonse Karr has happily defined dyspepsia as "the remorse of a guilty stomach."

A dentist now occupies the room where Balzac was born, and an English admirer of the great French author recently had two sound teeth drawn there as a souvenir of his visit.

M. Decaisne has made a report to the French Academy on the influence of the sewing-machine upon the health of women using it. He considers that its ill effects have been greatly exaggerated, and that the health of those who work with it averages as good as that of needle-women.

M. Sauer, of Berlin, after experimenting with all kinds of anæsthetics, comes to the conclusion that the very best is a mixture of protoxide of nitrogen, chloroform, and atmospheric air. He believes this mixture to be free from the dangers that attend the use of either chloroform or the protoxide alone. The proportions he uses are as follows: chloroform, six grammes; atmospheric air, three quarters of a litre; protoxide of nitrogen, sixteen litres.

In Europe, diphtheria and croup have been successfully treated with a wash of permanganate of potassa, one scruple of which is dissolved in six ounces of water.

The *Union Médicale* reports that a severe case of eclampsia was cured by bromide of potassium. One drachm of the salt was dissolved in four ounces of water, and a teaspoonful given every fifteen minutes.

Dr. Matthews Duncan is spoken of as the successor of Sir James Y. Simpson in the obstetrical chair of the University of Edinburgh. There is a movement on foot for placing a monument to the latter in Westminster Abbey.

HAIR DYES.

WITHIN the past year or two the public have been warned through your JOURNAL, and also many secular papers, against the use of preparations for the hair containing lead, and many physicians whose attention has been directed to the matter have warned their patients against it. Still the sale and use of these deleterious compounds continue as great as ever. Among all this class of nostrums I must rank "Hall's" preparation as one of the worst. I have had several, not only incipient, but fully developed cases of lead poisoning, which could only be accounted for by the use of this article. One of my patients is a lady who for many years has suffered from general nervous diseases, and her husband, who is an intelligent druggist, long ago suspected that the hair dressing she used (Hall's) was the cause of the peculiar benumbed feeling of the scalp, with derangement of the muscular power of the hands and arms, and caused her to cease from using it for some time, but for a few months past she has again used it. I found her in such a peculiar condition that I was led to suspect lead poison, and questioning brought out the fact. Is there no way by which the manufacture and sale of such well-known poisons can be prevented?

I recommend to those needing a preparation for the hair, the following, which is used by the ladies of my own family, and found to be all they require: Castor oil 4 drachms, Glycerine 2 drachms, Aqua Ammonia 1 drachm, good Cologne 6 oz. Mix the oil with the cologne first, shaking it well, and then add the rest.

Where there is evident weakness in the hair-bulbs, use the following: Castor oil 2 drachms, Glycerine 4 drachms, Tinct. Cantharis 1 drachm, Cologne 6 oz. Neither of these is found to injure the hair, and they keep it soft, and the scalp clean.

BENJAMIN WOODWARD, M. D.

WYANDOTTE, KANSAS.

SACHET POWDERS.

THE *Druggist's Circular* publishes the following in reply to inquiries for first-rate articles of the kind: —

Frangipanni Powder.

Powdered violet roots,	3 pounds,
" sandal-wood,	$\frac{1}{4}$ pound,
Orange oil,	1 drachm,
Rose oil,	1 "
Oil of sandal-wood,	1 "
Pulverized musk,	1 ounce.
" civet,	2 drachms.

Heliotrope Powder.

Pulverized violet roots,	2 pounds,
" rose leaves,	1 pound,
" Tonka beans,	$\frac{1}{2}$ "
" vanilla,	$\frac{1}{4}$ "
Granulated musk,	2 drachms,
Oil of bitter almonds,	5 drops.

Patchouli Powder.

Pulverized patchouli leaves,	1 pound,
Patchouli oil,	1 scruple.

Rose Powder.

Pulverized rose leaves,	1 pound,
" sandal-wood,	$\frac{1}{2}$ "
Rose oil,	2 drachms.

Verbena Powder.

Dried and pulverized lemon peels,	1 pound,
Caraway seeds,	$\frac{1}{4}$ "
Oil of lemon peels,	4 drachms,
Oil of bergamot,	1 ounce.

GENTIAN IN DYSPEPSIA.

DR. CHARLES CARTER, of Philadelphia, in an article contributed to the *Indiana Journal of Medicine*, states that he has found the following combinations of Gentian very serviceable in numerous cases of dyspepsia: —

℞

Gentian Root (broken), six drachms.

Wild Cherry Bark, one half ounce.

Quassia, two drachms.

Infuse in two pints of hot water.

Dose, a wineglassful before meals.

℞

Sub-Nit. Bismuth, one drachm.

Calc. Carb. Precip., three drachms.

Fl'd Ext. Gentian, one half ounce.

Aqua Cinnamon, three and one half ounces.

Dose, a teaspoonful before and after each meal.

"This latter," says Dr. Carter, "is not a very elegant mixture, for the powders, which must be given suspended in the liquid, precipitate. The mixture, therefore, requires to be well shaken before using. It is, however, very effective. I have recently administered it in a very severe and protracted case of dyspepsia, with complete relief of all the symptoms. The patient was under its use for about eight weeks. When he applied to me he was affected in the following manner: Loss of appetite, severe and frequent attacks of colic, diarrhœa, want of sleep, great emaciation, cough, want of ambition, and a confused and disturbed state of the mind. The emaciation was so marked that I was led to suspect phthisis, but a careful examination of the chest did not reveal any evidence. The patient informed me that for the two weeks preceding the last time I saw him, he had gained in weight seven pounds."

A CHILD BORN WITH A CHIGNON. — Dr. J. M. Marchant of Warren, R. I., writes as follows concerning a curious freak of nature that lately came under his observation: —

"A male child was recently born in this town, having upon his head what is rather a useless appendage to one of his sex. Covering that part of the head usually occupied by the *chignon*, is a thick curly mass of hair some three inches in length, and dark brown like the mother's, while that upon the rest of the head is short, thin, and very light. The father's hair is red."

A CAT INFIRMARY.

A RICH and eccentric business man, of Columbus, Ohio, has recently made a will, which disinherits all the natural heirs of the maker of it, and devises the entire property in trust for the establishment of an *infirmary for cats.* It provides areas for that sweet amatory converse so dear to the feline heart, and ratholes of the most ravishing nature to be kept well stocked. The most ingenious contrivances are provided for securing to the rat a chance for escape, so that the cats may not lose the pleasure of the chase by finding their prey come too easily. High walls are to be built, with gentle sloping roofs, for the moonlight promenade and other nocturnal amusements of the cats. The trustees are directed to select the grounds for this novel infirmary in the most populous part of some great American city, and the devisees are to be protected, by a competent force of nurses, from the ravages of men and dogs. No person of the male sex is ever to be admitted within the walls, and no female who has children or is under thirty years of age.

The last provision of the will is more ridiculous than the previous ones. Says the devisor: "I have always been taught to believe that everything in and about man was intended to be useful, and that it was man's duty, as lord of animals, to protect all the lesser species, even as God protects and watches over him. For these two combined reasons — first, that my body, even after death, may continue to be made useful; and secondly, that it may be made instrumental, as far as possible, in furnishing a substitute for the protection of the bodies of my dear friends, the cats — I do hereby devise and bequeath the intestines of my body to be made up into fiddle-strings, the proceeds to be devoted to the purchase of an accordeon, which shall be played in the auditorium of the cat infirmary by one of the regular nurses, to be selected for that purpose exclusively — the playing to be kept up for ever and ever, without cessation, day or night, in order that the cats may have the privilege of always hearing and enjoying that instrument which is the nearest approach to their natural voice." — *The Quart. Jour. of Psychol. Medicine.*

A NEW REMEDY FOR ASTHMA.

THE following extract from a letter lately received makes mention of an addition to the *materia medica:* "Dr. P., of Lawrenceburg, Indiana, some forty years ago related to me, among other incidents of early frontier life on the Ohio, his experience of a novel remedy involuntarily taken. The doctor had from childhood been a martyr to asthma; it was the rock ahead for which he was continually on the lookout. One day — it must now be near seventy years ago — in travelling the rounds of a country practice, and while yet at a distance from any shelter, a storm of rain burst suddenly upon him. He rode at full speed for the nearest cabin, distant some miles, and reaching there, drenched to the skin and gasping for breath, he dismounted and made the best of his way to the door. As he entered he met the inmates of the cabin rushing pell-mell out in the rain, holding their noses, and giving expression in every possible way to the most extreme disgust. He was not long in discovering the cause for their actions. The dogs had chased a polecat under the floor, and the whole atmosphere was loaded with its horrible effluvium. It was a choice between polecat and asthma, and Dr. P. chose the former and remained in the house. To his surprise the constriction of his chest began to disappear with the first inhalation, and in ten minutes he was free from every trace of the paroxysm. As soon as he could do so, he procured the musk-bag of one of the animals, and prepared an alcoholic tincture. The scent of this never failed to avert promptly a paroxysm of the disease, and ultimately the remedy, or time, or both combined, effected a permanent cure. He assured me also that he had successfully used it in cases similar to his own. Belonging, as it does, to the same class with musk and castor, but infinitely more active and efficient, if its odor be taken as a criterion of power, it may prove a valuable antispasmodic. I have seen cases of hysteria upon which, from a safe distance, I should have been delighted to witness a trial of its powers." — *Amer. Practitioner.*

A PHYSICIAN ON THE STAND.

THE standard legal dictionaries in use may be searched in vain for more accurate definitions of legal terms than those recently given by a physician in Pulaski, Tennessee, as reported to us by a leading member of the bar of that place. Mr. B. and a Mr. L., opposing counsel in a pending case, were engaged in taking depositions to be used on the trial of the cause. The question as to a certain woman's soundness of mind being in controversy, a physician was called as a medical expert, and during his examination the following dialogue took place: —

Question. — Do you think this lady is of sound mind?

Answer. — No, sir; I do not.

Ques. — Does she know the difference between a "power of attorney" and an "absolute conveyance?"

Ans. — No, sir; of course she don't, and there are very few women who do.

Ques. — Do you know the difference?

Ans. — Yes, sir; of course I do; do you suppose I am an ignoramus?

Ques. — Well, sir, will you be kind enough to tell us the difference?

Ans. — Well — well, a "power of attorney" is the strength of mind of any particular lawyer; and an "absolute conveyance" is a hack, or omnibus, or railroad car, or something of the sort. — *Bench and Bar.*

"CHOCK FULL OF LIGHTNING!"

A CORRESPONDENT on the wing, in one of our Western States, gives the following as an illustration of the ignorance of some practitioners in the West. He says: "I was invited home to dine one day by a regular M. D., a graduate of a Cincinnati college, who is doing a large business, and is worth perhaps $10,000. In the course of our conversation he mentioned the fact of his having lately been called to see a woman who had been struck by lightning. After stating his treatment in the case, he said that the results had not been satisfactory, and that if called to see a similar case again, he would pursue a different course. I asked him what that would be. Said he, 'I would wrap her in a wet sheet to draw the lightning out of her! Why,' said he, 'she's chock full of lightning yet; you can see it run down her legs and arms every now and then, and she can feel it shootin' through her body. Now if I had wrapped her up in a wet sheet, the lightning would all have been drawn out, and she would been got well sooner.' In answer to all my explanations of the laws of electricity, his reply was, that 'he didn't keer for equilibriums or anything else; *he* knew she was chock full of lightning anyhow.' This case is true in every particular, and the man has a diploma from a regular medical school, and *one* of the first in this country." — *Med. and Surg. Rep.*

Boston Journal of Chemistry.

[Vol]ume V. BOSTON, SEPTEMBER, 1870. Number 3.

Familiar Science.

LEATHER IN THE TEA-CUP.

[E]VERYBODY knows, we presume, that leather [is m]ade by steeping hides in an infusion of certain [veg]etable substances which contain a compound [cal]led *tannin.* The cheapest source of this tan[nin] principle is oak bark, but it is found in [gre]ater or less quantity in many other plants, as [th]e grape, the hop, coffee, tea, etc., and from [th]e it can be dissolved out with water. The [skins] of animals consist mainly of albumen [and] gelatine; indeed these substances are abun[dant] in all animal matter. In the blood and in [mil]k the albumen is merely suspended, as it [wer]e, in the water which constitutes by far the [large]r portion of these fluids. Tannin and al[bume]n have a remarkable affinity for each [ot]h[er], and unite as soon as they are brought in [conta]ct. The result of their union is the in[solub]le, tough material which gives leather its [distin]ctive character. When the hide is steeped [in th]e infusion of oak bark, the albumen of the [form]er thus combines with the tannin of the lat[ter, a]nd the loose, soft tissue of the skin is con[verte]d into hard, tough leather.

[N]ow when we pour milk into a cup of tea or [coff]ee, a similar chemical combination occurs. [The] albumen of the milk and the tannin of the [tea i]nstantly unite, and form leather — or minute [part]s of the very same compound which is pro[duce]d in the texture of the tanned hide, and [whic]h, as we have said, makes it *leather* as dis[tingu]ished from the original skin.

[T]annin has a peculiar taste which is tech[nical]ly called *astringent.* We can detect this [fla]v[or] in chewing the skin of a grape or the [see]ds of a raisin, and in coffee and tea before [the m]ilk is added. One of the main objects in [addi]ng the milk is to mitigate this astringent taste, [and t]hus enable us to enjoy more perfectly the [fine] flavor of the tea or coffee. Some people [pref]er the full astringency of the tannin, unmodi[fied b]y the milk, and so take the beverage with[out th]e leather; but with most of us the tea-cup [regul]arly becomes a miniature tannery. In the [cours]e of a year, a tea-drinker of average habits [will h]ave imbibed leather enough to make a pair [of sh]oes, if it could be put into the proper [shape] for the purpose.

[It] will be found, upon experiment, that a [small] quantity of milk produces a much greater [opaci]ty with tea than with water which has been [tinged] of the same color as the tea by the addi[tion] of burnt sugar. Of course, it is the minute [partic]les of leather floating in the liquid in the [form]er case, that causes the difference. If we [pour] the tea into a glass and hold it up to the [li]ght while the milk is dropped in slowly, the [chem]ical action will be very clearly seen. If [we u]se a very strong infusion of tea, and put in [a con]siderable quantity of milk, we can get a distinct precipitate of the *tannate of albumen,* or solid leather, by letting it stand for an hour or more.

We may add that the presence of tannin in tea is shown by the action of the liquid upon iron. Tannin, in most of its forms, unites instantaneously with this metal to form *ink;* and a drop of tea upon a knife-blade produces that familiar black compound at once. Singularly enough, the tannin in coffee does not unite with iron in this way, so that other tests are necessary to detect it.

A RAILROAD TO THE CLOUDS.

We have recently been on an expedition to the clouds, taking railroad direct to that misty region. But, as is usually the case when we attain to extraordinary results by any human art or invention, our ambition is only excited to reach further, or mount higher. We are now waiting for some one to construct a railroad to the moon, and when such a line of communication is opened we shall engage passage without investigating or questioning the *safety* of the device. Any one who has been above the clouds by rail, and reached that altitude by direct, almost perpendicular ascent, is prepared to go in any direction where audacious man may place his iron bars and blow his steam whistle.

The railway from the base to the summit of Mount Washington in New Hampshire is a marvel of modern engineering skill and daring. The road is constructed up the face of the huge rock, the grade being much of the way "very heavy," or equal to one foot ascent in three. This gives an upward inclination about equivalent to the roofs of our Gothic edifices, and when the engine is up the incline and stationary, it seems at a little distance to be clinging to the rock in a most fearful position. We may well imagine it to be some strange live animal, which has crawled up to a dangerous point on the cliff, and is there fixed, not daring to go forward or backward, for fear of a tumble. The track is laid to the very summit of the mountain, and the train enters and often passes above the clouds, which usually rest upon the lofty peak.

This railway is a great steam elevator of peculiar or novel construction, and it accomplishes an end which has never been reached before in the history of engineering. It requires about one and a half hours to "go up," including three stops to "take in water." It is estimated that the train would come down in *three minutes* if left to itself. We hope it will never be "left to itself," and that its trucks and cogs will never "play false" when they are pressed upon by a human freight. A train of passengers left to go down that fearful incline would be instantly torn or crushed to a jelly. But we are asked, Is it *safe?* We have perhaps given a satisfactory practical expression of our views upon this point, by placing ourself and family in charge of the engineer, and making the ascent. If we were asked if we would make a second excursion, some hesitation would be manifested before replying, yes; and yet abundant and efficient safeguards are provided against accident, and we do not well see how one *can* occur.

THE SEA AND THE LAND.

"The troubled sea that cannot rest" is an active and incessant worker. In calm and in storm it is alike busy, steadily carrying forward a thousand mighty labors. When the poet, in that famous apostrophe to the ocean which is familiar to every schoolboy, said, —

> "Thy shores are empires changed in all save thee,"

he merely put into verse the popular impression that the shores of the sea remain unchanged from age to age. But geology tells a different story. It teaches us that the boundary between the ocean and the land is ever changing. A map of the world at one geological epoch will not serve to represent its appearance at an earlier or a later period in its history. The continents are no more fixed and immovable than the waters that surround them. Their surface is rising and falling continually in undulations which, if slower in their motion than the waves of the sea, are on an immensely grander scale. We talk of "mountain billows," but the mountains themselves are nothing more than the billows of the great tide which in the lapse of geological ages sweeps across the continents. The "everlasting hills" are not eternal, but are the ripples of this ceaseless rise and fall to which the solid earth is subject.

Even within historic times, and in some cases within the limits of a single century, this undulation of the land has been detected and measured. There are localities where the changes thus effected in the geography of large districts are very striking. M. Quenault, in a little book recently published with the title "Les Mouvements de la Mer" (The Movements of the Sea), gives many interesting facts, gathered from old records as well as from his own observation, respecting the sinking of the land and the encroachments of the sea on the coasts of Brittany, Normandy, and other places on the northern and western borders of France. Thus, in the Gulf of Cordouan, at the mouth of the Gironde, the sea has advanced 730 metres (2,395 feet), within twenty-eight years; the buildings on the Pointe de Grave have often been destroyed and rebuilt, and the light-house is now removed, for the third time, more inland. The sea flows more than ten metres deep over what a short time since was a sandy beach.

The popular legends of Brittany lead one to think that many places near the coast, and now immersed, were formerly above the level of the sea. With their passion for the marvelous, the country people refer these facts to supernatural agency, where the devil plays a prominent part.

The Bay of Douarnenez, where at high water the depth is considerable, is the site of the once flourishing city of Ys. At the south side, when the tide is low, are distinguished clearly, five or six metres under water, Druidical remains, altars, portions of walls, and ruins of various monuments. On the opposite side, near Cape Chevre, they are also to be found, though not so easily seen and not so numerous. The fishermen there believe all the reefs and rocks in the bay to be portions of the ruins. In the sixteenth century, when the water in the bay was not so deep as now, Canon Moreau was able to follow the lines of a vast inclosure of masonry, and above the sand, in the shallower places, he discovered funeral urns, stone sarcophagi, etc. The traveller Comby also adds, that after a storm which excavated and scooped out portions of the sands, one could perceive traces of elm trees, disposed with a regularity which shows that a plantation existed at this spot.

Submerged forests have been found on the coasts of Brittany, and particularly in Finisterre, in the neighborhood of Morlaix. There are historical documents to prove that at the Bay of Mont Saint-Michel the coast has been submerged since the period of Roman rule. Rouault, Curé de Saint-Pari, says: "About the year 400 there was in Lower Normandy, towards the west, a large forest named Scicy, extending from the rocks of Chausey to the Mont de Tomba," now Mont Saint-Michel. In the twelfth century the troubadour Guillaume de Saint-Pari referred to this submerged forest in a quaint bit of old French, which may be freely translated thus:—

"Not far from Avranches, on Brittany's shore,
Quokelonde forest spread out of yore;
But that famous stretch of fertile land
Is hidden now by the sea and the sand;
No more will its venison grace the dish —
The ancient forest yields nought but fish."

This forest of Scicy was said to have been full of wild beasts, and peopled by half-savage natives, to whom succeeded, in Christian times, a number of anchorites who sought retirement there, far from the tumult of the world. The parishes of St. Louis, Mauny, and La Feuillette have disappeared beneath the waves since the thirteenth century. A story is told of a priest of the diocese of Dol, that having, in 1685, learned by tradition that there was formerly, in the place then (and now) occupied by the sea, a parish named St. Louis, he informed the Court of Rome that this living was vacant "*per obitum*." Upon this they consulted the registers and found actually that there had been presentations to this living by former Popes. A priest of Basse-Bretagne was therefore appointed, and he departed at once to take possession. But on arriving in sight of Mont Saint-Michel, what was his surprise when he was shown, on the sands and in the sea, the place where was formerly situated his pretended parish.

There is every reason to believe that the whole of the Channel Islands were, at one time, part of the mainland of France, and there is positive proof of the island of Jersey having been so. There are certain existing manuscripts belonging to the monastery of Mont Saint-Michel which tell us that, in the sixth century, the district of Jersey was separated from the mainland of Coutances by only a narrow rivulet, bridged by a single plank, which the inhabitants were bound to keep in repair for the Archdeacon of the mother church to pass over on his periodical visitations. In the register of the taxes of the island, there is an entry referring to rents received from various persons for the privilege of allowing pigs to feed on the acorns in the forest of St. Ouen — now the bay of that name. M. Quenault gives an exceedingly interesting map of this part of the French coast — a *fac-simile* of a chart copied in the year 1406 from one of a much older date. This map shows the coast line from Cape Finisterre down to St. Malo to have been, at that time, from six to twelve miles farther west than at present. The island of Jersey is part of a peninsula, ten or twelve miles wide, stretching out from the French coast to a point some three or four miles west of that island as it exists at present. Guernsey also is shown to have then been considerably larger than the Isle of Man now is. Throughout the whole area of this departed coast are depicted the positions of some score of places where evidences of the existence of submerged forests have been discovered.

The sinking of this region which has taken place within the period of history has occurred only between the parallels of 10° S. and 55° N. latitude. North of this, it is gradually becoming more and more elevated.

M. Quenault concludes, with regard to the depression of the land: "One gathers from all these evidences, that the movement, since the eighth century, has been about two metres a century. If it continues at the same rate for ten centuries more, the peninsula of Cotentin will be an island, and all the ports of La Manche will be destroyed. Some centuries later and Paris will be a sea-port, waiting only to be submerged in a score of centuries. Thus in a period less than half as long as that during which the pyramids of Egypt have braved the ravages of time, Paris itself, if it is not burned down during one of the revolutions of its inhabitants, — as amiable and *spirituel* as they are inconsistent, — Paris will probably be engulfed in the Atlantic, a master before whom the intractable Parisian must haul down his flag. Let him take warning!"

HAILSTONES.

How are they formed in such hot weather? This seems to be a mystery to most. The *Boston Journal* of June 24th, speaking of the late hailstorm says: "It is a curious fact that hailstones generally do not fall with the usual velocity of rain;" and then proceeds to give different theories to account for this fact. "One theory is, that the clouds from which they come have a considerably lower altitude than ordinary rain clouds. Another suggestion is that made by the late Prof. Olmsted, that the hailstone, when it starts downward, is but a nucleus of snow, and that it congeals and accumulates layers as it falls, which process retards its velocity."

The true reasons why hailstones do not fall so rapidly as rain drops of the same weight, are, 1st, that ice is specifically lighter than water; and 2dly, that rain usually falls in round, smooth globules, the most compact and solid form, while hailstones are often rough and irregular in their forms, causing greater resistance from the air. And besides, both rain and hail usually attain a uniform velocity respectively, long before reaching the earth, like shot falling from a great height. The resistance of the air soon counterbala their weight.

Most of the books on meteorology state tha really satisfactory theory of the formation of h stones has been devised; but it seems to writer, that this phenomenon is susceptible of v satisfactory explanation, if not absolute scien demonstration. He will endeavor to give his vi as briefly as possible, and at the same time to m the subject intelligible to the ordinary readers the JOURNAL.

It should be remembered that the atmospher an elastic fluid, eight hundred times lighter t water, yet of great weight, pressing everywh upon the surface of the earth about fifteen pou to the square inch, but, as we rise above the level, decreasing in density with great uniformity that at a height of about three miles it is only half this weight, or $7\frac{1}{2}$ lbs.; at *six* miles, one fou or $3\frac{3}{4}$ lbs.; at nine miles, one eighth, or $1\frac{7}{8}$ lbs. fifteen miles, $\frac{1}{32}$ or $7\frac{1}{2}$ ounces, etc. The ai principally composed of oxygen and nitrogen ga in the proportions of 21 to 79 parts by weight, about one thousandth part carbonic acid gas. H we have the material for the winds, as also medium for watery vapor, from which falls the d and out of which the clouds are formed.

Heat causes this vapor to arise from sea land, — from whatever contains moisture. This visible process is going on continually, as soon one storm is over, preparing for another, till atmosphere is sometimes completely saturated w it, while yet it may remain perfectly clear — n cloud to be seen.

Now for the process by which this invis vapor, diffused through the lower strata of atmosphere, becomes *cloud*, yielding rain, snow, hail. *Four* well established laws will prepare u elucidate the phenomena. *First*. In ascen from the earth every one hundred yards (n exactly, 352 feet) the thermometer falls *one* deg 200 yards 2°; 500 yards 5°; 1,000 yards 10°; 6, yards 60°. Above this, the law slightly varies.

The *second* law relates to what is called the *point*, as discovered by the illustrious Dalton. is the point of temperature where dew or cl first *begins* to form. As heat changes water vapor, so the abstraction of that heat restore to the form of *cloud*, or visible watery partic *Vapor* is invisible; as it becomes visible, it called *cloud*. By ascertaining the *dew point* at time, we may discover the entire amount of va in the atmosphere at that time. It has been fou that if the dew point be at 32°, just $\frac{1}{240}$ of the is vapor, so that if it should then all fall in rai would amount to 1.72 inches. When the dew p is at 52° (20° above 32°) just $\frac{1}{120}$ is vapor, or in.; when at 73° (21° above last) just $\frac{1}{60}$ is va or 6.91 in.; when at 80° (highest ascertained) $\frac{1}{48}$ is vapor, or 8.64 in.; that is, the vapor dou for about every 20° above the freezing point.

The dew point may be easily ascertained any time, by the aid of a thermometer and tumblers or pitchers. Fill one tumbler or pit partly full of hot water, the other with cold. N the thermometer as it stands in the air to be tes (say 72°). Now put the thermometer into the water, and pour in slowly from the cold, noti carefully when *dew* first begins to appear on outer surface of the glass; then take the readin the thermometer inside the glass (say 62°) and have the dew point, 62°. Take the differe (72° — 62° = 10°), and make careful note of for future use.

We are now prepared for the *third* law. W dense air is rarefied, or made thin, it is ther *cooled*. Exhaust one half the air from a recei and a thermometer inside it *falls*. The receive still full as before, though the air is only one

dense. The heat is consequently more widely fused. This principle explains why it is colder, you ascend into the upper regions of the atsphere, the air becoming more thin.

Now, as shown by our second law, if we could e that dense air at 72°, with the dew point at °, and carry it up 1,000 yards, it must expand, l so be cooled down those 10° to the dew point, l *cloud* would there begin to appear. All this evident; but how shall this dense air be thus vated?

If we build a fire in an open fire-place, the air heated above and rises, as indicated by the ascent the smoke. There is a tendency to a vacuum at fire, but the exterior air rushes toward it to tore the equilibrium, while the current continues ward over the fire. The same is true when re is kindled in an open field on a calm day. e heated air rises over the fire, as in the mney, while the air flows toward it from every and then *up*; it cannot accumulate. If the becomes powerful, the calm is destroyed; the d seems to start from all sides toward the fire, l there goes up, often carrying up large cinders, l if sufficiently powerful, this upward current y reach the dew point, and then *cloud* must in to form. If the fire be on a hill or mountain, Vesuvius, this greatly aids the process. Thus an ption of Vesuvius often causes torrents of rain.

And it is on these principles, doubtless, that we e the ordinary summer shower, with lightning thunder. It comes in the warmest weather; sun acts as a mighty fire, warming the surface he earth. As this becomes heated, the atmosre coming in contact with it also becomes heated rises, producing that glimmer we often notice a warm day, as also over a hot stove; but the qualities of the land probably aid this ascent, sing the heated air to glide up the sides of a more in a mass, and then reaching the summit n all sides, it pierces the cooler atmosphere, and s up an invisible current (like smoke) till it hes the dew point, and then what we often call hunder-head or summer-cloud, more properly a *ulus*, begins to form. If a brisk horizontal wind lowing, it may soon break away without rain, another and another start, and so over the le region. These clouds are thus formed, much we see a *steam-cloud* rising from a locomotive, ecially in cold weather; only this is soon dissipated he atmosphere. So the cumulus clouds, broken y from their base, begin to descend into warmer ons, and soon disappear slowly, as may be seen careful observation. But in order to complete demonstration, we must introduce a

Fourth law, or principle, that of *latent heat*. This hat form of heat which becomes *concealed* in ies, in their change from a solid to a liquid, or id to an aeriform state. In melting ice, the mometer stands at 32° in the mass till all is ted, when it rapidly rises to the boiling point, 2°, where again it stands till all is converted into m, when if confined its temperature again rises. heat applied during the *change* of state bes *latent*, as indicated by the thermometer's rening stationary.

A cubic foot of water (about 30 qts.) converted steam or vapor, under the ordinary pressure of atmosphere, measures about seventeen hundred c feet, and it requires a large amount of heat produce this change. But changing seventeen dred cubic feet of vapor back into *one* of water, ores that heat; it is no longer *latent*, but bees manifest, affecting the thermometer and the es. The heat thus developed in a single ver has been estimated equal to that produced burning 30,000 tons of coal, — an almost inconable amount of heat, like that of an intense ace, or Vesuvius itself in eruption. The consequence of this remarkable development of heat, at the dew point, is to increase suddenly and powerfully the upward current, forming cloud with great rapidity in the higher and cooler regions, the current driving the cloud into drops of rain and throwing these upward with more or less force, till turning *outward* they descend on all sides, — and some through the centre, if the upward current be not too violent, — and thus we have the beautiful shower of rain. The drops in their ascent and descent move somewhat in the form of a sheaf of wheat, standing upright, each straw indicating the line of a rain drop.

Now for the *hailstones*. If the shower become very violent, as is most likely in the hottest weather, the upward current may send up the drops of rain *ten miles high*, into regions of intense cold (over 100° below zero), accumulating as they ascend into large irregular drops, freezing in their upward as well as downward course through such intense cold, into irregular solid ice, it may be of large size; the water driven by the violence of the current, going up in sheets, or irregular masses, rather than round smooth rain drops.

And here another fact should be stated. At an elevation of about three and a half miles, a current of air is always blowing from S. W. to N. E. — that is, from the equator toward the pole, to restore the equilibrium caused by an opposite current — so that, when a cloud, in a severe shower, rises into this current, the top of the cloud is blown over toward the N. E. side of the shower, and in case there is hail, it falls in a single glade on that side. If, however, it is more intense, the hail overcomes this more gentle upper current, so as to fall in two glades on the opposite sides of the shower, with a space between, in which there may be little or no hail.

Such is believed to be the true theory of the ordinary summer shower, and also of the hailstorm. Does it not rest on long established principles? The view is confirmed by many observations as well as by science. Every one has observed how the wind always blows *toward* the shower, while it is coming up, apparently in exact opposition, and then as the shower passes over, the wind turns and follows it, adding material, as it were from every side; also, how calm it often is, in the very midst of it, caused by the wind blowing toward its centre, and then upward. If more violent, it may not rain at all in the very centre, while it is pouring in torrents on every side. This, too, accounts for the *fall* of the *barometer*, the upward current taking off a part of the atmospheric pressure. Lightning and thunder arise from the sudden condensation of so much vapor to rain, which develops immense quantities of electricity. The appearance of the clouds, also, especially the cumuli, clearly indicates their formation, as before intimated.

The above *four laws* have been long since established, but the honor of combining them, to illustrate the formation of rain, snow, and hail, as above briefly described, belongs to the late Prof. Espy of Washington. It is passing strange, after his demonstrations of this theory, so simple and yet so beautiful and satisfactory, that there should still be so much "mist" enveloping the subject in the minds of even scientific men.

The theory may be extended with modifications, to storms, tornadoes and nearly all the phenomena of atmospheric changes, especially as connected with the deposition of vapor, in whatever form.

D. W.

An alloy of 50 parts of lead, 36 of tin, and 225 of cadulum, is recommended for stereotyping purposes as more feasible and at the same time harder than that usually made with bismuth.

NOTES ON FAMILIAR SCIENCE.

Speed of Electric Signals. — Professor Gould has found that the velocity of the electric waves through the Atlantic cables is from 7,000 to 8,000 miles per second, and depends somewhat upon whether the circuit is formed by the two cables or by one cable and the earth. Telegraph wires upon poles in the air conduct the electric waves with a velocity a little more than double this; and it is remarked, as a curious fact, that the rapidity of the transmission increases with the distance between the wire and the earth, or the height of the support. Wires buried in the earth likewise transmit slowly, like submarine cables. Wires placed upon poles but slightly elevated transmit signals with a velocity of 12,000 miles per second, while those at a considerable height give a velocity of 16,000 or 20,000 miles.

Cabbage-Tree of New Zealand. — It may not be generally known that the cabbage-tree (*Cordyline Australis*), which grows so abundantly in New Zealand, contains a very considerable proportion of saccharine matter. In former years, says *Applied Science*, the Maoris used, when on their fishing excursions up country, to hack down a few of these trees near their encampments, and after a day's exposure to sun and air, cut off quids, which they chewed with great gusto. Fifteen years ago a gentleman resident in Otago obtained a fair sample of sugar manufactured by the Maoris from the cabbage-tree, which he sent to London for inspection. The process for extracting the sugar, so far as we are aware, has not been divulged by the natives, and probably no individual European is conversant with the matter. It might, then, form an interesting subject for inquiry and dissertation how the process was accomplished, and how far could the tree be utilized for such a purpose. The cabbage-tree may be readily propagated from seed, and its growth is comparatively rapid. The whole tree is fibrous, and can be made into paper. It grows to a diameter of from 1 ft. to 3 ft., and height from 10 ft. to 20 ft., and is found chiefly in swampy situations, although it grows on hill-sides. The stem is thickly fibrous, and the leaves, which are long (ribbon-like) and about 2½ in. broad, contain a good deal of fibre.

The Cork Tree. — This tree is a species of oak growing abundantly in Spain, Portugal, and Italy. In Georgia the experiment of raising the tree from the acorn has been successfully tried, and we have no doubt there are many parts of our country where it could be acclimated. The barking is commenced when the tree is fifteen years old, and may be repeated every eight or ten years afterwards with no injury to the oak, which, in spite of this periodical flaying, lives to the age of a hundred and fifty years. In July and August, incisions are made around the tree, and down to the root; the pieces which detach easily are soaked in water, placed under heavy weights, dried before a fire, and stacked in bales for exportation.

The cork-cutters cut the sheets into narrow strips, and round them into shape with a sharp knife.

The Sulphur Beds of California. — Sulphur has been chiefly supplied from the sides of Mount Etna, in Sicily, but the works on the shore of Clear Lake, California, produce now 4 tons a day. This lake occupies the crater of an extinct volcano, and the evidences of volcanic action abound in the vicinity. The sulphur bed consists of a bank resembling ashes, containing numerous alkaline and sulphur springs with vent-holes, from which sulphurous fumes escape. Pure sulphur crystals deposited from the fumes surround these holes. The earth, containing about 50 per cent. of sulphur, is placed in an iron retort heated to a high temperature, so that the sulphur is driven off in fumes into a receiver, where it settles in a liquid form, and runs out into pine boxes 2 ft. long and 1 ft. square. The

lump sulphur is used chiefly for making powder and sulphuric acid, which last is employed in making blue-stone, giant-powder, nitric acid, and muriatic acid, and in refining gold and silver. The consumption of sulphuric, nitric, and muriatic acids on the Pacific coast amounts to 2,000,000 lbs., and the entire demand is supplied by home manufacture. Flowers of sulphur have also been produced at Clear Lake. The fumes passing off from the retort are in this case led into a large cool chamber, where they condense into a flaky snow-like condition.

HOUSEHOLD RECIPES.

Tomato Vinegar. — Take one bushel of ripe tomatoes, mash them in an open tub, add one quart of molasses, and thoroughly mix the whole together. Let the tub stand several days, frequently stirring the mixture. When a decided vinegar odor is given off, the juice should be strained from the pomace and put into casks. Vinegar thus made is equal to the best.

Cement for Pickle and Preserve Jars. — To two ounces of the best gum tragacanth, add six gills of cold water, and three grains of corrosive sublimate. Set in a warm place for two or three days, frequently stirring it to assist the solution. This will be found a very useful paste for labels, or for pasting paper over jars, holding pickles, preserves, fruits, etc., providing it does not come in contact with the condiment, to avoid which the jars should be first covered with paper or bladder, and then with the pasted paper.

To get rid of Flies. — The smoke of the dried leaves of a pumpkin burnt on a bright fire will cause flies to quit an apartment instantly, or it will kill them. Birds must be withdrawn before the operation, and persons should abstain from going into apartments immediately after, as the smoke causes headaches. The employment of laurel oil is also a preservative against flies, as they cannot bear the smell of it. In Belgium, butchers have long applied it, and with great success, to the doors and windows of their shops.

Cleaning Silver-Plated Articles. — White-metal articles, electro-plated with silver, should be cleaned with the greatest caution. The use of soap gives to the articles a leaden appearance. If tarnished, rub them with a little fine whiting, wet with water; then wash with clean, soft, warm water. Dry carefully, and polish with fine whiting on a piece of soft leather.

To wash Flannels without shrinking. — No woolen fabric should have soap rubbed on it, unless you wish to shrink it. Soak it in warm water half an hour; rub lightly when you rinse it out; then rub thoroughly in good hot suds; rinse it out, put in a tub and pour clean boiling water on it — the more the better; let it stand till cool enough to be rinsed out by hand.

To make old Kid Gloves new. — Make a thick mucilage by boiling a handful of flaxseed; add a little dissolved soap; then when the mixture cools, with a piece of white flannel wipe the gloves, previously fitted to the hand; use only enough of the cleaner to take off the dirt, without wetting through the glove.

To whiten Yellow Flannel. — Dr. Artus tells us that flannel which has become yellow with use may be whitened by putting it for some time in a solution of hard soap, to which strong ammonia has been added. The proportions he gives are $1\frac{1}{2}$ lbs. of hard curd soap, 50 lbs. of soft water, and two-thirds of a pound of strong ammonia. The same object may be attained in a shorter time by placing the garments for a quarter of an hour in a weak solution of bisulphite of soda to which a little hydrochloric acid has been added.

The Arts.

THE "CARBURETTING" OF COAL-GAS.

Every year new patents are taken out for improving the illuminating power of coal-gas by some process of "carburetting," or "carburizing" or "carbonizing" the same. The forms of apparatus are varied, but the *modus operandi* is similar in them all, consisting essentially in mixing with the gas the vapor of a liquid hydrocarbon. Some of the processes are better in their way than others, but the main difficulties still exist — namely, the irregular evaporation of the liquid, and consequently the uncertainty of the light obtained from gas passing through the vapors of the carburizing liquids.

Experiments have been made by an able chemist in order to ascertain the rate of evaporation of liquid hydrocarbon. The material chosen was the spirit of petroleum, as light as it could be procured, being about .700 specific gravity. Three pounds of the liquid were placed in a suitable vessel in such a manner as to expose a large surface for evaporation, and on passing atmospheric air through by means of a motive-power meter, a very large and rich flame, giving off abundance of smoke, was the result. This at first, when adjusted to 5 ft. per hour, gave a light equal to sixteen candles, but speedily the flame became perceptibly less; in a short time it was diminished to a remarkable extent. After twenty-six hours merely a blue light was obtained, and at the end of forty-eight hours no flame whatever existed, as all the constituents volatile at the temperature had evaporated. On re-weighing the residue, barely one half of the total quantity had been available. This clearly demonstrated how easily people may be deceived by a carefully prepared experiment, for at the commencement the air was so highly charged with carbon as to occasion the greatest surprise; but as this was of such short duration on account of the very small quantity of the highly volatile material, the process of carbonizing the air was utterly useless. Many people, however, have been "taken in" by experiments of this very sort. Of course, when coal-gas is used instead of air, the result is essentially the same, so far as any *continued* increase in the amount of light is concerned.

It ought to be understood, moreover, that this process of improving the ordinary gas has been thoroughly tested by the ablest scientific men, and that they have pronounced it a failure. For nearly two years it was tried in the street lamps of London, under the direction and inspection of Dr. Letheby, and yet was abandoned, and has not again been adopted. Great economy, with increase of light, was at that time promised, according to the theory and estimate of the projectors. To ensure economy in the consumption of gas, the ordinary burners, consuming five feet per hour, were changed to those which would consume only three feet per hour. Of course the gas company's bill was materially diminished. But what about the increase of light? Very often the streets of London were in comparative darkness, and so loud became the complaints of the public that the authorities were compelled to order the removal of the carburizing apparatus, and to restore the ordinary five-feet-per-hour burners.

Even where there is a gain by the use o carburetting apparatus, it is rarely, if ever, great as is promised. Twenty per cent. is pr ably about the maximum that can be counted u *as an average* by the very best contrivance of kind. This, considering the uncertainty of light on account of the irregular evaporation which we have referred above, will scarc balance the cost of apparatus and naphtha, extra attention required, and the risk in us so inflammable a liquid.

INDIA INK.

The basis of all the different kinds and quali of India ink is lamp-black, the best of which obtained from pig's-foot and other oils, and so times from resins, while an inferior sort is m from pine wood. The materials are burned i furnace about a hundred feet long, along the si and top of which the smoke condenses. That n remote from the fire and nearest the top is finest, and is carefully kept separate from the r

Glue made from the skin of the buffalo of country is soaked in water for a time until it much swollen, and afterwards completely dissol The lamp-black is then introduced and worked until it forms a soft paste. When the materials thoroughly mixed a quantity of the oil of peas added, and the temperature maintained for a ti at from 110 to 140 degrees, until the paste homogeneous in character. It is then removed separated into little cakes, which are allowed remain for some time drying and becoming mell after which they are strongly compressed in woo moulds, on the interior of which are engraved characters which are seen upon the cakes. surface of the cakes is finally coated with a kin animal wax, which gives a polish, and prevents ink from staining the hands.

The peculiar odor of India ink is produced adding to it, during the process of preparation mixture of Borneo camphor and musk. Only finer qualities, however, receive this addition. Chinese do not use liquid inks, but when they w to write they rub up one of these sticks in wat and use a very fine pointed hair pencil. Those have not tried ink prepared in this way will surprised to find how readily it flows, even fro pen. The durability of such ink is much grea than that of the European, as it does not bec obliterated by moisture or ordinary atmosph agencies.

MEMORANDA IN THE ARTS.

Steam Boilers become Brittle by Use. — Mr. Peter Carmichael recently read a paper u steam boilers before the Scotch Institution of En neers, in the course of which he mentioned tha had been found that "all qualities of iron get h and brittle after the boilers have been at work m than a dozen years, more especially where expo to the action of the fire; and that in the furnac even Lowmoor iron becomes as brittle as comm iron in that time, and great care has to be taken making repairs to prevent the plates from cracki For this reason sixteen to seventeen years is lo enough for a boiler to be in use, at a pressure of pounds to 45 pounds. If used longer, the press ought to be lowered." Two boilers which had be in use nineteen years, and which required repai were found by Mr. C. so brittle that the rivet he on the outside flew off when the inside heads w struck; showing that the rivets had deteriorated much as the plates.

Manufacture of Grape Sugar from Co — Large factories for this purpose have recen been established in New Orleans, Buffalo, a

Brooklyn. The corn is steeped in weak soda lye, or the purpose of softening the husk and gluten, nd is then ground wet, and run through revolving ieves to separate impurities; afterwards it is made o flow through ways or troughs, in which the starch radually settles as a white powder. The wash rater is run into a large cistern, and allowed to erment and produce a weak vinegar. The starch rom the troughs is put wet into the mash tub, and reated with water containing one per cent. of sulphuric acid, for eight hours. The acid is neutralzed with chalk or carbonate of lime, and the liquid vaporated to get rid of the gypsum, and afterwards urther evaporated in vacuum pans, and run into arrels ready for crystallization.

Cement for Leather. — A good water-proof ement or glue, for holding wood or leather, may be nade by dissolving fine shreds of India-rubber in arm copal varnish. The material to be united hould be made clean, and be perfectly dry at the me of applying the cement.

Elastic and Sweet Glue. — Good common lue is dissolved in water, on the water bath, and e water evaporated down to a mass of thick constence, to which a quantity of glycerine, equal in eight to the glue, is added, after which the heatg is continued until all the water has been driven f, when the mass is poured out into moulds, or on marble slab. This mixture answers for stamps, rinters' rolls, galvano-plastic copies, etc. The weet Glue, for ready use by moistening with the ongue, is made in the same way, substituting, howver, the same quantity of powdered sugar for the ycerine.

New Method of purifying Sugar. — M. Iarix has taken, in France, a patent for the appliation of fluosilicic acid for the purifying of beetoot and other saccharine juices. The saccharine uids are first diluted with a sufficient quantity of ater to take away the viscosity of these fluids, sufcient fluosilicic acid is then added to precipitate all e potassium salts present, and next chalk is added saturate any excess of the acid. The fluid is then tered, in order to obtain a clear liquid, and this terwards treated in the usual manner.

The Separation of Animal and Vegetable Fibres. — M. Shervord has invented an ingenus method for the separation of animal fibre from egetable. The process does not alter the structure color of the animal fibre, and permits the use of tton and linen fibre separated from it for numerus purposes. It is sufficient to suspend the goods an atmosphere of nitrogen or carbonic acid, and cause the vapors of perfectly dry sulphuric, osphoric, or hydrochloric acid to enter the room. hese fumes disintegrate the vegetable fibre, and ave intact the animal; the two fibres can thus separated and appropriated to their respective es.

Cold Tinning Process. — M. Daubié, ironaster, Blanc Murger Works, at Bellefontaine, in e Vosges, has obtained a patent for tinning by a ld process, in order to prevent oxidation of iron in eneral, and especially of iron wire, employed in e fabrication of cards and wire cloth, without alring its polish or rigidity. The inventor's chief bject is to prevent the softening of the metal, and e mode adopted is successive immersions in baths ntaining cold solutions of salts of tin, with the ldition of a certain amount of organic matter, ch as fecula or starch, which has always been und valuable both in tinning and galvanization. he solution patented is composed as follows: To ery twenty gallons of water add 6 lbs. of rye flour, nd let it boil for about half an hour; filter it, and terwards add 212 lbs. of pyrophosphate of soda, 34 s. of crystallized salt of tin, 134 lbs. of neutral prochloride of tin, and from 3 oz. to 4 oz. of sulphuric cid. When the salts are dissolved the solution is distributed in eight or ten wooden vats, a little additional water being added to the first two or three of the vats. The wire is passed successively through the whole of the vats, and if great brilliancy of surface is required, also through draw plates at intervals, and the wire, while retaining all its rigidity, becomes covered with a brilliantly polished coat of tin. Beautiful and inoxidizable cards and wire cloth have been produced by this process, which is applicable to wire for a hundred different purposes. M. Daubié has also succeeded in silvering iron wire, by using, in place of the salts of tin in the solution, cyanide of silver and cyanide of potassium.

Agriculture.

SHORE PENCILINGS AT LAKESIDE, No. 2.

SOME THOUGHTS UPON SOILS AND CROPS.

Reclining under the trees on the shore of the Lake in company with a neighbor, the conversation turned upon the different nature of soils and their adaptability to various grains and grasses. Having presented in the conversation some thoughts upon the topics, which resulted from practical experience, we pencilled them down when alone.

It was remarked that long since we had learned in the laboratory that in order to reach certain results, in chemical manipulation, there must be a strict observance of certain laws of combination and association, and also, that no substitutions or omissions could be permitted. To form gunpowder, nitre, sulphur, and charcoal were needed, and one substance was no more important than the other. Sulphur and charcoal had no explosive energy by themselves, nor had nitre and charcoal; but the three combined, when ignited, could overturn forts, or lift mountains. So in agriculture, we have learned that plants can only grow in a normal way, when certain elements are supplied to them. They require carbon, phosphorus, silica, ammonia, potash, lime, magnesia, etc., in order to grow healthfully; and all these must work together in building up the plant fabric. These are all of equal value as sources of nutrition, and it is only by their combined action that a perfect plant is secured. It is absurd to talk about the superlative importance of ammonia, when not a plant exists, or can exist, without phosphorus; it is absurd to talk about potash or lime, as being the one or two things needed to clothe barren fields with verdure, when soluble silica and magnesia are quite as indispensable. The truth is, none of these substances can replace or discharge the functions of another. We may fill our soils with potash, but if the phosphatic salts are absent our crops fail. We may saturate with ammonia, or nitrogenous compounds, and the cereals will not mature without a supply of the other essentials. The results of our experiments have established this point clearly in our mind, that in order to grow crops successfully, *all* the substances needed by plants, must be present in the soil in which they flourish. Some soils furnish all of these in ample abundance, others do not. The former we call rich soils, the latter, barren or impoverished. The soils of cultivatable lands hold in a greater or less proportion all that is essential to the growth of plants. Sometimes one or more of these essentials is largely in excess, or there is more than is needed by any crop for a succession of years; and often one or more is held in small amount, barely sufficient for some crops and wholly insufficient for others. A soil resulting exclusively from the disintegration or crumbling of limestone rocks will be rich in the calcareous element, but deficient in several of the other essentials. Soils resulting largely from feldspathic masses, and granite, will hold quite all that supply the elements of nutrition to plants, and such are therefore good. No two fields or farms are alike as respects the nature of the soil, and therefore when the question occurs, how can this or that farm be restored to fertility, it is necessary to know the general composition of the soil as preliminary to any intelligent attempt to bring it into good tilth. Much of the confusion and doubt which prevail among farmers springs from this difference which exists in soils. Farmers seek for some specific manure which will insure large returns of all kinds of crops, but no such specific exists, nor ever will. There is certainly no specific for our bodily diseases, and therefore doctors, in prescribing, are said to feel their way in the dark. The farmer who is searching for specifics is groping in thick darkness. The intelligent doctor who is acquainted with the constitution and idiosyncrasies of his patient possesses, in the cure of disease, a great advantage over one who knows nothing of such peculiarities. The most proper business of the physician is to study the peculiarities of his patients, and the most proper business of the farmer is to study the physical and chemical peculiarities of his soils. Of course a knowledge of the chemical and geological sciences is of great advantage to a farmer in successfully conducting his labors, but an intelligent observer can secure a good knowledge of the nature of his soils in ten years, and know but little of any of the exact sciences. Without any knowledge of anatomy or physiology, the farmer obtains by observation a knowledge of the peculiarities of his animals. He learns how to feed his pigs so as to fatten them most rapidly and profitably, how to supply nutriment to his cows so as to cause a copious supply of milk, and he learns the temper and habits of his horses and oxen, and accordingly controls them to his advantage. Why should he not learn by observation the nature and capabilities of his fields, and be able to a great extent so to feed them as to obtain the highest and best crop results from year to year? Any farmer, from ten or even five years' observation, can ascertain the extent to which his different fields are retentive of moisture. He must learn how well they withstand the drought or the protracted wet of summer, how different crops behave when the rain fall is small, or copious, in the growing months. Physically considered, some farms are not adapted to the raising of corn, and perhaps some other grains. Corn withstands drought better than almost any other cereal, but that fact affords no reason why it can be raised to advantage on loose, dry soils. Weak, puny corn can be raised in a sand bank, but foolish indeed would a farmer be to plant his corn in such a locality. Corn requires a good retentive soil, a good fair loam, in which to grow in perfection, and if the owner of lands has none such, let him not attempt to grow it. His fields are better adapted to melons, beans, rye, or perhaps wheat. It is useless to attempt to force corn or any of the noble grains

to grow upon naturally wet, or low, clay bottom lands, without thorough drainage and deep tillage. Such are better adapted to grass, and grass farms, if kept in good tilth, are the most profitable of any. Every cultivator of the soil must first become acquainted with the physical character of each parcel he has under his charge, and then he will know what crops are adapted to the several localities.

During the seven years Lakeside farm has been under our care, we have turned over and carefully examined about every rod of those portions suited to tillage. We know its "temper," constitutional and chemical peculiarities, as well as we do the peculiar traits in our horses. We have learned where to plant corn, and where to sow wheat, and not be disappointed in results. We do not fret about wet and dry seasons, as we have proved the important point, that lands can be so selected and cultivated as to place crops beyond their influence in a very great degree. The season last year was particularly unpropitious for corn, and our readers have knowledge of the remarkable yield we secured. The present is fearfully dry and hot, so much so, that farmers in Eastern Massachusetts and New Hampshire, are forced to concede the loss of their late crops. As we look out upon our fields, everything appears green and succulent. Two judiciously selected plats for corn are covered with luxuriant foliage, and from the promise afforded, we predict a yield nearly or quite equal to that of last year. Fifty tons of hay have been mowed from fields which, seven years ago, gave but about a dozen. It is certain that farmers must study the nature of their soils, and their adaptability to the different crops which it is thought desirable to raise. By drainage and deep tillage the physical condition of most lands can be completely changed, and with the supplying of such chemical agents as are needed, crops of every description can be raised, satisfactory and remunerative to the husbandman.

FODDER CORN.

THE *Rural New Yorker*, in a recent issue, presents some analyses of fodder corn, which are designed to show that Dr. Loring's views regarding its value as feed for milch cows are erroneous. What Dr. Loring's exact notions are, we do not know, and we do not care to inquire. Facts and principles in agriculture do not rest upon the mere opinions of any man. Opinions should only receive consideration when they are supported or based upon accurate observation and careful experiment. We have in the JOURNAL and elsewhere given the results of experiments, which lead us to place a low estimate upon the value of fodder corn as grown under the usual or ordinary conditions among farmers. Upon this subject, which is regarded as of importance by many, we do not wish to be misunderstood. We have distinctly stated, that it is the corn fodder produced from broadcast sowing, or in drills when in close contact, which is comparatively worthless; not that grown in hills, or drills wide apart, properly cultivated, and cut just before the ears commence forming, or when they are in the milk. No one can place a higher estimate upon the maize plant as fodder for milch cows, than we do, if it is *properly cultivated with full access of light and air.* Can farmers afford to cultivate a *hoed crop*, to feed to cows in a green state? We think not, as a general thing. There are crops which we have pointed out, which serve a good purpose as green feed, which can be raised from broadcast sowing and left to grow under the conditions of ordinary grasses. The matter of cost and convenience in raising crops of any kind must be left to farmers themselves; they ought to be the best judges. It is, however, important that they should clearly understand the modifying influences of culture, air, and sunlight upon different kinds of vegetable productions.

KANSAS AS A FIELD FOR EMIGRATION.

THE *Kansas Farmer*, in an article of considerable length and apparently written with impartial accuracy, answers a series of questions put by an Eastern inquirer respecting the advantages of that region for agricultural emigrants. We give a brief summary of the main points in the article, thinking that they may be of interest to some of our readers.

Kansas is as healthy a State as any in the whole Western country. Notwithstanding the immense return of unharvested vegetable matter to the earth by decomposition, the turning up of hitherto undisturbed earth by the multitude of new comers, and the privations and hardships of pioneer life, the region is still free from serious epidemics and malarial diseases. Residents upon the bottom lands, who live in temporary houses, set upon the ground and in the timber, and who use surface water, suffer more or less from chills and fever. The climate is no more to blame for this, however, than is the fire for burning a finger thrust into it, in defiance of well understood natural laws.

The average temperature is mild, and the atmosphere dry. Snow is unusual, except for a few days at a time. The unpleasant feature of the winters is sudden and severe changes, the mercury sometimes going below zero in many localities. At these times a change of thirty to fifty degrees in twenty-four hours is not surprising. These "cold snaps," however, are of short duration, ordinarily culminating inside of three days, followed by a resumption of mild, agreeable weather.

Water is good in Kansas, as a rule. Enduring water is reached at a depth of twenty to seventy feet, the average being but little above the first named depth. Springs are abundant and pure as those gushing from the sides of the Green Mountains. Prof. G. C. Swallow, who made a geological survey of Kansas, says in his official report: —

> "Kansas is well supplied with streams of living water. . . . Almost every farm has a good supply of never-failing springs. . . . But few countries are better supplied with running streams and perennial springs; and few have such easy methods of obtaining artificial supplies of pure water."

There are good farming lands, that can be taken by homestead and preëmption, and some timbered land so open; but timbered claims are not so easily obtained. They lie in the northwest and south portions of the State. For specific information touching the west and north, address George W. Martin, U. S. Register, Land Office, Junction City. For south and west, address Watson Stewart, U. S. Register, Land Office, Humboldt.

These lands are adapted to the most diversified, and therefore most desirable and safe, sy tem of culture. Cereals, fruits, and grasses ar produced, in quantity and quality equal to thos of any part of the country. Stock-raising an after question, a simple question of econom depending upon location with reference to ma kets. As a rule, the products of the soil shoul be converted into meat, to attain the highe profit, unless grown in close proximity to a gre market of consumption.

Stock farming is *sure* in Kansas, if it is cor ducted with ordinary intelligence; but no or should go there with the expectation of keepin stock, particularly sheep, without protection winter feeding. As mild as are the winter stock should be protected by good and sufficie cover, and should have *plenty* of hay, with *son* grain.

In closing, the *Farmer* says that "the imm grant will find a hearty welcome by a peop second to none in intelligence and energy, i this or any country. He will find a people p lite and generous, yet self-reliant, and bitter hostile to *drones*. The man of indolence an indecision has no place in Kansas. Such ma *stay* here, and think they live; but to the bus bustling, whirling masses they are dead an buried, out of thought and memory."

PRUNING DWARF PEARS.

AN experienced pear culturist says that he h examined thousands of dwarf pear-trees in th grounds of others; and has never seen goo healthy, vigorous trees where annual pruning h been omitted. Near his orchard, which contai two thousand healthy, thrifty dwarf pear-trees, neighbor planted trees at the same time, obtain from the same source, and of the same age as hi This neighbor pruned a little the first and seco years; but last year, his trees being full of blosson buds, he allowed them to bear and left them u pruned. The season was a dry one, the fruit di not fully mature, and now from one half to tw thirds of the trees are dead; while trees on whic the previous year's growth of wood was cut bac from one half to two thirds are healthy and vigo ous, and had an abundance of fruit-spurs and bud

FOWLS VERSUS WORMS. — M. Giot, a Frenc entomologist, has lately found new employment f fowls. He says that French farmers have, durir the past year, complained bitterly of the prevalen of worms, which infest corn and other crops, th highest cultivated fields being the most infeste Fowls are known to be the most indefatigable wor destroyers, pursuing their prey with extraordina instinct and tenacity. But fowls cannot conven iently be kept upon every field, nor are they want there at all seasons. Therefore M. Giot has invent a perambulating fowl-house, which is described follows: "He has large omnibuses, fitted up wi perches above, the nest beneath. The fowls a shut in at night, and the vehicle is drawn to the r quired spot, and, the doors being opened eve morning, the fowls are let out to feed during th day in the fields. Knowing their habitation, the enter it at nightfall without hesitation, roost, and la their eggs there."

SEWAGE MANURING. — Experiments with sev age as manure have thus far proved entirely succes ful in England. At Barking, the fourth consecuti crop of wheat is now growing upon land treated i this way. The stalks are about five feet high, wi ears of great length.

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, SEPTEMBER 1, 1870.

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SOME OLD INVENTIONS.

There are several inventions and art processes egarded as very new and wonderful by the nultitude, which seem quite old to us. We ave watched the progress and adventures of hese art processes and devices for many years vith the same interest that parents watch the areer of their children, for the reason that they re indeed the children of our brain. Many of ur readers have doubtless noticed the huge piles of vhat is called "leather board," heaped upon the idewalks and in the leather stores of our cities. Sixteen years ago we made the first sheet of the rticle ever produced in the United States, or n the world. Noticing the immense heaps of "leather scraps" (the worthless refuse of shoe actories), which are seen in New England owns, we conceived the idea, in 1854, of attempting to utilize them by disintegrating, or earing them into fine shreds, and forming from he particles a cheap leather board which might erve many useful purposes in the mechanic arts. An old paper mill, belonging to the late Mr. Flagg of Exeter, New Hampshire, was hired for the purpose of experiment, and after surmounting many difficulties, we succeeded, during the year, in manufacturing several tons of the new article. As soon as the problem was fairly worked out, it was allowed to pass into the hands of other parties who have since carried on the manufacture upon an immense scale. No patent protection was sought, and no remuneration for our labors has ever been received. An exclusive right to make this article, on a patent protection, would have been worth a great many thousand dollars. Although the production of the "patent leather," as it is often called, has been of advantage to producers, its invention has not been particularly advantageous to the consumers of shoes. The interior "soles" of most cheap shoes are now constructed of this material, and when water penetrates into them, the result shows that it is a poor substitute for good leather. We fear that "*pater familias*" will never thank us for devising "leather board."

Twenty-three years ago, we engaged in a series of extended experimental investigations upon the hydrocarbon liquids, and one of the results of these labors was the production of an apparatus for lighting buildings by employing air for the conveyance of the light vapors to gas burners. From this invention have come all the "portable gas machines," "gasoline apparatuses," "air lights," "automatic gas" devices, which are so numerous in our cities. Every one of these is claimed as "very *new*," and all are covered by "patents." The perusal of an article published in the *Traveller* newspaper of this city in 1849, describing the results of our labors, will show that but few important improvements have been made in our original devices, during more than twenty years. Sixteen years ago we constructed an apparatus for extinguishing fires by the employment of carbonic acid, or aerated water under pressure. The instrument was almost precisely similar to the one now claimed as *new* and owned by a company who control the *right* to make "Fire Annihilators." We did not at the time we invented the apparatus, nor do we now, regard it as of much practical importance. Nearly seventeen years ago we put in position the first apparatus for cooling mineral waters and syrups at the place of outlet, or upon the counter of the dealer. All the new "soda water" devices seen in the shops are based on our original device, and are but modifications of our invention. Upon this no patent protection was secured, but we have been informed by an extensive manufacturer that its value at present would be not less than *fifty thousand dollars.* The numerous devices which have been lately introduced for protecting lamps and fluid cans from explosions are simply the reappearance of contrivances which we made public twenty or more years ago. At that time we covered metallic lamps with glass, and prevented flame from entering the reservoir by a chamber of wire gauze; and also some wick arrangements, now claimed as new, are found in our old lamps. Time is worse than wasted in endeavors to make lamps *safe* which are designed to hold and burn dangerous, inflammable liquids. More severe accidents are caused by spilling and igniting the liquids than by explosions. The inflammable light napthas sold so often as kerosene, cannot be harbored in any dwelling with safety. No matter what lamps or cans are used, the danger is not in any important degree removed by their agency. There is safety only in expelling everything of the kind from household use.

We might increase the list of so called "new inventions," which originated with us many years since, but our object is not to "tell what we have done," but to present some reliable examples, illustrating the nature of many of the "new patents" which are constantly thrust upon public attention. Our readers may have reason to thank us for affording them some insight into the merits of the claims of those who seek from them pecuniary assistance.

A NEW ARTIFICIAL LIGHT.

The *Berggeist* describes a new artificial light which has recently been successfully experimented with. It is the Philipp carbo-oxygen lamp, and its trial during the month of March, at Cologne, was such as to win approval on every hand. The system of lighting is distinguished from those already in existence by its simplicity, its brilliancy, and, moreover, by its less noxious character. The light is generated by the simultaneous combustion of a liquid chemical compound and a current of oxygen, in a suitable lamp. The gas is derived from the atmosphere either by chemical or mechanical means; the chemical methods being to act upon the oxygen of the air with chloride of copper (Mallett's method), or with manganate of potash (Tessié du Motay's method), while the mechanical mode is that of utilizing the different degrees of solubility of nitrogen and oxygen in water or other liquids. By compressing atmospheric air into receivers filled with water, a portion of the nitrogen is taken up by the water, while the oxygen remains insoluble in the water; the air, thus containing a goodly proportion of oxygen, is forced into a second reservoir of water, where a further amount of nitrogen is absorbed, and after the operation has been repeated seven or eight times, an atmosphere is obtained containing 97 per cent. of oxygen. The nitrogen which has been separated is made use of in a well-constructed apparatus, as an auxiliary to the motive force. Experiments have established the fact that a flame fed with air containing 53 per cent. of oxygen yields a light equal in brilliancy to that obtained with pure oxygen, and with diluted oxygen of this kind the Philipp flame has a brilliancy of 90 to 100 candles, or ten times that of an ordinary gas jet. The light is of a bluish white, resembling very much that of electricity and magnesium. The liquid employed consists of liquid hydrocarbon, very rich in carbon; it costs but little, burns economically, and can be employed only in this particular direction. The combustion is maintained in a lamp — Philipp's carbo-oxygen lamp — fitted with a wick, into the flame of which the oxygen penetrates in a horizontal direction. The flame is thus made to assume the form of a star, and any heating of the wick-holder thereby prevented; if of the size and power above mentioned, the quantity of gas consumed is $5\frac{1}{2}$ cubic feet per hour. As to the lamp, no special attention is necessary beyond that of filling it with liquid, as the wick is of a very durable nature, and needs no trimming. The hydrocarbon employed is patented both in Europe and in America. This method of lighting is, we believe, likely to be adopted very widely. Independently of its simplicity and reasonable cost, which are, indeed, extreme, it possesses the very eminent and valuable qualifications of perfect security; no explosion is in any way possible.

Chemistry of the Farm and the Sea. — This little book, which we permitted Messrs. A. Williams & Co. to publish two years since, has passed through several editions, and meets with a ready sale. We are constantly receiving letters from near and distant parties, thanking us for the book, and assuring us that great pleasure and much information has been derived

from its perusal. Mr. Wm. F. Cox of St. Genevieve, Missouri, writes under date of July 17th, that he is so well pleased with it that he has ordered four more copies to present to his friends. It is certainly gratifying to be able to contribute to the happiness and stock of knowledge of others through the medium of books, or in any other way.

EDITORIAL NOTES.

New Developments in Adulteration. — In our last we referred to cream of tartar, without any cream of tartar in it, as one of the latest "dodges" of adulteration — if adulteration it could be called. We have since read of another sample of the same article which contained more than 90 per cent. of sulphate of lime, and not one particle of bitartrate of potash. It would have been dear at five cents a pound, and was sold as "extra fine" at fifty-five cents.

There has also been a new development in the adulteration of coffee. People have flattered themselves that if they bought the coffee beans raw, and roasted and ground them at home, they were sure of having the genuine Mocha or Java; but artificial coffee-beans are now made, like bricks, from a greenish clay, and the eye cannot distinguish them from the natural article. They are made in moulds, a hundred at a time, and cost about a cent a pound. When roasted they absorb the brown color from the genuine berries with which they are mixed, and the true and the false are still undistinguishable. This admixture of clay is not injurious, as it settles to the bottom of the coffee-pot, giving a literal significance to the term *grounds* as applied to that familiar sediment. The beverage is weaker, of course, but otherwise no worse; indeed, we suppose that some dietetists would say that it is all the better for the inert addition to what they consider an unwholesome decoction. The fraud may be detected by breaking open some of the raw berries and examining them closely, or by chewing them; or, as some one has suggested, you can make a microscopic examination of the interior of each berry!

Potato "Reconstruction" in Paris. — These Yankee achievements in the fine art of cheating are not to be easily surpassed, but we are not sure that our Gallic friends may not cheat us of our laurels. In Paris they manufacture "new potatoes" out of old ones by the following process: the potatoes are put into tubs half-filled with water, and are vigorously stirred about by the feet of workmen until the dark skin has been rubbed off, and they acquire a smooth and satin-like appearance; they are then dried, neatly wrapped in paper, and arranged in small baskets, which are sold in the markets for five francs each. The *rafistoleurs* make no secret of their trade, and may daily be seen at work on the banks of the Seine, within sight of the Hôtel de Ville.

Not afraid to say he didn't know. — Dr. Allnatt, the other day, sent the following inquiry to Prof. Tyndall: "Schönbein believed that ozone could not exist without the production of its antagonistic congener, antozone. When ozone-tests, fully colored to their maximum hue, become blanched by exposure to the air, is the bleaching to be ascribed to the action of elemental antozone?"

Professor Tyndall replied as follows: —

"Dear Sir, — The answer to your question regarding the action of ozone and antozone is brief, but full. It is thus: I do not know; nor do I believe that anybody knows.

"Yours very faithfully, John Tyndall."

The Purifying of Rivers. — The general result of the investigations of Dr. Frankland and the Government Water Commission, amounts to a denial of the current notion that sewer-water, mixed with the stream of a river, is purified by the combustive action of the oxygen dissolved in the water. He maintains, on the contrary, that there is no river in England long enough to effect this combustion completely and satisfactorily. It is true that, after a short distance, the river-water becomes limpid, and less loaded with organic matter; but that is because the greater part of the organic matter in suspension has fallen to the bottom, and is deposited with the mud. The source of infection has merely changed its time and place. The spores which are capable of transmitting disease resist both modes of separation. To purify sewer-water, the Commission sees no other practicable means than filtration through the earth, which it serves to manure and enrich.

The Nature of Yeast. — At a late meeting of the London Chemical Society, the President, Dr. Williamson, gave a brief review of the present state of knowledge of the yeast plant. Though called a "plant," the yeast organism appears in all its functions rather animal than vegetable; the products of its secretion are less complicated than those it takes in; it does not, like plants, require light for its vital process; neither does it absorb heat, but on the contrary gives it off.

Physical Science at Oxford. — Some mischievous Oxford students, not long ago, destroyed several valuable pieces of statuary by building a fire under them. They afterwards gave themselves up to the college authorities, and pleaded, in extenuation of their offense, that they only meant to blacken the sculptures with smoke, and didn't know that fire would convert marble into lime. Very likely they didn't, and the fact is a suggestive commentary upon the neglect of science teaching in the great English University. There begins, however, to be a reform in that respect, both at Oxford and at Cambridge.

Commendable Caution. — One of the best of our city exchanges was lately the victim of a "sell" in regard to a pneumatic tube 400 miles long, and now naturally looks with a suspicious eye upon the account of the device for supplying locomotives with water while they are in motion, which has been in use for some time in England (we saw it there two years ago), but has only recently been tried in this country. This is what it says about it: —

"An improvement, or possibly a hoax upon the credulous, is described in the *Poughkeepsie Eagle*. The invention is said to be a trough in the centre of the track, kept full of water, from which a locomotive can, by an ingenious apparatus, take up a supply for the tender, when running at the rate of thirty miles an hour! The account does not state how the novelty is to work in zero weather. If the story is a true one, and the experiment as successful as reported, there can be through trains without any stoppages."

Of course, the thing is *not* feasible in freezing weather, but it works well at other times, and we do not see why it should not be generally adopted for express trains on our railways.

Boston Milk. — We have received the "Eleventh Annual Report of the Inspector of Milk" for this city. Of 1,680 samples of milk inspected, 520 were more or less "extended." The average watering of the stock was 28 83 per cent., the minimum being 19.25 and the maximum 41.87, or *nearly one half*. The daily supply of milk for the city is put at 20,948 gallons, for which the consumers pay $7,122.32. The milk-bill for the year figures up to something more than *two and a half millions* of dollars.

The adulterating material used is almost invariably water. Mr. J. F. Babcock, the Analyst, says that he has never detected the chalk, sheep's brains, starch, flour, etc., which books on this subject mention as sometimes added to milk. Salt is occasionally added to bring up the specific gravity reduced by the addition of water, and burnt sugar is used to neutralize the blue tint of the diluted liquid. To prevent souring carbonate of soda is sometimes put in. With these exceptions, water is the sole adulterant employed in the manufacture of "milkman's milk" from the genuine article.

Hydrogen Manufacture. — Du Motay and Maréchal have suggested a new process for the preparation of hydrogen on a large scale. It consists in heating to redness a mixture of damp coals and alkaline hydrates. The mixture of hydrogen and carbonic acid thus disengaged is conducted over certain carbonates, which retain the carbonic acid and become bicarbonates. The pure hydrogen is collected in a gasometer for use. The bicarbonates are employed as such, or as sources of carbonic acid. The oxides produced by the carbonization of the alkaline coals may be utilized for the purposes of agriculture or other industries, or, better, to form the hydrates for subsequent operations. The same chemists also propose to obtain pure hydrogen by passing ordinary illuminating gas over lime heated to cherry redness; the dry residue will be carbonate of lime.

Milk as a Preventive of Lead Poisoning. — M. Didierjean, a red lead manufacturer in France, states that he tried every possible way to keep his workmen in good health, but did not wholly succeed in preventing lead colics until by mere accident he found out that two of his men were never affected in that way. Inquiry brought out the fact that these men regularly took milk as a drink with their meals. He was thus led to try the experiment of making the use of milk (a litre a day) compulsory with the workmen, and he has succeeded by this means in keeping all of them free from any symptom of lead disease for the past eighteen months. The absolute correctness of this statement is confirmed by good authority. The remedy is a simple one, surely, and it ought to be thoroughly tested by every person exposed to the danger of lead poisoning.

ATOMS.

The steam power employed in this country is equal to 130 millions of men, but that of Great Britain is vastly greater, being equal to 400 millions of men. — A "soap mine" has been discovered in Pennsylvania — in other words, a great deposit of a peculiar kind of clay, which resembles soap, and can be used for washing purposes like that substance. — A nugget of pure copper, weighing 117 pounds, was discovered the other day in an Iowa field, where it had been kicked about for years, being taken for a common stone. — A diamond from the Cape of Good Hope, lately brought to England, weighed 186 grains after cutting. — A Vermont marble company has sent a block of statuary marble to Italy. — Arrangements have been made to run trains from New York to Chicago in twenty-four hours. — Fifteen thousand miles of railroad are now under contract in the United States, which, finished and furnished, will cost about 750 millions of dollars. — A steam omnibus is now running regularly between Edinburgh and Portobello, a distance of three miles. — Experiments have been made in Cornwall in lighting mines with gas, and the report is that the new method is one third cheaper than lamps or candles, to say nothing of its greater safety. — A single manufactory in Edinburgh makes an amount of chloroform which would furnish eight thousand doses a day. — Sour milk is recommended for keeping the leather of kid boots soft. — Charcoal biscuits, which are largely used in England, can be made by subjecting ordinary biscuits

to a current of superheated steam between 500° and 600° F. — The velocity of nerve force in the motor nerves of a frog is estimated by M. Helmholtz at one hundred and ninety feet per second, — which is at the rate of 11,400 feet, or a trifle over two miles a minute. — Artificial india-rubber is made in Paris by a mixture of gelatine, glycerine, etc. It has all the properties of the genuine gum, and costs only 25 cents a pound. — Filters filled with black oxide of iron are very effectual in removing organic matter from impure water. — The heaviest liquid known, except mercury, is a compound of thallium and alcohol, which is about three and a half times as heavy as water. — Carbonic acid has been converted into oxalic acid by passing the dry gas over sodium at a high temperature. — Dry litharge and glycerine, made into a stiff paste by stirring, and used immediately, form an excellent lute or cement for chemical apparatus. — There are in America and Europe more than 250 manufactories of india-rubber articles, employing some 500 operatives each, and consuming more than 20,000,000 lbs. of gum per year. — Out of the total area of Great Britain 30,339,000 acres, or 53 per cent., are under cultivation. — The raising of the tea plant promises to succeed in California. 300,000 plants are now growing there, and doing well. They are mostly under the care of Chinese and Japanese laborers. — Small quantities of glycerine are added to paper stock to give the paper greater flexibility, and especially to give copying paper the quality of taking up color readily. — Valuable gold mines and vast salt fields have been discovered on the table lands of Thibet. — Vienna is to be supplied with water by an aqueduct from the Styrian Alps. — Chromate of lead, a dangerous poison, is extensively used in the adulteration of sugar. — Dr. Poselger has proved by experiments that trees are not injured, as has been supposed, by the leakage of street gas pipes. — The farm products of the United States for 1869, are estimated by Secretary Wells, at $3,282,950,000, which is nearly half the grand total of all the productions of the country or $6,825,000,000. The three heaviest items are corn, 450 millions; wheat, 375 millions; and cotton, about 300 millions. — California has 800,000 peach trees, or about five to each voter. — The average price of meat in Russia is about five cents a pound. 200,000 tons of tallow are yearly made there. — A few leaves of green wormwood scattered in places infested with black ants, will dislodge those insects. — Chloral is still the predominant topic in the medical periodicals. — It is asserted that the bite of the cobra, or any other poisonous snake or reptile, can be cured by administering a preparation of the gall of the venomous creature.

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — home, science, arts, agriculture, medicine, etc. — will be answered under this head, but *only when the subject is one of general interest to our readers.*

E. J. S., Hyde Park, Mass. The substance known as *bird lime* is a green, viscid, and tenacious mass, and is made from the bark of various shrubs, but principally from the common holly. The middle bark of the holly contains a large amount of viscid matter which is extracted by boiling; this is allowed to ferment, evaporated to a paste, beaten in a mortar, and afterwards packed in jars for use.

H. W. J., Cleremont, N. Y. Permanganate of potassa cannot well be prepared and retained in pill form. It should be used in its dry crystalline condition, or in solution.

A. M., Waterloo, N. Y. To answer properly the questions you propound, would require the space of at least one entire page of the Journal. A good pipe for sewage purposes, is the common glazed clay pipe. This you can obtain of the dealers, of any size required.

T. H. W., Thompsonville, Ct. Thank you for pointing out the error. The subject matter of physicians' prescriptions, as you suggest, should be discussed, and a reform brought about in the method of writing them.

S. B., Barnardstown, Mass. Your experience with steel pens does not afford satisfactory evidence that palsy is produced by their use. The difficulty you describe arose probably from nervous weakness, and want of air and exercise. We do not think that what are called "steel" pens ever produced a case of palsy by any direct or indirect agency.

J. F. J., Northborough, Mass. The horn shavings and saw dust, the products of comb factories, are very valuable fertilizing substances when properly prepared and applied. The shavings may be "rotted" or made to undergo putrefactive change, by layering them with moist soil or peat. Make a heap: first a layer of soil three inches deep, then a layer of thin shavings or dust, then another layer of soil, and in this way make the heap four or six feet high. Keep it moist, and in a month or two it will ferment, and the horny structure of the shavings will be destroyed. They may also be fitted for soil use by dissolving them in a bed of fresh ashes, or in potash water. The manure formed from them is highly nitrogenous, and must be used sparingly. A handful put in a hill on moist ground, and a cabbage plant set in the hill, will give extraordinary results.

J. O. T., Kittery, Me. Use an iron pipe in your artesian well. It is the only pipe you can use under the circumstances.

M. S., Groton, Mass. A strong solution of cyanide of potassium will remove silver indelible ink from linen. It is, however, poisonous, and must be used with care. Dilute hydrochloric acid, made by adding five parts of water to one of acid, will remove the stains. It should be washed out with pure water soon after using it.

M. V. S., Ogdensburg, N. Y. Our correspondent informs us that she is a "victim to dyspepsia," and wishes to know how much food she can take at meals without doing harm. If she is troubled with indigestion, we think this important question ought to have been settled to her satisfaction long ago. A dyspeptic generally knows when he or she has eaten too much, as the pangs of an overloaded stomach are of such a nature as not to be easily misunderstood. The question is too difficult for us to answer.

R. S., Montpelier, Vt. Horse-hairs never turn into small snakes. This is one of the vulgar notions that has obtained wide credence, and although contradicted a thousand times is still believed in by multitudes. The long, tiny worm which resembles a horse-hair, and which is found in ditches and puddles of water, is of a regular order and family, and well understood by naturalists.

T. O. N., Providence, R. I. Both the Urbaniste and Glout Morceau varieties of pear-trees are very slow in coming into bearing, and you must patiently wait for the fruit to appear. We have vigorous trees, eight years old, which have never produced a single specimen. It is provoking, but it is the nature of the tree.

M. N. O., Washington, D. C. Mildew is a fungoid plant which has life or vitality like other parasitic growths. Examine it under a microscope of 300 diameters, and its wonderful and beautiful structure will become apparent.

E. M. P., Granby, Mass. You are quite right in your suspicions. The parties are wretched quacks, and will be fully exposed in due time. The matter is explained elsewhere.

A. H. H., West Sand Lake, N. Y. — The following is a recipe recently sent us for an ink which is very black and which keeps well: —

Ext. logwood	4 oz.
Sulphate of copper	1 "
Nutgalls	15 "
Sulphate of iron	6 "
Gum Arabic	6 "
Cloves	2 "
Rain water	3½ qts.
Vinegar	4 oz.
Pyroligneous acid	8 "

A little carbolic acid may be added. This, with the pyroligneous acid, will prevent the ink from mildewing. The cloves alone do not answer this purpose, but they give the liquid an agreeable odor.

J. B., San Jacinto, Texas. Ivory may be bleached by keeping it in a thin milk of lime (made from freshly slaked lime, and heated) until it is white. It should then be dried and polished.

John H. Williams, M. D., who sent us $1.00 some time ago, forgot to name his P. O. address.

Wm. A. Fry, of Worcester, sends us $1.00, but neglects to mention his *State*. There are *four* post-offices of that name.

Water Supply Pipes. — The remarks presented in our last number respecting the dangerous nature of galvanized iron water pipes, have created a wide-spread interest, and considerable anxious inquiry has arisen regarding the best and safest pipe to use for water conduit. The whole subject of water supply pipes will be discussed in the October number of the Journal, and we trust the paper will not only be interesting but useful.

Medicine.

THE VALUE OF VACCINATION.

The prevalence of small-pox in Paris has led to a thorough re-discussion of the value of vaccination, the various methods of performing it, and all the related questions; and renewed attention has thus been called to the subject among medical men in this country also. The almost unanimous verdict, both here and in Europe, is in favor of vaccination. A Medical Commission appointed by the hospitals of Paris, speak as follows in their report: "We all know that in some cases the benefit of vaccination disappears to such a degree, that certain persons having beautiful vaccinal cicatrices succumb from confluent variola, or, more often, from the malignant, and especially the hemorrhagic forms; we know that a larger number of vaccinated persons are attacked with variola discreta, which sometimes present great gravity, and may terminate by death; but we also know that these facts are only the exception, and that the majority of vaccinated persons are only lightly attacked; and on the contrary, we are not ignorant that, if it happens that persons not vaccinated are slightly attacked, this is by far the greater exception; and that, for persons not vaccinated, when attacked with small-pox, the danger, the confluence, and the malignity constitute the rule and not the exception." The Commissioners give statistics taken not only from the present epidemic, but from former ones, in proof of these assertions.

Dr. Baroffio, in his report on vaccination in the Italian army, states that the number vaccinated in 1868 was above 57,000. The good effects of vaccination and revaccination are constantly becoming more apparent. The mortality from small-pox, which formerly was nearly 7 per cent., had fallen in 1863 to 4 per cent., and in 1868, was little more than 3½. Dr. Baroffio expresses a favorable opinion of the plan of taking the lymph from healthy and strong infants, and then transmitting it from arm to arm among the soldiers.

In Russia, vaccination is not compulsory, and, according to official returns, no less than 10,350,000 persons have died of small-pox in that country during the last seventy years.

In England, of every 1,000 deaths from 1750 to 1800 there were 96 deaths from small-pox; but since the introduction of vaccination the number has averaged only 35 out of every thousand, or a diminution of nearly two thirds. The regular decrease for the first sixty years of the present century is well shown by a table prepared by Dr. E. C. Seaton, Medical Inspector to the Privy Council. He gives the number of deaths from small-pox out of each 1,000, in London, for the successive decades from 1800 to 1860 as 64, 42, 32, 23, 16, 11. From this it appears that the mortality from this disease for the years 1851–1860 was only about *one sixth* of that for the years 1801–1810.

In Germany, before vaccination was known, the deaths from small-pox were 6.65 to the 1,000, but since its introduction they have averaged only 7.26 to the 1,000, — a reduction of *nearly 90 per cent.*

Dr. William Pepper, one of the physicians to the Philadelphia hospitals, in a valuable article on vaccination in the *American Journal of the*

Medical Sciences, arrives at several distinct and decided conclusions, which are in substance as follows: —

1. Vaccination appears to furnish almost complete protection against either varioloid or variola, during the first six years of life.

2. In subjects not vaccinated, the greatest susceptibility to the variolous poison seems to be during the first two years of life, at which time the form of the disease is very apt to be confluent, and in a large proportion of cases fatal.* The same tendency to assume the grave form of true confluent variola in unprotected subjects may be seen, though to a less degree, at all ages.

3. When, owing to any cause, whether from possible inertness of virus, imperfect insertion, or idiosyncrasy on the part of the subject, the vaccination fails, the operation should be repeated at short intervals, varying the virus and perhaps the mode of insertion until success is obtained or all danger of exposure to contagion ceases.

4. In very many cases, however successfully vaccination may have been performed, its protective power becomes exhausted after a number of years, although there is very little risk when vaccination has preceded the exposure by so short a period as two years.

5. When the protective power of vaccination has been exhausted, the subject may contract any form of variolous disease.

6. Notwithstanding this possibility, the chances are very much more in favor of an attack of varioloid or a mild form of variola, when the subject has been vaccinated successfully, no matter how long before, than if this operation had not been performed.

7. Although the tables furnish meagre evidence of a positive kind as to the absolute power of vaccination to protect against death from variola, they furnish strong negative evidence in its favor.

8. If vaccination is performed during the incubation of variola, at such a time that the vaccine eruption appears before the variolous eruption, the latter will be modified, and, in the vast majority of cases, favorably.

* We may remark that this view is confirmed by the French report from which we have quoted above. The mortality in Paris was very great among children less than one year old — ten times greater than between the ages of 20 and 30. To children under three months of age it was especially fatal.

THE HEALTH AND LONGEVITY OF BRAIN-WORKERS.

Dr. G. M. Beard, in an article in the *College Courant*, gives many facts and statistics to show that brain-work is *per se* favorable to health and longevity.

The earliest records of average longevity are those of Upianus, 225 years B. C., and relate chiefly to the *intelligent and wealthy* classes. His table makes the average length of life for persons under 20 to be 30 years; for those between 20 and 25, 28 years. In England, at the present day, the average length of life for *all classes* is 46 years for those under 20, and 38 years for those between 20 and 25. In the United States the average expectation of life for all persons under 20 is 47 years; for those between 20 and 25, 39 years. In other words, all classes live 50 per cent. longer under the modern civilization of England and the United States than the most favored brain-working classes lived under the Roman civilization.

In all nations the higher classes live longer than the humble.

Increase of longevity is shown by comparison, not only of ancient and modern times, but also of the earlier with the later stages of our modern civilization.

Thus in Geneva, where vital statistics have been carefully kept for nearly four centuries, the expectation of life —

In the 16th century was 21.21 years.
" 17th " " 26.67 "
" 18th " " 33.62 "
From 1814 to 1833 " 40.68 "

This comparison shows an increase of almost one hundred *per cent.* in three centuries. As the civilization of Europe and America has been mainly developed during the past three centuries, the comparison is a fair one.

In Sweden the expectation of life at birth —

From 1755 to 1775 was $35\frac{1}{4}$ years
" 1841 " 1855 " $43\frac{3}{4}$ 5-12 "

In England and Wales mortality has diminished *two fifths* in a single century — from 1720 to 1820.

The rate of mortality in Dublin at the beginning of the eighteenth century was 1 in 22 of the population; in the middle of the nineteenth century 1 in 38 of the population.

The rate of mortality in Boston —

From 1728 to 1752 was 1 in 21.65 of the population.
" 1846 " 1865 " 1 " 42.08 " "

Here we have a decrease of about fifty per cent. in one century; and similar decrease has been observed in Paris and London.

It is just to conclude that this very remarkable increase in the average duration of human life under civilization is materially due to the influence of labor of the brain. This is, however, by no means the only cause of this increase of longevity. There are various other causes that are associated with and flow from increased mental activity of nations. Among these may be mentioned —

1. Increased comforts. Civilization gives us better food and drink, better homes and clothing, better surroundings every way, than barbarism.

2. Diminished hours of labor, with better reward. Excessive muscular labor is more injurious than excessive mental labor, especially when it is ill-paid, and pursued under depressing circumstances.

3. Improved morals. Intemperance and licentiousness, the two great foes of the human race, have both diminished with the advance of civilization.

4. Advance in sanitary and medical science. The types of disease have changed, and some forms have passed away. The plague, which in the seventeenth century destroyed thousands every year, and the "black death," which destroyed 25,000 in 1348 and 1349, are now unknown. Small-pox is but 1-10, measles 1-5, fevers 1-4, and consumption a little more than 1-2 as fatal now as in the seventeenth century. Nervous diseases have lately increased in severity and variety, but they are much less fatal than fevers and epidemics. Meanwhile hygiene and medical science in all its branches have rapidly advanced.

PROFESSOR HUXLEY ON MEDICAL EDUCATION.

Professor Huxley distributed the prizes the other day, at the University College, to the medical students, and made an address to the audience. Speaking of medical education, he said he had, for twelve or thirteen years, been an examiner in the University of London. Although the men who came up there were the pick of the London schools, he had found them all laboring under certain disadvantages, owing to the defective system of education now pursued. What struck him, during his long experience of the best instructed of the medical schools, was the singular unreality of their knowledge of physiology. He did not complain of the quantity, for there was, if anything, too much of it; but he did quarrel with the quality. He had invariably found that the men who came up for examination did not know their physiology as they did their anatomy. The number of schools in London rendered it almost impossible that competent men could confine themselves to the teaching of the theoretical branches of the profession. Anatomy, which lay in the direction of practice, might be thoroughly taught, but this was not so with physiology. From the very nature of the case, the occupant of the physiological chair remained there until he had achieved professional success, and then he left it; he was clothed, but physiology was bare. The remedy he suggested was the centralization of the teaching of the theoretical branches of the profession in not more than three central institutions, where able professors could be maintained. He would cut down these theoretical branches to a considerable extent, and would have the elements of physical science taught in the primary schools — physics, chemistry, botany, and the like. Comparative anatomy ought to be absolutely abolished, although it would involve the putting back of such branches as zoölogy and botany to the students' early education in ordinary schools. He would also abolish Materia Medica. He could not understand why gentlemen who had to practice medicine should be obliged to learn all about drugs, and where they came from; they might just as well be required to learn all about cutlery because they used knives. If his views were adopted, there would be left for the four years' study the following nine subjects: physics applied to physiology, chemistry applied to physiology, physiology, anatomy, surgery, medicine, obstetrics, hygiene, and medical jurisprudence, which would be quite enough for the man's pursuit — and this course would not oblige a medical student to occupy his time with what would not be absolutely useful in his future life.

We condense the above account of Professor Huxley's remarks from a report in the *London Daily News*. As might have been expected, his strictures did not escape criticism. In a letter addressed to *The Lancet*, Dr. Parry attributed the deficiencies of the students in the examination on physiology to the method of examining adopted by Professor Huxley and his colleagues, complaining that the questions asked were too hard. This charge Professor Huxley at once rebutted by facts drawn from the official reports of the examinations. He challenges Dr. Parry to point out a single question in the papers given to the candidates which any one acquainted with the "fundamental principles" of physiology ought not to be able to answer. *Scientific Opinion*, in summing up the results of the discussion, decides that Professor Huxley's position has not been successfully assailed, and adds the following remarks, which will serve to show how the instruction in this department compares with that in our own medical schools: —

"But, leaving aside altogether the respective opinions of the two disputants, we would ask the question, Is physiology properly taught in medical schools generally? We doubt not that in some of the larger hospitals and colleges much attention is

directed to those facts and phenomena in practical physiology on which medicine itself is so firmly based. But is it not the case that in others, a few antique diagrams, preposterously unnatural models, utter absence of anything like real demonstration, and unnecessary dwelling on speculations and effete hypotheses, constitute the whole teaching of the subject of physiology? How many lecturers are there in London even, who demonstrate the circulation of the blood, or show the passage of the chyle along the lacteals, or make their students familiar with the normal heart and lung sounds, or with the difference between the anterior and posterior roots of the spinal nerves, or show the action of constant galvanic currents as compared with inductive ones, or familiarize their pupils with the result of section of the spinal cord at different points? We should like, indeed, to know. No doubt, numerous lectures on the cell theory are given; 'reflex action,' as an hypothesis, is adequately dwelt on; the relative claims of Servetus and Cæsalpinus to the discovery of the circulation are disposed of, and no end of text-book quotations are indulged in.

"This is unquestionable; but it is not teaching physiology as it ought to be taught; and as it is the system usually followed in nine cases out of ten in this country, Professor Huxley was perfectly justified in pointing it out, and passing the severest censure upon it. That Professor Huxley's view is right we do not for a moment doubt, and we thank him heartily for the courage and candor with which he has exposed a system, not only detrimental to the advance of abstract science, but most pernicious in its influence on the present generation of medical men, since it cultivates a tendency to accept the assertions of books rather than to observe the phenomena of disease."

STATISTICS OF HYDROPHOBIA.

The French Secretary of the Interior has communicated to the Academy of Sciences in Paris an interesting report concerning all the cases of hydrophobia which were brought to the knowledge of his employés from 1863 to 1869. Of the one hundred departments into which France is divided, eight failed to send in their reports; in thirty departments no case of hydrophobia occurred; in the remaining forty-nine departments three hundred and twenty persons were bitten by mad dogs. In one hundred and twenty-nine cases the biting was followed by hydrophobia; in one hundred and twenty-three cases the bitten persons suffered no evil consequence; and nothing was known of the remaining sixty-eight. In every case, without any exception, where hydrophobia broke out, the patients died. Of the whole number bitten, only twenty-six were females. Two thirds of all persons who had been bitten were males between five and fifteen years of age. The numbers of mad dogs were very nearly equally divided through the four seasons. The number diminished somewhat during the hottest months. The officers succeeded in establishing the time when the hydrophobia broke out in one hundred and six cases. In seventy-three cases it broke out during the first two months after the bite, and the other cases were divided among the following six months, only two falling in the eighth month. The disease never lasted longer than four days, and almost all the patients died on the second day. Of all the remedies employed after a person was bitten by a mad dog, the burning of the wound proved the only one which was followed by good results; of one hundred and thirty-four persons whose wounds were burned, ninety-two remained without evil consequences, whilst the same was the case with only ten of sixty-six whose wounds were not burned. The sucking of the wounds, or their treatment with ammonia immediately after the persons were bitten, proved salutary also in many cases, but cauterization was by far the safest means of all.

A SPECIFIC IN ERYSIPELAS.

In presenting a case of facial erysipelas before the University Hospital clinical service last week, Dr. J. E. Garretson remarked, that in his practice of the past five years he had met with no case of erysipelas which had not readily and instantly yielded to the local application of the muriated tincture of iron, tincture of cinchona, and sulphate of quinine. The case before him, he remarked, while threatening and angry looking, would, he felt convinced, so surely succumb, that he should give the patient the prescription and send her to her home, not to return for three days. Without attempting to enter into any special discussion of the variety of causes thought to influence this condition, Dr. Garretson said he felt sure that this peculiar inflammation had a basial irritant as specific in its character as that of small-pox, typhoid fever, or the ague, and that as, in this latter disease, we had found an antagonist in quinine, and that of typhoid fever not unlikely in hydrochloric acid, so in this morbid inflammation he trusted it was found in the combination alluded to. As, said the lecturer, every effect is from a cause so rational as to abort effects by removal of causes. He was not, he said, prepared to deny the existence of specifics; it was common sense, rather, to believe in them. Everything in physics exhibited and demonstrated the existence of antagonisms. He thought some of the members of the class would, most likely, live to see the day when the intelligence of this or the coming century might make even cancer a disease no longer to be dreaded. Without doubt this cachexia had a cause. Why should not continued investigations discover this cause? and if discovered, there was nothing at all improbable, certainly, in the supposition that it was capable of being antagonized. "Belladonna," he said, "would antagonize opium; yet it has been only a short time since we knew so important a fact; and hundreds, perhaps thousands, have died, simply because they had the misfortune to be born before the medical mind knew of such an antagonism."

The following cases which, within two weeks back, had been presented in his practice, were noted by Dr. G.:—

Case I. — Very old man; erysipelas of hand and arm attendant on an operation performed on one of the fingers three weeks before; parts heavily engorged and indurated, the finger sinking easily into the cushion-like mass. From fear, the patient had denied himself applying for assistance until the inflammation had been four days in progress. The whole arm presented the peculiar glisten, particularly that part just below the elbow, where an abscess was evidently forming. The combination, as usually prescribed, was directed.

℞. Tinct. ferri chlor.
Tinct. cinchonæ . . . f℥ij.
Quiniæ sulph. . . . gr. xxx.
Aquæ . . . . . . f℥iss. M.

This was to be applied by means of a brush four times a day.

Second day, blush all gone; opened the abscess; case well in a few days.

Case II. — Young professional gentleman; lacerated wound of ring finger; whole hand and lower portion of the fore-arm erysipelatous; fingers thrust widely apart by the swelling; back of hand a soft cushioning mass; few cases appear more threatening. No constitutional treatment; mixture applied as in the first instance, and hand enveloped in a poultice of flaxseed; next day the specific character of the inflammation had entirely disappeared. The treatment of this case was continued on general principles for five days, when the patient was in condition to be dismissed.

Case III. — Mill-boy from the country; erysipelas of leg; three days in progress. The father of this lad presented him in great anxiety, having during the summer of last year lost a son with an erysipelas which commenced in a similar location. In the boy presented for treatment there was no wound or traumatic injury of the part affected. At 5 o'clock on one evening the mixture was applied; by the next, the case seemed and remained entirely cured.

Dr. Garretson said, if necessary, he could readily occupy the entire hour in an enumeration of cases, both of cutaneous and phlegmonous varieties, which had proved to him the good service capable of being performed by this application. He said he desired, however, not to be understood as advocating the combination as specific in an ordinary acceptation of that term; the intelligence of the class would well enough recognize that only one of many indications which might be present was proposed to be met; namely, the destruction of the specificity of the inflammation; this is the lecturer likened to an injury which might be done by a musk-rat to a river bank, saying, that while the destruction of the rat would be specific treatment, there was yet a hole left to fill up. — *Medical and Surgical Reporter.*

Dr. Letheby, in an article on the water supply of London, states that water of moderate hardness, like that used in London, Paris, Vienna, and some other European cities, is always to be preferred to that which is entirely soft, as being best suited for domestic purposes, on account of being brighter to the eye and more agreeable to the taste. He also makes the singular announcement that the French authorities are so well satisfied of the superiority of hard water, that they pass by that of the sandy plains, near Paris, and go far away to the chalk hills of Champagne, where they find water even harder than that of London; giving as a reason for the preference that more of the conscripts from the soft-water districts are rejected, on account of the want of strength of muscle, than from the hard-water districts, from which they conclude that the calcareous matter is favorable to the formation of the tissues.

Dr. Letheby further states that the mortality in England is greater, on an average, in places where soft water is used, other circumstances being equal, than where the water is hard; and it is suggested that the sparkling hard waters of the limestone districts are relished, not only because they are pleasant to the eye, but on account of some hygienic properties in the excess of carbonic acid they contain, and possibly because the percentage of lime acts medicinally on the system. The Doctor concludes by expressing his preference for the very slightly hard water of London over a softer quality, although reprehending the use of water containing an excess of mineral matters.

Quacks and Cancers.— The item relating to "carbonizing cancers" by a "new salt" of chromium, which appeared in the last Journal, was accidentally put among the "accepted" instead of the "rejected" matter for the paper, and thus got into type; and the mistake was overlooked in reading the proofs.

As the address labels for each number of the Journal are printed before the 18th of the preceding month, money for renewals received after that date cannot be credited on the labels until the next month. We will send a receipted bill to any one inclosing with his subscription a three-cent stamp for return postage.

ANOINTING IN DISEASE.

During the past eleven months Dr. Knaggs has been testing, with uniformly successful results, the value of a very simple method of treating such infantile complaints as atrophy, bronchitis, convulsions, diarrhœa, febrile disturbances generally, and indeed all disturbances of childhood which are accompanied by an unnatural state of the skin.

The treatment simply consists in smearing with salad oil the whole surface of the body, from the crown of the head to the tips of the fingers and toes, the process being repeated every twelve, six, or even four hours, according to the urgency of the case. Of course, the use of a long flannel gown or small blanket is obvious, and the fluid should be slightly warmed.

The application of oil, the author writes, possesses the following immense advantages over the ordinary warm bath: —

1. Skin-action is more completely and permanently restored.

2. The danger of reaction is avoided, for there is no sudden change of temperature; and moreover the sheet of oil protects the surface from atmospheric influences.

3. It acts as a fuel-food, not only preventing waste of tissue, but actually increasing the bulk of the little patient.

4. It does not depress, but, on the contrary, appears to exhilarate.

It will scarcely be credited by many that the formidable affections above mentioned will frequently yield to this treatment, or at any rate show signs of abatement, in from twenty minutes to twenty-four hours, but such is the case, though sometimes forty-eight or even seventy two hours will elapse before any decided signs of improvement occur. — *Lancet.*

FOREIGN NOTES.

A New Remedy for Intermittent Fever. — Dr. Lorinser, of Vienna, gives, in the *Wiener Medizinische Wochenschrift*, the results of a number of observations with regard to a new remedy for intermittent fever. The remedy is the tincture of the leaves of the *Eucalyptus globulus*, a plant of the natural order *Myrtaceæ*. In 1869 Dr. Lorinser made some experiments, the results of which he published; but he was brought to a stand-still by the want of a supply of the medicine. The plant has since been cultivated by Herr Lamatsch, an apothecary; and a sufficient quantity of tincture has been made from the leaves to supply a number of medical men in the districts of the Theiss and the Danube, and in the Banat.

The records of fifty-three cases of intermittent fever in which the eucalyptus was administered have been communicated to Dr. Lorinser. Of these, forty-three were completely cured; in five, there was relapse, in consequence of a failure of the supply of the eucalyptus, and quinine had to be employed; two of the cases were not true ague; in one case, neither the eucalyptus nor quinine cured; in one, the medicine (as well as other remedies) was vomited; and in one the patient would not allow the treatment to be continued. In eleven of the cases quinine had been used without effect; and nine of these were cured by the eucalyptus.

A Civic Sanitary Staff. — The authorities of Glasgow have organized the most complete "sanitary department" probably ever established as a permanent branch of municipal administration. The object aimed at is no less than to prevent disease — not only to wipe away the reproach which Glasgow has of late years been incurring from the mortality returns, but to render the town more clean and sweet to live in, to improve the habits and condition of the poor, and to secure more vigorous health and greater length of days to all. The "Sanitary Inspection Service" consists of a chief officer, five district inspectors, and thirty ordinary nuisance inspectors, each of whom has a section of one of the five districts into which the city has been divided under his charge.

Ice in Chloroform Accidents. — Dr. Baillie, Surgeon to the Calcutta Native Hospital, states in the *Indian Medical Gazette*, that in cases of syncope from inhalation of too large a quantity of chloroform, there is no means upon which he should more rely to restore the movements of respiration, than the introduction of a *good sized lump* of ice into the rectum. This is much more easily effected than one would suppose; a little pressure with the ice being made over the sphincter causes it to relax, and the ice slips in, followed almost instantaneously by a prolonged inspiration, the precursor of natural breathing, and restoration of the heart's action. This measure, but with a *small* bit of ice, would doubtless, answer equally well with still-born children.

Concerning Opium. — M. Garnier, a member of the French Cambodian expedition, states that in China the taste for opium is by no means confined to the human race. Pigs and horses thrive upon poppy flowers, and when deprived of their favorite food languish and die. At a town in Zunnan rats used to resort in large numbers to an opium factory, in order to inhale the fumes from the coppers; and after the town had been sacked by the Panthays, the ruins of the building were still haunted by the animals.

The *Pall Mall Gazette* thinks that a good deal of nonsense is talked about the fearful consequences of opium-eating. In moderation opium is an excellent stimulant, and this is well known to the hundreds of literary and professional men who could hardly get through their labors without its help. The stereotyped emaciated opium-eater is one of the *bogies* used by well-intentioned but ignorant people, and is, like the hopeless drunkard, the exceptional instance in a large class.

An English journal recently asserted that opium is put into Manila cigars. In reply to this, an old resident of Manila remarks that "those who entertain this absurd opinion can have but little idea of the cheapness of tobacco here and the high value of opium: it would never pay to mix the drug, even in small quantities, with our excellent tobacco, which certainly needs no such addition."

The History of Hygiene in England. — In an address to the students of St. Mary's Hospital, a few weeks ago, Dr. Lyon Playfair gave some curious historical illustrations of the origin of hygiene in England. If his view of the matter is correct, the study of sanitary science arose from a singular accident. The Court and Parliament were at Oxford, which had been recently drained, and the citizens had removed all accumulation of filth and garbage from the streets, lest they should offend the nostrils of their distinguished guests. The plague was raging at the time, and Oxford was the only place which enjoyed an immunity from it. Cause and effect were for the first time connected in the public mind, which was thus enlightened for the first time as to the nature of what we now call pythogenic, or filth-born maladies. Prior to that, the measures recommended by the council of the physicians of Paris for the arrest of the plague were: That if a shower of rain fell during the day a spoonful of treacle should be taken, and that fat people should not sit in the sun. Michelet declares that for several centuries during which filth reigned supreme, not a man, woman, or child in Europe took a bath voluntarily and out of a desire for cleanliness. Out of this chronic and wide-spread filth arose the black death, the plague, the sweating sickness, and other pestilences, the consequences of bad hygienic conditions.

A Singular Experiment. — One of Dr. Richardson's last course of lectures on experimental medicine was remarkable for an experiment, which appears to show that there is a direct and almost immediate passage of substances in the gaseous form through all the tissues of the body, and especially through the coats of veins. He introduced a fine tube through the nostril of a rabbit into the cranial cavity. Air, or carbonic acid gas, pumped through this tube, instantly made its appearance in the right cavities of the heart. The carbonic acid darkened the blood and stopped the systolic action. Atmospheric air rendered the blood of the right side arterial, and restored the systole.

VALUABLE FORMULÆ.

Croup. — The *Chicago Medical Times* says that the following has the most marked effect in relieving this distressing complaint in its common form: —

R.	Oil Stillingia	gtt. x.
	Oil Lobelia	gtt. x.
	Diluted Spirits	oz. j. M.

One to ten drops in a little mucilage or syrup — or on sugar — to be given every fifteen or twenty minutes, until the paroxysm passes off, which it usually does very soon.

We have known many severe cases also to be relieved by simple warm water, given in teaspoonful doses every five minutes or so, until nausea was produced, and accompanied with hot packs around the throat.

The simple syrup of Lobelia, for domestic use, proves much more efficacious than the old fashioned Hive Syrup of the dispensatories. A very good way for making it quickly, is: —

R.	Tinct. Lobelia	oz. j.
	Simple Syrup	oz. iij. M.

Dose, half a teaspoonful to a teaspoonful every twenty minutes until relief is obtained. For office use, fluid extract of Lobelia, half an ounce, can be substituted for the tincture.

TOOTHACHE TINCTURES.

1. *Tincture of Pellitory.*

Take of Pellitory root (bruised). . .	1 ounce,
Alcohol	½ pint;

digest a week, with frequent agitation, then express the tincture, and, after repose, decant and filter it. Excellent as "toothache drops;" also, diluted, as a mouth-wash in toothache and face-ache.

2. Take of Tincture of opium .	2 fl. drachms,
Ether	4 "
Oil of cloves . . .	½ "

mix, with agitation, and shake it each time before use. The product is a favorite form of toothache drops with many persons, and represents the composition of several odontalgic nostrums.

3. Take of Creosote. . . .	1 drachm,
Chloroform . . .	2 "
Alcohol. . . .	3 fluid drachms;

mix, etc., as the last. Very serviceable in toothache arising from caries.

4. *Dr. Collier's.*

Take of Pellitory (bruised small) .	2 drachms,
Camphor	1½ "
Opium (powdered) . . .	½ "
Oil of cloves.	1 fluid drm.
Alcohol	½ pint;

digest a week, as the last. It must not be swallowed.

5. *Vicat's "Anodyne Odontalgique."*

Take of Powdered opium . .	1 drm. (Troy).
Powdered camphor. .	½ "
Ammoniated alcohol (caustic)	¾ fluid ounce,
Alcohol	1½ "

digest in a stoppered bottle, with agitation, for some days, and, after repose, decant the clear portion. Used as "drops" in toothache, in which it is often very serviceable, particularly when it arises from caries; also as a lotion in face-ache, and to the temples and forehead in headache. — *Druggists' Circular.*

Boston Journal of Chemistry.

OLUME V. BOSTON, OCTOBER, 1870. NUMBER 4.

Familiar Science.

THE CONSUMPTION OF GUNPOWDER.

It is generally supposed that in time of war ere is a vast increase in the consumption of npowder; but this is not the case. It is a rious fact that the arts of peace require a ich larger use of the explosive than the arts war, and that consequently France and ermany will burn *less* gunpowder from month month during the contest than they otherse would if peace had continued. Even in severest and most protracted battles comratively *little* is burned. One of the owners a large powder-mill in this State informed us ently, that he could make at his establishnt before breakfast any morning all the pow- that was consumed at Gettysburg. Ben tler stored more powder in his foolish "bomb p," which he exploded against Fort Fisher North Carolina, than was used in some of our st important battles. War takes from mines, nufactories, farms, etc., tens of thousands of n who are constantly engaged in consuming npowder for various purposes. In the army y pass months, perhaps years, in idleness, and occasion is afforded for its use except in utes, etc., so that they actually consume less service than out. There was during our ntest, especially during the first part of it, reased activity among powder makers, and materials of gunpowder rose in price, but a y small part of that manufactured was ever sumed. The Government has now on hand, its magazines and arsenals, prodigious quanti; enough probably to carry us through two h wars as the last. It may be further obved that probably not one ounce of gunpow in twenty used in battle does any execu. Its explosion serves to increase the oise and confusion," but comparatively very are hurt through its agency.

HAT SHALL WE USE FOR WATER-PIPES?

We are certain that the discussion of no subt can be of more general interest to our ders than that relating to the nature and ety of the different kinds of pipes which are d for conducting water to the culinary departnts of dwellings. Great anxiety has always n manifested, by housekeepers and others, arding the safety of the conduit pipes in genl use, whether composed of lead or of other tals. It is important that this subject should fairly and intelligently discussed, in order t the extent of the danger may be clearly lerstood, and also that the utility and economy different kinds of pipes may be known. ile it is important that all real sources of iger should be pointed out, it is also desira that groundless or unnecessary fears should allayed. We are happy to present to our readers, in plain language, the results of several years' observation and experiment upon the different kinds of water-pipes.

LEAD PIPES.

Lead is the metal by far the most largely employed for service water-pipes, and it certainly is the cheapest and most convenient material of which to construct them. It is soft, ductile, easily and readily put in position, and seldom gives trouble by leakage. It is a pity that a metal so well adapted to our wants should be liable to be dissolved by the water brought in contact with it, and that the metal and its salts should so disturb the vital functions as to engender disease and destroy life. And yet, we cannot help remarking, how slight is the danger from the use of lead water-pipes. Millions of pounds of it lie buried in the earth, and through it water is flowing to thousands of families, and yet comparatively a small number suffer from its influence. A large proportion of the waters of this country, that are suited to culinary purposes, will pass through lead pipes under *ordinary conditions*, and remain uncontaminated. During the past quarter of a century, we have studied diligently this matter of the action of different waters upon lead, we have made hundreds of analyses, and have found but few from ponds, lakes, and open reservoirs that do not contain elements which exert a *protective* influence upon the surface of the metal. The first chemical action of water upon lead is usually that of oxidation. The oxygen, which enters into combination with the metal, comes from the air always present in water, or possibly it may come from the water itself through chemical decomposition, the result of galvanic action. The oxide of lead is a soluble compound, and quite poisonous. If the results of the contact of water with lead were to stop here, not a family could use leaden pipes with impunity. The oxide would continue to form as fast as it was washed away and dissolved by the current, and shortly the whole structure would be destroyed. But most waters contain, or hold in solution, another element, carbonic acid, which readily combines with the oxide, and forms a new salt. This is the carbonate of lead, and fortunately is *insoluble*. The first action, then, of most waters upon lead is to form upon the surface a coating of the white oxide of lead; the second action is to change this dangerous soluble oxide into a hard insoluble carbonate, and this, adhering to the whole interior surface of leaden pipes, prevents further contact of the water with the metal, and all decomposition ceases. This is a plain statement of the way in which lead is usually acted upon by water; and if there were no disturbing agencies to come in and interfere with these results, we should hardly require safer or better water-pipes than those constructed of lead.

It sometimes happens that well and spring waters contain other agents which interfere with the chemical changes we have described. Many wells in the Northern States are fed by springs which percolate through or over beds of rocks charged with iron pyrites, or sulphuret of iron. This mineral is usually found in the form of little cubes, very hard and dense, and having a golden yellow color. These cubes are often supposed to be true *gold* by well-diggers. We receive a carefully done-up package of this mineral as often as once a week during the year, sent to us for chemical analysis, the finder believing he has discovered a gold mine. We are always sorry to be compelled to furnish results which demolish the foundation upon which rest "great expectations." Waters brought in contact with such minerals are often impregnated with an offensive gas (sulphuretted hydrogen, or sulphydric acid) and the taste is unpleasant. Their action upon leaden pipes is of an unfavorable nature, producing sometimes rapid decomposition. We have not sufficiently investigated the nature of this action to be able accurately to define it; but it is certain it occurs, and leaden pipes should not be employed to conduct such waters. Organic matter from vaults and cesspools frequently finds its way into wells, and changes the character of waters, so that they become dangerous in their influence upon lead. Some waters are decidedly alkaline, and thus the action of carbonic acid upon lead oxide is neutralized, and it remains in solution.

The nature of the action of water upon lead is changed from local causes, operating within the pipes themselves. Lime, leaves, and other substances, which may be deposited in the angles or bends of pipes, will modify the chemical changes, so as to render an otherwise safe pipe very unsafe. The twisting and bending of pipes, when placed in position, disturb the crystalline structure of the metal, and give rise to electrical currents, which promote its solution in water. Well-waters and spring-waters are usually more unsuited to lead conduction than those of ponds and rivers.

As service-pipes for aqueducts, lead pipes will, under ordinary conditions, deliver water free from lead contamination. In a city or town supply, where the general influence of the waters is protective, as described above, there will be *local causes* operating, through the agency of which *some* families will suffer from lead poison. No city or large town can introduce lead service-pipes into its aqueduct system, with entire exemption from danger. It is not enough to learn the *general* influence of aqueduct waters, as thereby people are misled; we must know the character of the water which flows into each *separate* dwelling, if we would have knowledge of its *exact* influence. If each water-taker in a city could have the water received carefully tested twice during the first year after it is introduced, he would learn

whether he is free from danger or not. If, after this period, the water flows pure, no anxiety need be felt. It is perhaps impracticable to have chemical analysis of waters made upon so extensive a scale, but it is the only way in which there can be perfect exemption from cases of lead poisoning in cities. In a majority of wells, lead conducting pipes can be used with safety; but since without analysis it is impossible for housekeepers to know *when* the conditions are unfavorable, it will be better to employ some other kind of pipe. It may be said here that we have used water in our own dwelling for twenty years, which passes through leaden service-pipes from the iron mains of the city of Haverhill aqueduct. Not a trace of lead has been found in the water since the first month after its introduction. If we did not *know* that we are free from agencies causing local decomposition, we should remove the pipes at once.

TIN-LINED LEAD PIPES.

To obviate the danger incident to lead pipes, an inventor in New York conceived the idea of lining the interior of such with tin. These pipes are called "*tin-lined lead pipes.*" They are constructed of a thick outside pipe of lead, while another thin one, of tin, is drawn through the interior and rests in contact with it, forming a lining. This idea is such as would quite naturally suggest itself to any one; and ingenious mechanics or inventors, unacquainted with the electro-chemical relationship of metals, would seize hold of it as a most important discovery. They would not know that tin by itself is often more readily attacked and dissolved by water than lead, and that, when placed in association with lead, if any water contact is made between the tin and lead, both metals are dissolved with increased rapidity. We have heretofore unreservedly expressed our dissatisfaction with this pipe; and our views are supported by some *practical* scientific men, whose opinions are certainly worth more than those of a whole army of gentlemen who devote their lives simply to performing illustrative chemical experiments before classes in colleges. Besides this, we have had opportunity of examining specimens of the pipe which have been used for different periods of time, and we have found results which fully confirmed our opinions. In regard to this pipe, we do not assert that in every case, or in a majority of cases, where it is used it is positively dangerous. If the pipe is perfectly covered with tin throughout its entire surface, and if it is placed in contact with the waters of such wells or aqueducts as do not readily act upon tin, it will serve a good purpose for many years. What housekeepers require in a water-pipe is *not* one which *may become dangerous under conditions liable to occur*, but one which *is safe under all possible conditions. The tin-lined lead pipe is not of this character.*

TIN PIPE.

Pure "block-tin," so called, supplies a good metal from which to construct water-pipes. As noticed above, it has the disadvantage of being readily acted upon by some waters; but this is purely an economical matter, as the salts of tin are not specially poisonous, and no harm can result from its solution in water. Block-tin pipes are quite expensive; but this is a small matter to many, and we recommend the use of tin pipes in cases where cost is not regarded. Of course, there are many who cannot afford them, and a cheaper and equally safe water-pipe is needed. Those who seek a cheaper pipe must not be deceived by the clean, attractive appearance of the

GALVANIZED IRON PIPE.

Since we called special attention to the objectional nature of this pipe, in the August number of the JOURNAL, a flood of correspondence has poured in upon us; and we are no less surprised at the sad want of correct information manifested by the writers, than at the extent to which this pipe has been introduced. Incredible as it may appear to those who understand its chemical nature, it is evident that it has come into quite common use, and that thousands of yards of it are put down every day, for the conveyance of water for household use. Several of our correspondents ask if we are not mistaken in our views regarding the dangerous character of galvanized pipe, and one *doctor* remarks that the salts of zinc are *not* poisonous, as he uses them freely in medicine. Indeed! So we suppose he employs also the salts of *lead* in medicine. Zinc salts and lead salts may be very good remedial agents, but we had rather be excused from using them freely as condiments in our daily food. Another says that he has taken up his pipe laid down two years ago, and he finds it "all right." By the same mail came half a dozen letters describing the galvanized pipes put in position a few months ago, which were *not* found to be "all right."

Iron pipes are "galvanized," by immersing the common gas-pipes in hydrochloric acid, and then immediately placing them in a bath of melted zinc. The zinc amalgamates with the surface of the iron, forming a superficial covering of the metal. This is a *very cheap* process, and was originally adopted with the view of preventing gas-pipes from rusting in damp places. Such pipes were never designed to be used for the conveyance of water, even by the manufacturers; and how any one ever ventured to use them for that purpose is a matter not easily understood by us. Zinc is a coarse, cheap metal, easily oxidized or corroded by weak acids, and when thus acted upon, forms salts, which are harmful to the economy. Who ever heard of zinc being recommended by a reputable chemist as a suitable metal from which to construct water-pipes? And yet pipes composed entirely of zinc would be less readily acted upon by water than the coating of the metal when deposited upon iron. The thicker this coating, the more dangerous it becomes, as the longer time is consumed in removing it, and the larger the quantity of salts produced. It may be further observed, that if the salts of zinc were not injurious, galvanized iron pipe should not be used for water from economical considerations. It costs more than plain iron pipe, oxidizes more readily so long as a trace of the zinc remains, and therefore has a less money value. Used for dry gas, above ground, iron pipes coated with zinc may have some advantage over the uncoated, but they are, after all, insignificant. We now pass to the consideration of plain iron pipes.

NOTE.— Our article has become unexpectedly long, and as we wish to speak of iron, brass, gutta-percha, clay, and other kinds of pipes, we will defer the remainder until the next number of the JOURNAL.

THE STARRY UNIVERSE.

MR. R. A. PROCTOR, the well-known English astronomer, has lately delivered an interesting lecture before the Royal Institution "on star grouping, star-drift, and star-mist." The closing paragraphs, which may serve as a summary of the lecture, are as follows:—

"It remains that I should exhibit the general results to which I have been led. It has seemed to many that my views tend largely to diminish our estimate of the extent of the sidereal system. The exact reverse is the case. According to accepted views, there lie within the range of our most powerful telescopes millions of millions of suns. According to mine, the primary suns within the range of our telescopes must be counted by tens of thousands, or by hundreds of thousands at the outside. What does this diminution of numbers imply, but that the space separating sun from sun is enormously greater than accepted theories would permit? And this increase implies an enormous increase in the estimate we are to form of the vital energies of individual suns. For the vitality of a sun, if one may be permitted the expression, is measured not merely by the amount of matter over which it exercises control, but by the extent of space within which that matter is distributed. Take an orb a thousand times vaster than our sun, and spread over its surface an amount of matter exceeding a thousandfold the combined mass of all the planets of the solar system:— so far as living force is concerned, the result is — *nil.* But distribute that matter throughout a vast space all round the orb:— that orb becomes at once fit to be the centre of a host of dependent worlds. Again, according to accepted theories, when the astronomer has succeeded in resolving the milky light of a portion of the galaxy into stars, he has, in that direction at any rate, reached the limits of the sidereal system. According to my views, what he has really done has been but to analyze a definite aggregation of stars, a mere corner of that great system. Yet once more, according to accepted views, thousands and thousands of galaxies, external to the sidereal system, can be seen with powerful telescopes. If I am right, the external star-systems lie far beyond the reach of the most powerful telescope man has yet been able to construct, insomuch that perchance the nearest of the outlying galaxies may lie a million times beyond the range even of the mighty mirror of the great Rosse telescope.

But this is little. Wonderful as is the extent of the sidereal system as thus viewed, even more wonderful is its infinite variety. We know how largely modern discoveries have increased our estimate of the complexity of the planetary system. Where the ancients recognized but a few planets, we now see, besides the planets, the families of satellites; we see the rings of Saturn, in which minute satellites must be as the sands on the sea-shore for multitude; the wonderful zone of asteroids; myriads on myriads of comets; millions on millions of meteor-systems, gathering more and more richly around the sun, until in his neighborhood they form the crown of glory which bursts into view when he is totally eclipsed. But wonderful as is the variety seen within the planetary system, the variety within the sidereal system is infinitely more amazing. Besides the single suns, there are groups and systems and streams of primary suns; there are whole galaxies of minor orbs; there are clustering stellar aggregations, showing every variety of richness, of figure, and of distribution; there are all the various forms of nebulæ, resolvable and irresolvable, circular, elliptical, and spiral; and lastly, there are irregular masses of luminous gas, clinging in fantastic convolutions around stars and star-systems. Nor is it unsafe to assert that other forms

nd varieties of structure will yet be discovered, or hat hundreds more exist which we may never hope to recognize.

But lastly, even more wonderful than the infinite ariety of the sidereal system is its amazing vitality. nstead of millions of inert masses, we see the whole eavens instinct with energy, — astir with busy life. The great masses of luminous vapor, though occupying countless millions of cubic miles of space, are moved by unknown forces like clouds before the ummer breeze; star-mist is condensing into clusters; star-clusters are forming into suns; streams nd clusters of minor orbs are swayed by unknown ctive energies; and primary suns, singly or in systems, are pursuing their stately path through space, ejoicing as giants to run their course, extending on l sides the mighty arm of their attraction, gathering from ever new regions of space supplies of motive energy, to be transformed into the various forms f force, — light, and heat, and electricity, — and istributed in lavish abundance to the worlds which rcle round them.

Truly may I say, in conclusion, that whether we gard its vast extent, or its infinite variety, or the mazing vitality which pervades its every portion, the dereal system is, of all the subjects man can study, e most imposing and the most stupendous. It is a book full of mighty problems, — of problems hich are as yet almost untouched by man, of problems which it might seem hopeless for him to attempt to solve. But those problems are given to m for solution, and he *will* solve them, whenever dares attempt to decipher aright the records of at wondrous volume.

CHEMICAL INTENSITY OF SUNLIGHT.

FOR many years past Professor Roscoe, of Manchester, Eng., has devoted much attention to the easurement of the chemical intensity of light at fferent parts of the earth's surface and under varying conditions. At the outset these laborious and portant researches were made in conjunction with ofessor Bunsen, of Heidelberg; subsequently the tter was taken up in England, and instruments structed according to the plan of Professors nsen and Roscoe were set to work at Kew Obvatory, where the registration of the chemical ensity of daylight has been chiefly carried on hin the last few years.

Very recently Professor Roscoe and Mr. Thorpe e made a new series of determinations in the tude of Lisbon, and have arrived at the following y interesting general results, which confirm those viously obtained by one of the authors: —

It is found that the intensity of diffused light of sky — not that reflected from clouds — is proptional within certain limits to that of the sun lf. When the altitude of the sun is less than degrees above the horizon the chemical insity of its light is practically nothing, while that ected from the sky reaches a very appreciable ntity.

Again: the chemical intensity of the solar light ound steadily and regularly to increase with the 's altitude, until the maximum is reached when meridian is crossed. The reason for this obvisly is that, as our great luminary pursues his arent upward course in the heavens, his rays e to penetrate a less extent of the earth's abent atmosphere, until, at the zenith, the light to pierce a layer of minimum thickness of this orbent envelope. As the sun declines after n, the same gradual loss of actinic power in its t is observed. It is found that, though the litions of the atmosphere may vary, this increase diminution of the intensity of the solar light is tly proportional to the altitude of the sun.

One of the consequences of this law is of the pest interest to photographers, more especially to those living under a cloudless sky, as it would only be necessary to determine the time of exposure of a print at one period of the day, and Professor Roscoe's table would then supply the necessary information as to exposure at any other hour while the sun was more than ten degrees above the horizon.

DIFFUSION.

SOME very elegant and simple methods of exhibiting the phenomena of diffusion are given by Herr Merz, in a recent number of the *Journal für Praktische Chemie.* A portion of the shell of an egg having been removed by the action of hydrochloric acid, leaving the membrane exposed, the egg is to be suspended in water from the arm of a balance, a counterpoise being placed in the opposite scale. In about half an hour the weight of the egg has sensibly increased, as the position of the balance-beam will show, in consequence of the passage of water through the membrane. If, now, alcohol be substituted for the water, and the weights readjusted so as to bring the beam horizontal, it will soon commence to move in the opposite direction, showing that the egg has become lighter by the diffusion of water into the alcohol. The diffusion of vapor may be exhibited by tying a diaphragm of india-rubber — a portion of a small toy balloon will answer the purpose — over the mouth of a funnel, the other end being in communication, by means of an elastic tube, with a vessel of water. The funnel being inverted over a dish containing ether, which, however, the diaphragm is not to touch, the vapor of this fluid will pass rapidly into the funnel, the air being observed to escape in bubbles in the water at the small end. Remove now the vessel of ether, and the operation will be reversed, the vapor passing through the diaphragm into the atmosphere. In order to fill the vacuum thus created, the water will rise in the tube, the lower part of which should be of glass to render this apparent, and the diaphragm will be curved inward. These experiments are particularly instructive, and are within reach of every one. The balance may be extemporized by means of a light bar of wood.

SINGULAR OPTICAL PHENOMENON.

NOT long ago, on a day when the sea was calm and the sky was clear, the water flowing from the "A. B. C." Works for the purification of sewage, at Hastings, England, appeared like a dark current amid the general azure of the salt water. Most people thought that there was some trouble with the machinery at the works, and that the sewage was flowing into the sea in its original state of impurity. Even the parties who were conducting the works became perplexed. A boat put off, in order to investigate the state of affairs, and samples were taken from the black stream as well as from "the bright, blue sea." On examination it was found that the black water was the clearer. The fact was that the same phenomenon had been repeatedly witnessed before, but never carefully investigated. The eye of an intelligent observer would often perceive — particularly on such a day as that to which we now refer — that the sea on the verge of the horizon was of a deep indigo blue, tending to blackness, whereas near the shore the tint was much paler. The gradation of tints between the distant water and that which lay close to the shore diminished the effect of contrast. But the effluent water from the sewage works brought the deep blue into the midst of the light blue, so that the former looked most suspiciously dark. The sea near the shore held particles of sand in suspension. These particles reflected the light, and gave the water a paler tint, in consequence of their own sandy hue. Far out, the sea was tolerably clear from this suspended matter, and therefore the pale reflection was absent. The more free from mechanical impurity, the less able was the water to reflect light. Hence an apparent darkness. Every one knows how a dark room is often lit up by a passing cloud, simply because the cloud reflects more light than the sky. So in like manner cloudy water may at a distance look brighter than clear water. Thus, the clear water resulting from the "A. B. C." process was unable to reflect so much light as the sandy fluid into which it was ejected, and consequently the clear stream appeared comparatively black. To the fishes gazing upwards the effect must have been reversed, the clear stream transmitting a greater proportion of light than the sandy sea.

MECHANICAL EFFECTS OF MAGNETIZATION.

THE following is from a recent lecture by Professor Tyndall: —

"At the moment when the current passes through the coil surrounding the electro-magnet, a clink is heard emanating from the body of the iron, and at the moment the current ceases a clink is also heard. In fact, the acts of magnetization and demagnetization so stir the particles of the magnetized body that they, in their turn, can stir the air and send sonorous impulses to our auditory nerves. These sounds occur at the moment of magnetization, and at the moment when magnetization ceases; hence, if a means be devised of making and breaking, in quick succession, the circuit through which the current flows, we shall obtain an equally quick succession of sounds. I do this by means of a contact-breaker which belongs to a Ruhmkorff's induction coil. A thin bar of iron stretches from one of the bridges of this monochord to the other. This bar is placed in a glass tube, which is surrounded by copper wire. The contact-breaker is placed in a distant room, so that you cannot hear its noise. The current is now active, and every individual in this large assembly hears something between a dry crackle and a musical sound issuing from the bar in consequence of its successive magnetization and demagnetization."

The Arts.

HYDROGEN GAS: AN IMPORTANT DISCOVERY.

FOR a score of years we have industriously experimented with the view of discovering a practicable and cheap method of preparing *hydrogen gas.* This problem is undoubtedly one of the most important that can engage the attention of chemists, and therefore immense sums have been expended in attempts to solve it. We have sought to eliminate hydrogen from all conceivable sources, and by all conceivable devices; but while we could obtain it in satisfactory *quantity,* the important element of *cost* would come in to disturb our practical results. As regards obtaining hydrogen by the decomposition of water or steam by heat or any direct methods, we became satisfied long ago that the idea was fallacious. The intense heat or force demanded to effect the separation of the hydrogen from the associated oxygen is equivalent in cost to the value of the product obtained, to say nothing of the wear and tear or destruction of the apparatus employed. No class of charlatans are more presumptuous and dangerous than those who infest cities, or travel over the country, selling

"patent-rights" to use or make "water-gas stoves," or patents for burning water or steam. Their schemes are often so ingenious and delusive, that men who have some reputation as chemists are deceived. A few years ago, an inventor in New York brought to this city a water-burning stove, and placed it on exhibition under the auspices and upon the recommendation of a gentleman who now serves as a *State Assayer*. The great Cunard steamships, according to his view, were to be sent across the ocean, the boilers heated by this water-gas, and all the world was to pay tribute to the new calorific device. Like the stick to all water-gas rockets, it came down tamely and ignobly to earth, but we have no doubt that other adventurers will pick it up, and start it skyward again.

We desire to call attention, however, to a new process for making hydrogen which, so far as we can see, is one of great promise. It is the invention of Messrs. Tessié du Motay and Maréchal, the French chemists who have been so successful in cheapening the production of oxygen by a process which has been fully described in the JOURNAL. They, indeed, obtain their hydrogen from water, but indirectly by the use of alkaline hydrates, decomposing them by means of carbon. When quicklime is "slacked," or acted upon by water, as in the process for making mortar, it becomes intensely hot, swells up, absorbs much water, and finally, on cooling, crumbles into a dry powder, which is the hydrate of lime. This hydrate Du Motay places in retorts along with charcoal, coke, pit coal, peat, or other substances rich in carbon, and heats them to a red heat. The hydrate of lime is decomposed, and by loss of water is converted into oxide of calcium; the water also is decomposed, its oxygen uniting with the carbon to form carbonic acid. The mixture of carbonic acid and hydrogen thus obtained is passed through water, which takes up the carbonic acid, and the pure hydrogen is then collected for use. The oxide of calcium produced by the decomposition of the hydrate of lime can be reconverted into hydrate, and thus used again and again. The whole process is as simple and easy as that for making carburetted hydrogen or illuminating gas. The hydrogen gas is generated without any special production of steam, and hence may be prepared without any other apparatus than the retorts themselves, and also the retorts remain uninjured.

If hydrogen can be thus obtained in copious quantity at small cost, it promises to bring about a complete revolution in the industrial and domestic concerns of the world. All the present modes of smelting, heating, cooking, etc., may be done away with at once. The era of no smoke, no dust, no ashes, no tugging at the coal-bin or wood-pile, comes in with the invention, and in the kitchen an important part of Bridget's duties is gone forever. If the process for obtaining hydrogen which we have described fulfils the expectations of its distinguished inventors, the gas before long will be manufactured in every city and town, and distributed to consumers in the same way as illuminating gas now is. It will be used for heating houses, cooking, generating steam, etc., instead of coal and wood. We hardly dare to expect so great and desirable an event as this; nevertheless there is ground for hope in Du Motay's process, and let us wait with becoming patience the full developments of so important a discovery.

A NEW TELESCOPE.

HAVING been engaged in telescopic observations, for the past eight or ten years, with instruments of various apertures, between $\frac{1}{2}$ and $3\frac{1}{4}$ inches, I thought that I would communicate to you the results of a few observations, which I lately made, with one of the new, improved, short-focus telescopes of $2\frac{1}{2}$ inches aperture, 23 inches focus, with a celestial eye-piece magnifying 45 diameters, constructed by Mr. R. B. Tolles. This telescope readily shows Polaris double; it appears as steady as Titan does in my 48-inch achromatic, with a power of 81. It shows very finely the four principal stars in the trapezium of Orion, also Mizar, Beta Cygni, and other superb double stars. The view it gives of the great nebula of Orion is magnificent. The elliptical nebula in Andromeda was well seen. Various clusters of stars in the milky way were exhibited in great splendor. Rigel I saw double, which I consider a pretty severe test. The planet Jupiter was a beautiful object, its oblate figure being so very apparent that one unaccustomed to telescopic observation would readily perceive it; the equatorial belts were shown very distinct and sharp; the satellites appeared round and very distinct, the difference in their size very apparent. Saturn is also a splendid object; the principal division in the ring is shown all round. I saw the inner dark ring, where it crosses the ball; also the equatorial belts and the shadow of the ball, on the ring; two satellites, with a glimpse of a third, that I am confident of.

The short focal length of this telescope I consider to be a great advantage, making it more portable, and much more easily directed to a celestial object. The instrument is mounted on a firm cast-iron tripod, with appliances for keeping it in position. It shows all the objects enumerated here far better than a similar power in my 48-inch glass, which has a clear aperture of $3\frac{1}{4}$ inches, and which I consider a good glass. Since making these observations I have had the loan of another telescope, made on the same principle, but with an object-glass only 1 inch in diameter, and 4 inches focal length, furnished with a pancratic erecting eye-piece, magnifying 24 times. Its performance is wonderful. It shows Saturn well, but with terrestial objects, its definition is superb. It is mounted on a universal joint, with a gimlet screw to fasten it to a tree, fence, etc.

I should have made a comparison between these two large instruments with the same eye-piece, but had no appliances convenient to fit the Tolles eyepiece on my instrument; but from my experience I consider the Tolles glass the superior instrument, the field being very dark, instead of gray, as in other instruments. I have never seen any small telescope perform equal to the $2\frac{1}{2}$ or 1 inch.

WILLIAM H. PHELPS.

MEMORANDA IN THE ARTS.

THE LAVATOJO. — Although the olive is the most important product of Italy, the means generally employed for extracting the oil are very imperfect, and until within the last five or six years, after the olives had been crushed by the peasants the husks were abandoned as worthless; but in a few places steam machinery has been introduced to turn to account the husks thrown away by the peasants as worthless, and which it is now known represent a considerable portion of the value of the oil crop. The process of extracting the oil from the husks by a *lavatojo* is very simple. The husks are placed in tubs, and worked with water by machinery until the water has carried off all the remaining oily matters which rise to the surface after the water has been allowed to remain still. The husks are then put in a stea press, which squeezes out all the moisture; and a ter they have gone through these different process the husks are used for fuel. The oil thus extract is used for the manufacture of soap.

ARTIFICIAL PRODUCTION OF ICE IN INDIA.— In many parts of India the natives dig shallow pi in such localities as are quite freely open to t sky and distant from trees. The pits are lined wi straw, and upon the straw are placed dishes (ma of a very porous earthenware) filled with wate During the calm and clear nights prevailing du ing the period from November to the end of Fe ruary, the water placed in the dishes freezes, yiel ing a solid cake of ice, while the temperature of t air is + 10°. Dr. Janssen has investigated th curious subject experimentally, and has found th the freezing is principally due to the radiation du ing the night; but the evaporation of the wate aided by the porosity of the earthenware employe is not to be overlooked at the same time.

AN IMPROVED PAVEMENT. — The Commissio ers of Sewers for the City of London are showi a worthy desire to solve the pavement problem, e pecially as to the value of asphalt. More than tw years since an admirable piece of granite paveme fixed by asphalt, instead of by lime and sand, w laid in Duke Street, Smithfield, and the experien gained there seems to prove it to be the be adapted to sustain the heavy and severe traffic the London streets. After two years of the roug est use, not a single stone has shown the slighte appearance of wear or displacement. A furth portion is now being laid down inside Temple Ba The merits of this asphalt pavement are, that gives clean streets in winter by preventing t pumping up of mud from between the stones, whi the old system favors, and also prevents dust summer by stopping up the source whence the du comes. The sewers will also be relieved of an im mense amount of solid *detritus* coming from thi source. Asphalt being impervious to water, the be will always keep dry and intact.

A NEW PROJECTILE FOR NAVAL USE. — Ca tain Ericsson announces that he has perfect a system of submarine attack by which he can d stroy the largest ironclads ever built. The resis ance of the water is so great that explosive proje tiles have always proved failures hitherto when d signed to strike below the water line. Capta Ericsson is confident that he has devised a proje tile which will overcome the difficulty caused by th resistance. It is an elongated shell, charged wi 300 lbs. of dynamite, and shot from a 15 inch gu at such an elevation as to enter the water near t hostile vessel, and strike the hull anywhere belo the water-line. It is fitted with a percussion ca which explodes upon very slight inpact against t hull, so that the velocity of the shell when it reach its destination need not be high. The gun is ca ried on a swift armored boat, protected by a turre Captain Ericsson is ready to fit out at his own co and risk a fast screw vessel with two 15 inch guns the kind described, if somebody else will furnish th ironclad to be experimented upon. He singles o the new British ironclad *Devastation* as one of th most splendid specimens of an armored war vess which can be produced, and challenges her to com out and encounter his torpedo.

POLISHING POWDER FOR GLASS, ETC. — Pro ably the best polishing powder for metals of mediu hardness and for glass would be that used by Lo Rosse for polishing the speculum of his large tel scope. He thus describes his method of prepari it: "I prepare the peroxide of iron by precipitatio with water of ammonia, from a pure dilute solutio of sulphate of iron. The precipitate is washe pressed in a screw-press till nearly dry, and expose to a heat, which, in the dark, appears a dull, lo

red. The only points of importance are that the sulphate of iron should be pure and the water of ammonia should be decidedly in excess, and that the heat should not exceed what I have described. The color will be a bright crimson, inclining to yellow. I have tried both potash and soda, pure, instead of water of ammonia, but after washing with some degree of care, the trace of the alkali still remained, and the peroxide was of an ochrey color, and did not polish properly."

Bleaching Wool. — A French patent, by M. Fregon, furnishes a novel process for bleaching wool and silk, for which until now we have had only the sulphurous acid method. A bath is made by dissolving 4 lbs. of oxalic acid and 4 lbs. of common salt in 200 quarts of water, and the goods to be bleached are left in this bath for an hour, after which they are drained and rinsed in soft water.

Agriculture.

THE ADULTERATION OF MILK.

It is so generally understood by consumers of milk in cities that they do not and cannot obtain the pure article, that they cease to manifest much anxiety regarding the matter, and receive what is brought to them by venders, without inquiry or examination. The venders understand this, and knowing how difficult it is to detect the fraud, they carry the attenuation to a point where the article ceases to exhibit even the physical characteristics of the lacteal fluid. Water is the great adulterating material, and this is mixed with milk in such large quantities by the New York dealers that the citizens are defrauded to the enormous amount of twelve thousand dollars a day, or *four millions of dollars* annually. In this city adulteration is not so flagrant, or extensive, yet the amount of water paid for by our citizens, at ten cents per quart, amounts to a very large sum yearly. We have frequently made analyses of specimens of milk sold in this city, and never, except in a single instance, have we found the adulterating material to be other than water. Nearly two years since an employee in our laboratory noticed in a milk vessel in use at his boarding-house an insoluble substance resting upon the bottom as a precipitate. A specimen of this was secured for chemical examination, and it was found to be the substance known as "whiting," an impure carbonate of lime. This was indeed a wholly factitious milk, a vile mixture, and such as we trust is seldom manufactured. Nearly all our large cities and towns appoint milk inspectors, whose duty it is to seize and cause to be analyzed all suspected specimens, and, if any are proved to be fraudulent, to prosecute the dealers. This has seemed in some degree to prevent adulteration, but it is very far from being a satisfactory protection. It is not a difficult matter to analyze milk, but it is a difficult point to decide positively that specimens have been tampered with by the addition of water. We have in our pastures a score of cows, and, upon examination of the milk furnished by each, we have not found that any two furnish it of precisely the same quality. We have cows supplying milk which would probably be condemned by Dr. Chandler, or other competent chemical examiners, as factitious. It is certain that the specific gravity cannot be relied on; neither can the general fact that true milk contains no more than 88 per cent. of water. Some cows furnish milk of such inferior quality that the amount of water exceeds 90 per cent. We need in our milk examinations a good and reliable test that will tell us when water has been purposely added, and also afford us positive knowledge regarding the quantity. If this test can be supplied, convictions for frauds will be easy, and the evil of adulteration can be speedily abated. Dr. A. E. Davies, Chemical Inspector of Milk in Manchester, England, states that he has found the specific gravity of the serum, or liquid portion of the milk, from which the caseine and fat have been removed by coagulating and straining, to be remarkably constant, and he proposes a test based upon this fact. The serum of genuine milk has a specific gravity of 1.026; now, by diluting this with various quantities of water, we may obtain a standard of comparison, which will show what quantity of water has been purposely added to any specimen of milk brought under examination. This is apparently an important suggestion, and we shall take early opportunity to submit it to practical experiment.

PEARS AND GRAPES.

We have fruited this year over thirty varieties of pears, and about as many varieties of grapes, and have carefully watched the growth and time of ripening of the fruit from both trees and vines. In common with all other kinds of fruit, they have suffered greatly this season in New England from drought. This has been very severe, and we have reason to fear that permanent injury has come to our trees. Pears and grapes have ripened prematurely, and in many cases imperfectly, and the quality of the fruit is affected. We can, however, judge in a measure of the comparative merits of the different varieties, and, in the light of past experience, are able to name those best adapted to our climate. In New England we must make our list of really good pears, which can be successfully and profitably grown, much shorter. In three orchards of one hundred trees each, on different soils, and with different exposures, and subjected to similar treatment, we find great differences in the thrift and productiveness of the trees. There are not more than ten varieties which will flourish upon our soils. The Glout Morceau is a failure with us, and so are most of the so called "winter varieties." There are but few of these that do not ripen before Christmas under the best conditions for keeping that we can devise. The Bartlett, Duchess, Seckle, Buffum, Louise Bonne de Jersey, and Swan's Orange are the varieties that do best in our orchards. The only early pear really worth cultivating is the Doyenne d'Eté. This is indeed a delicious little pear, and we get a taste of its rich qualities by the middle of August in ordinary seasons. It is rather a vigorous stock, but it needs a moist, retentive soil in which to grow. Osburn's Summer Seedling is only fair, and it is later than the Doyenne.

Among the new varieties of grapes, the Adirondack is worthy of praise. We have fruited it three consecutive seasons, and it is the earliest and the sweetest of all our varieties. It has also proved to be a good bearer, hardy, and the fruit holds well on to the stem. It is a magnificent grape for wine, affording a variety resembling true Malaga. It is so exceedingly saccharine that it needs to be watched closely and handled intelligently, in manipulating for wine. The Israella, of Grant paternity, is also a good and early grape. It closely resembles the Adirondack, but it is inferior in several respects. The Israella is upon the whole a failure. The clusters are beautiful, and the grape a good one; but it ripens late, too late for this locality, and then the ripening is singularly uneven and imperfect. We have bunches which contain berries fully ripe, others partly ripe, and still others as hard and green as the Concords in July. This grape will not do for this section, and we doubt if it proves entirely satisfactory in any locality. The grape and pear crop is abundant this year.

THE ABSORPTIVE POWER OF SOIL.

It is an important discovery of recent date, that soils have the power of separating not only ammonia but other bases also from their solutions, and of holding them with great tenacity after their absorption. Thus 100 grains of clay soil, taken from the plastic clay formation of England, absorbed 1,050 grains of potash from a solution of caustic potash containing one per cent. of the alkali. It is interesting to observe that the liquid was not in this case filtered through the soil, but the cold solution was merely left in contact with it for twelve hours.

It has been further shown that soils have the ability to separate the alkaline bases from the acids with which they are combined. When saline solutions were slowly filtered through soils five or six inches deep, the liquids which passed through were deprived of their alkaline bases, as potash, soda, ammonia, and magnesia, and only the acids were to be found in combination with some other base. Thus when muriate of ammonia was filtered through the soil, the ammonia was removed, and a corresponding quantity of lime, in combination with muriatic acid, was found in the filtered liquid. In the same way sulphate of potash was deprived of its base, and the liquid collected gave sulphate of lime on analysis.

Those soils which have the greatest amount of capillary porosity will condense the greatest amount of manurial substances on their internal surfaces, will retain them longest against the adverse solvent action of water, and will give them out most readily to the rootlets of the growing plant. A mass of adhesive clay will absorb but a very slight amount of available manure; but if this same mass is rendered friable by mechanical processes, its power of absorption is amazingly increased. In view of what has been stated, it is very clear that one way in which ploughing increases the fertility of land is by increasing its porosity by pulverization.

Again, many manurial substances exist in the soil, which, being insoluble, exercise no action on the growth of plants, and contribute nothing to their nutrition; but by the slow, though regular action of the frosts and the rain, the air, and the sunshine, insoluble and refractory compounds are reduced to a soluble state, and are appropriated and held on deposit by the soil to the credit of the next cultivated crop. This explains the well-known fact that soils, which have been cropped to the very verge of barrenness, will recover their fertility if allowed to

remain long enough under the action of climatic influences to saturate the soil with the necessary plant-food which they have unlocked from their chemical combinations, and given to the soil in a proper physical condition. These changes are brought about more rapidly when certain mechanical changes of condition are wrought upon the soil.

Carbonic acid is one of the most active of the agents employed in bringing the insoluble organic matter in the soil into that physical condition in which it becomes available as plant-food; in order that this acid may be formed, it is essential that the carbonaceous matters in the soil should be brought into direct contact with the atmosphere, from which they procure the oxygen necessary to convert them into carbonic acid. So long as stagnant water remains in the soil, or so long as the soil is in a dense or a very compact condition, it is impossible for the carbon to be converted into acid.

FARM-LIFE IN BRAZIL.

A CORRESPONDENT of the *Rural Carolinian* — a most excellent journal, by the way — writes as follows of Farm-life in Brazil: —

" We have lived here in the valley of the Amazon two years and a half, and can therefore speak of the seasons, the soil, the crops, and the people, from actual experience and observation. I shall therefore give facts and not uncertain matters of hearsay.

" We live about six miles by water or seven miles by land from Santarem, which is situated at the mouth of the Tapajos River, there emptying its waters into the Amazon. By reference to the map, you will see that we are nearly under the equator, and yet we are not scorched by the heat of the day, and have cool nights all the year round. This day, June 27th, 1870, at half-past six o'clock, A. M., the thermometer stood at 72° Fahrenheit in my bedroom. We plunged it into a jar of water that stood in the air for drinking purposes, when the mercury fell to 58°; we next immersed it in the stream, about forty feet distant, when the mercury rose to 77°; hence you perceive the stream, in the morning, is much warmer than the atmosphere, and the water in a jar is cooler than the atmosphere. We never feel the want of ice to cool our beverages. We sleep under a blanket or quilt every night the year round. Dews are very heavy here. We have never seen a fog. The water of the Amazon is of a yellowish clay color; that of the Tapajos is clear, and at a little distance looks black; and, for many miles down the Amazon, the two rivers seem to be running side by side, without mingling their waters.

" The nights and days are so near of equal length all the time, that, unless a calculation be made, we would suppose them the same. For example, according to the calculations made for a large scope of the Empire, including the province of Para, December 1st, the sun rises at five o'clock twenty-nine minutes, being the earliest hour that it appears. July 1st, sun rises six o'clock twenty-five minutes, being the latest, and there being only ninety-six minutes difference in the rising of the sun for the entire year; an average of eight minutes per month. September 23d, the sun rises five o'olock fifty-two minutes, and sets at exactly the same hour in the afternoon. March 20th, sun rises six o'clock and seven minutes, and sets the same hour in the afternoon; hence great regularity may be observed by systematic persons.

" The custom in regard to meals is a cup of coffee and a biscuit made of *mandioca* or tapioca at sunrise, breakfast at from ten to eleven o'clock, and dinner at five o'clock.

" But there is a class of people here who have no system, and eat, as they work, irregularly. When the time arrives to prepare a field, they invite their neighbors, who all gather at the house, lounge around, sharpen their *tercados* (a large knife about twenty-five inches or more long), and about ten o'clock the owner tells the men to appoint their officers. When the captain is selected, they all go to the spot, and the captain receives all instructions, and the owner has no more to say. They all set to work and cut down the bushes. During the day they are served with a fermented beverage called *terrabar*, made of *mandioca*. Too much of this will intoxicate, but in moderation it is a nice drink. Tobacco rolled up in the bark of a tree, called *toweree*, is smoked all day long. About four o'clock they quit for dinner, and finish up all the liquor. Thus the field stands until dry enough to burn, when another working party plants it, the men digging the holes, and the women putting in the cuttings of the *mandioca* (pronounced *manioa*). The cuttings are about eight inches in length, and four pieces are stuck in each hill. The work is now done. In nine months from seven to ten hills will give a bushel of roots, if the yield be good. Of these roots they make *farinha*, which is their bread. For the rest, the rivers supply them with fish. But though food is thus easily obtained, they often suffer from want; for as long as they have anything to eat, they will not seek for more. When the last is consumed, and they fail to catch fish, which often happens in certain conditions of the water, they are in want. If you visit them, they are kind and polite, and would give anything they might have, but the trouble is they have nothing.

A small *paliah* house (the *paliah* is a sort of palm), without table or chairs, serves to live in. They sleep in hammocks, eat off of mats on the ground, and use their fingers altogether. They wear but one garment, are generally clean, and bathe often. They regard it no disgrace to be destitute, though an effort would give them abundance. Pine-apples, plantains, and bananas they seldom get, for they will not plant them. It is a good country for stock, yet they do not own a cow or horse, and one dozen eggs could not be purchased at one house. So with everything else. While it is a country of great abundance, you can get nothing. You must buy your supplies in the city, cut down and burn off your land, plant corn, peas, pumpkins, sweet potatoes, okra, tomatoes, pine-apples, bananas, plantains, and many other things, and in three months from planting you have more ready to gather into your storehouse than your entire neighborhood would previously afford.

" The class of inhabitants referred to in the foregoing paragraphs are a mixed race of Indians and their descendants."

THINGS WORTH NOTING.

DOUBLE FLOWER-POTS. — Many plants will thrive better in double pots than in single ones; that is, if the pot containing the plant is placed inside a larger one, with earth between the two. The outer pot prevents the sun from striking with too great force on the inner one, and thus keeps the plant moist, and secures for its roots a more uniform temperature. The suggestion appears to be a good one.

VINEGAR. — The following is an English recipe: Make a syrup of $1\frac{1}{4}$ lbs. of sugar to 1 gallon of water, and to each gallon add a quarter of a pint of yeast. If kept for three days at a temperature between 77° and 86° F. (34° and 38° C.), it will be sufficiently acetified to allow of being drawn off into the ripening cask, where 1 oz. of bruised raisins and 1 oz. of crude tartar are to be added to each gallon of liquor. When the sweet taste has entirely disappeared, it should be drawn off into bottles, and corked down tightly. It is stated that such vinegar will contain as much as 5 per cent. of pure acetic acid. From 2 to 3 per cent. is the average strength.

A HUSK DOOR MAT. — Take an inch board of the size you wish your mat; dress it neat: rule it each way, drawing the lines 1 1–2 inches apart, bore a hole with a 3–4 inch auger in each square; double a piece of broom-twine, pass it through the holes, one at a time; have the husks dampened, take a sufficient quantity to fill the hole very tight, pass it through the loop of twine, draw it through until the double end of the husk is 1 1–2 inches long, draw the twine out, and proceed in the same way until all the holes are filled. Then take a sharp knife, and cut the double husks, spread them apart, trim the uneven side, tramp it down, and set it where it is to be used, either side up.

BEET SUGAR IN ENGLAND AND IRELAND. — The Chancellor of the Exchequer, in his recent speech on the Budget, when introducing the subject of the partial remission of the sugar duties, said: — " We know that the beet-root industry of the Continent seems to have got over its difficulties, and to be spreading very widely. There is also the prospect of the growth of beet-root, with this object, in our own country; and, if we could hope for anything so good as that it should be introduced with success into the south of Ireland, it would be one of the greatest blessings that could possibly befall that country." The sugar-beet has been grown experimentally in various parts of the county of Kilkenny, and the important result has been established that the climate of the south-east of Ireland is suitable for the growth of such a crop, and that sugar-beet can there be grown of a quality which will remunerate the manufacturer. It is calculated that a per centage of 8.5 of crystallizable sugar will pay; and in some instances, comprised within the range of the experiments, there was a yield of 10.91 and of 8.94. That the magnitude of the industry is sufficient to warrant operations on the largest scale is shown by the fact that last year France alone produced no less than 300,000 tons of beet-sugar, which, at £25 per ton, would be worth £7,500,000, the molasses (100,000 tons at £5) bringing up the value to £8,000,000. Beet-root may yet redress the injury inflicted on Ireland by the failure of the potato.

FEATS IN FARMING WEST OF THE MISSISSIPPI. — A correspondent of the *Kansas Farmer* tells the following " tall " story: " I have peach trees grown from seed, planted last spring on upland broken the previous year, which, by actual measurement, are six feet two inches, or seventy-four inches, from the ground up, and over an inch in diameter at the base. How far the roots extend toward China, I never looked to see. I have several that measure over six feet, and hundreds of them over five feet high. I also have apple trees, grown from common nurserymen's root-grafts, set out last spring on the same soil, over five feet in height. I also raised, on the same soil, three and a half bushels of Harrison potatoes, from one potato weighing about half a pound. The ground being measured, the product was at the rate of seven hundred bushels per acre. One barrel ($2\frac{1}{2}$ bushels) of seed gave 300 bushels of potatoes."

A widow in Santa Cruz, California, received over five hundred dollars for the strawberries raised on a half acre of poorly-tended land, this last season. A man in the same neighborhood sold eighty dollars worth of blackberries from less than a hundred plants growing along a fence in his garden. The plants are four years old.

Boston Journal of Chemistry.

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WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, OCTOBER 1, 1870.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 *Congress Street, Boston, Mass."*

All correspondence relating to editorial affairs should be addressed to the Editor, 150 *Congress Street, Boston.*

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THE EDITORS AT LAKESIDE.

IT was certainly a rare and interesting sight to look upon the party gathered at Lakeside on the shore of the beautiful Kenoza Lake, Haverhill, Mass., on the 20th inst. It was composed of the Editors of the old Commonwealth of Massachusetts, with their wives, about three hundred in all; and in respect of general culture, intelligence, wit, social accomplishments, and moral worth, it was an assemblage which cannot be surpassed. Probably more than *three millions of readers* were represented by the editors present. It was a private social party of cultivated ladies and gentlemen, full of wit and cordiality, and meeting under circumstances where there could be freedom from ceremony and restraint. We were proud of our guests, and coming as they did from distant homes, from the sands of Cape Cod and the hills of Berkshire, we felt highly honored by their presence. Thus much it is becoming in us to say. As regards the success and enjoyments of the occasion, we prefer that the kind narrations of our guests should be presented rather than any words of our own. The press in this city and in all sections of the State have been pleased to bestow upon it the most generous praise. The *Boston Daily Journal* gave a full report of the proceedings, and from it we take the liberty of making the following extracts: —

"Lake Kenoza, the prettiest sheet of water in Massachusetts, if not in New England, was yesterday the scene of a very happy gathering. Dr. James R. Nichols, the proprietor of the Lakeside Farm, and the editor of the JOURNAL OF CHEMISTRY, sent an invitation last summer to the Massachusetts Editors' and Publishers' Association to visit his residence; but at that time the members of the Association had arranged for a trip to Gloucester, and the invitation of the Doctor had to be set aside. The proposal was again renewed, however, and the 20th of September fixed upon as the date of the visit. More glorious weather certainly never smiled upon any undertaking; more glorious success has never attended any social gathering; all the circumstances conspired to make the day a pleasant one, and one to be long remembered in the annals of State journalism.

"A special train left the Boston and Maine depot in this city at eight o'clock, with the members of the Association and their ladies, for Haverhill. On arriving there, the party at once proceeded to the steamboat wharf, where the barge *Queen of the Merrimack* was in readiness to convey them on an excursion down the river.

"The barge was gayly trimmed with bunting and flags; and as she left the wharf, drawn by the little steam-tug *T. Weed*, the crowd of persons that thronged the wharf, and filled the windows of every manufactory bordering upon the river, waved handkerchiefs and flags, and wished the *voyageurs* a good time. Down the placid Merrimack the barge glided with its cargo of humanity, passing scenes of rare beauty that enchanted the eyes of the beholders, while the strains of the Haverhill Cornet Band held many an ear captive. The picturesque valley was in its full beauty; the autumnal foliage mingled most harmoniously with the greensward, and made a glorious picture in the bright rays of the sun. The barge continued on to the pleasant town of Groveland, just below which she was put about and headed once more for Haverhill, where she deposited her living freight at 11 o'clock.

"On landing from the boat, an informal procession was made, and the entire party, with the exception of the band, walked to the residence of Dr. Nichols, on Summer Street. The house was very tastefully trimmed with the national colors. On entering, the party was welcomed in the most genial manner by their host, who was ably seconded by his estimable lady. Every preparation had been made for the reception of the large number of newspaper men, and nothing that could possibly conduce to their enjoyment had been left undone. Refreshments were served immediately on arrival. The visitors scattered themselves over the lower portion of the house, enjoying the collection of the articles of art and *vertu* which were to be found in nearly every room. Many lingered before the large and excellent painting of Lake Kenoza, one of the latest productions of Mr. Thomas Hill, the well-known landscape painter, who has done full justice to the beautiful spot. At last the carriages were announced, and the party was soon on the high road to Lake Kenoza, which fully sustains the reputation it has so long enjoyed, and bears out the words of Whittier, that —

'O'er no sweeter lake
Shall morning break or noon-cloud sail.'

"The drought has not apparently affected to any considerable extent the spot where the Quaker poet laid the scene of 'Snow Bound,' and where he passed his early life, for everything looked fresh and beautiful yesterday. The five miles of land skirting the clear water were soon dotted with visitors, who climbed to the summits of little hills, and eagerly drank in the beauties of the place. The boats stationed at the wharf were at once engaged in taking parties out for a sail. Then the Quintette Club and the Haverhill Cornet Band were stationed in front of the Doctor's splendidly decorated house, and performed at intervals, together with a quartette choir, composed of Mrs. J. E. Houston West, Mrs. C. A. Barry, Mr. M. W. Whitney, and Mrs. F. C. Packard, whose efforts always met with applause. So the time was spent until one o'clock, when the dinner was served in a large decorated tent on the lawn. The tables presented a truly magnificent sight, loaded down, as they were, with fruit of all kinds. The meal was a first-rate one, in thorough keeping with the well-known hospitality of the host, and the place in which it was given.

"At the conclusion of the meal, the chairman, Dr. Nichols, called the company to order, and delivered the following address of welcome: —

'I have the very pleasant duty to perform of welcoming to our young city, and to this rural retreat, the Editors and Publishers of the old Commonwealth of Massachusetts. I feel highly honored in having for my guests so large and so distinguished a company, gathered from so many and distant homes. I ventured to invite my brother editors to this place, feeling that a humble hospitality, a social, free, and easy reunion, would not be distasteful or altogether unacceptable. I believe in large families; and having in former seasons gathered around these tables the farmers, the doctors, and the clergymen of Essex county, there was still room left for more. The space which my friends in the county could not fill I felt might possibly be closed up by drawing upon the whole Commonwealth. But it would be impossible to fill these voids satisfactorily without the ladies, and we have the great pleasure of greeting the ladies at our table, and now the measure of our satisfaction ought to be complete. We have to regret the absence to-day of one who in early life was inspired by the rural scenes around us, — by these woods and hills and these quiet waters, — so that his poems are read with delight wherever the English language is spoken. Mr. Whittier hoped to be with us to-day, and I am sure we should all of us have been glad to take him by the hand. In a letter received on Saturday, he expresses a strong desire to visit these old haunts of his childhood, and join our festivities, but illness prevents. If we cannot greet the poet to-day, we can read a few of his charming lines, which have a local interest. The lake and the shore on which we are assembled Mr. Whittier has commemorated in verse: —

'The shores we trod as barefoot boys,
The nutted woods we wandered through,
To friendship, love, and social joys
We consecrate anew.

Here shall the tender song be sung,
And Memory's dirges soft and low,
And wit shall sparkle on the tongue,
And mirth shall overflow,

Harmless as summer lightning plays
From a low, hidden cloud by night —
A light to set the hills ablaze,
But not a bolt to smite.

Kenoza! O'er no sweeter lake
Shall morning break, or noon-cloud sail;
No fairer face than thine shall take
The sunset's golden veil!

And, Beauty's priestess, thou shalt teach
The truth so dimly understood,
That He who made thee fair for each
And all designeth good.'

"The President of the Association, Mr. Stockwell, was then called upon by Dr. Nichols, and he made a brief address, in which he said that his brethren of the press, in fixing upon his name for President, had forgotten one thing, or else they did not know of it at the time, that they had selected a man who

could not make a speech. Looking upon that scene of beauty before them, which he believed was unparalleled by anything he had ever seen, he thought if a man was at all able to make a speech it should be at that time and place. He simply rose to express, on behalf of the Association, his most hearty thanks to the honored host for his very kind and liberal entertainment. He closed by proposing the health of their generous and respected host, Dr. Nichols.

"The chairman explained that several persons had been invited to be present, but were unable on account of sickness, among them being Governor Claflin and John G. Whittier. In the absence of the Governor he called upon Judge Russell, who responded as follows: —

'My friends, it would be the greatest honor of my life, if, for five minutes, I could worthily represent William Claflin. I thank you, Dr. Nichols, for all that I have enjoyed to-day; for the beautiful sights that we have seen, and the sweet voices that we have heard — for everything — except this call. As we looked upon the unsurpassed valley of the Merrimack, the sleeping river, the groves on either side, the rounded hills, the thriving city — model of a New England town — and now upon the blue waters of the lake, the whole landscape tinged by the haze of Whittier's poetry — all bathed in sunlight and in this pure air; bathed, also, in the light and atmosphere of a generous hospitality, — the words of the familiar hymn occurred to me:

If God hath made this world so fair,
Where sin and death abound,
How beautiful beyond compare
Will Paradise be found!

'But, at once, I recollected the words of a hymn equally familiar: —

Each pleasure hath its danger, too,
And every sweet, a snare.

'The danger which alloys this pleasure, the snare which attends these sweets, is the peril of having to make a speech. Wonderful is the county of Essex. Yesterday, some of you stood at Cape Ann, and saw a new development of the energy and enterprise which turns our New England granite into gold, the same energy and enterprise, which, at the call of loyalty, headed the march and saved the Capital. To-day we have heard and seen something of the skill which applies science to agriculture; which gives us delicious fruit, not the product of the earth, but of the crucible, and which is destined to feed millions, and to renovate the surface of the civilized globe. I hardly trust myself to speak of the wonders to be wrought by agricultural chemistry. It will build up the waste places of our own State, those little towns dear to their sons, of whose decline we read in the census with grief and fear for the future. Their worn-out soil shall be renewed; their decay shall be checked; once more they shall be thriving members of a great commonwealth. The men who teach this wisdom are benefactors of the race. We used to think of chemistry as a harsh and crabbed study. Its emblem was a wrinkled old man, bent down over a blowpipe, with a smoky crucible and a discolored retort. Now chemistry is a good fairy, making all things fresh and new, scattering from her open hands the golden grain, the purple grape, the rosy fruit.

Flowers laugh before her on their beds,
And fragrance in her footing treads.

'And a mightier power is represented here — without crucibles (not always without retorts) — the Press. This, also, keeps the earth fresh, and builds up waste places. When the sounds of war are hushed, this power shall make the Old World young again. Happy day, when the representatives of these great powers meet. Twice happy when they meet on the shores of Kenoza Lake.'

"Other speeches were made by Rev. Dr. Seelye, and Mayor Whittier, of Haverhill; Mr. C. F. Guild, of the *Commercial Bulletin*; Major Ben. Perley Poore; Hon. C. W. Slack, of the *Commonwealth*; Mr. G. W. Bull, of the Buffalo *Commercial Advertiser*; Rev. Asa Bullard, of the *Well-Spring*; Hon. Simon Brown, of the *Farmer*; and by Mr. Robbins, of Waltham; all of which were of a congratulatory and pleasant character. A poem was also read by Mr. G. A. Marden, of the *Lowell Courier*, which abounded in good and spicy hits and humor, and was most warmly received by the audience.

"At half past four o'clock the entire party left the grounds in carriages, and proceeded to the Haverhill depot. The train left at five o'clock, and arrived in this city an hour later, bearing on it a crowd of people who had spent a pleasant day."

COMPLIMENTARY.

THE *Boston Transcript* contains the following remarks regarding the article upon the Chemistry of the Human Body, published in our August number. For the very kind and complimentary allusions to the JOURNAL, we are under great obligations. We are constantly receiving from the press, in all sections, the most warm and generous commendations, for which we are grateful. As intimated by the editor of the *Transcript*, the name of our journal hinders large numbers from becoming acquainted with it, who, if they understood its character, would be among its warmest supporters. A journal of *chemistry*, many think, must be a dry and uninteresting publication, and therefore they never examine it. Our friends who *do know* what the JOURNAL *is* must help us in disseminating information regarding it. All we need is to be *known* and *understood*, and our friends will be numbered by tens of thousands.

"OUR MAKE UP. — Science has no respect for romance. Physiology is regardless of sentiment. Physical facts are not poetical. The moment you talk of the human body, as does the BOSTON JOURNAL OF CHEMISTRY, away goes the ideal, the fanciful, the imaginative, and down you come to statements that are of the earth, earthy. These statements are, nevertheless, interesting and instructive, and the analysis they report will amuse and inform many who are ignorant of their corporeal composition. The JOURNAL takes to pieces an adult weighing one hundred and fifty pounds, and approximately gives his elements, to the number of fourteen — as we count. Chiefly the subject is oxygen and hydrogen combining in the form of water, of which compound he possesses about 110 lbs., or fourteen gallons; enough to drown him, if it were contained in a suitable vessel; and "water" — the savant grows rhetorical — "flows through our life, as it flows through mountain cataracts and meadow springs, unchanged and unchangeable," as to its own identity. Then the JOURNAL puts other matters attractively in this illustrative style: —

"'Of phosphorus, every adult person carries enough ($1\frac{3}{4}$ pounds) about with him in his body to make at least 4,000 of the ordinary two-cent packages of friction matches, but he does not have quite sulphur enough to complete that quantity of the little incendiary combustibles. This phosphorus exists in the bones and in the brain, and is one of the most important constituents in the body. Every schoolboy is acquainted with those strange metals, sodium and potassium, for he has seen them flash into a brilliant flame when thrown upon water. The body contains $2\frac{1}{4}$ ounces of the former, and a half-ounce of the latter metal; enough for all needed experimental purposes in the schools of a large city. The twelve grains of magnesium wou[ld] be ample in quantity to form the "silver rain" f[or] a dozen rockets, or enough to create a light whi[ch] under favorable conditions could be seen for a di[s]tance of twenty miles.'

"These are only specimens of an amusing artic[le] which shows how plain and clear may be made common folks what common folks will be the wis[er] and healthier for knowing. This paper exemplifi[es] the character of the periodical in which it appears a periodical that deserves special commendation general readers, for it is admirably conducte[d]. Whilst studying to be accurate and up to the lates[t] discoveries, it is free from guess-work and untrie[d] theories, and aims to talk about wonders and th[e] most subtle investigations, in language that everybod[y] can understand. Its title should not deceive any body into the erroneous supposition that it is of us[e] only in the laboratory, school, or lecture-room, an[d] out of place in the company of newspapers an[d] magazines for home consumption."

A SIGNIFICANT FACT.

NOTWITHSTANDING that a million of soldie[rs] belonging to the French and Prussian armie[s] have been trampling down and laying waste th[e] magnificent vineyards in the great champagn[e] district around Rheims, Epernay, etc., the pric[e] of the wine has not been affected in the leas[t] in this country. So extensive and destructiv[e] have been the military operations in the depart[]ment of which Rheims is the most importa[nt] city, that the vintage this year is almost a tota[l] loss, and the wine factors have to a great exten[t] had their stocks of wines destroyed. Any on[e] would suppose this would produce a pani[c] among dealers and consumers of the effervescin[g] wines, but such is not the case. The truth is in the manufacture of the beverages now sold as wine, the juice of the grape is of no account. A large part of that which is sold in this countr[y] is made from cheaper and more gross materials and we suppose if the vintage should utterl[y] fail abroad for twenty consecutive years, th[e] supply of *wine* would not in the least diminish Some time ago, when the terrible *oïdium* des[]troyed the vine in Madeira for several years and not a cask of wine was made upon th[e] island, the supply of *genuine* Madeira was neve[r] greater or the price cheaper. Wine-drinker[s] may take encouragement from these facts.

THE NEW FURNACE. — It must be distinctly understood that we cannot assume any responsi[]bility regarding furnaces made by any partie[s] anywhere, who claim that they are constructe[d] after our device. Our duty was discharged, an[d] our ends reached, in fully describing new improvements for rendering furnaces more health[]ful and comfortable. Manufacturers must be held fully accountable for any *imperfect, leaky* apparatus which they may construct after our model, and purchasers must protect themselves in this matter. The improvements we have suggested are *very important*, and we have described them for the benefit of housekeepers. If the apparatus is *carefully and perfectly* constructed, it will afford great comfort and satisfaction; if it is not, it will be worthless.

Messrs. Lebosquet Bros., of Haverhill, Mass., who advertise the furnace in the JOURNAL, are responsible gentlemen, and we think have taken great pains to construct it properly. We have

no time or inclination, however, to look after or examine any one's work, and those who construct must be held accountable for the perfection of their mechanical labors.

EDITORIAL NOTES.

Organic Matter in Water. — New facts on this interesting subject are continually coming to light. Dr. Heinsch, in a paper communicated to the London Chemical Society, states that not long ago he was called on to assist a large manufacturer of lemonade, who suddenly found it impossible to make lemonade that would keep. After a day or two it became turbid, and its odor anything but agreeable. On investigating the liquid under the microscope, it was found full of small spherical cells with, in most cases, a very bright nucleus. After examining all the materials employed, it was decided that the fault was with the water. On putting a few grains of pure crystallized sugar into some of the water, it became turbid in a few hours, and contained the cells above mentioned. On inquiry it turned out that the well, from which the water for the preparation of lemonade was obtained, had been slightly contaminated by sewage. This led the experimenter to mix a minute quantity of sewage with a sugar solution; the cells very soon made their appearance. Filtration through the finest Swedish paper does not remove the germs. Boiling for a half hour in no way destroys their vitality. Filtration through a good bed of animal charcoal seems to be the only effectual mode of removing them; but it is necessary to air the charcoal from time to time, else it loses its purifying power.

New Form of Spectroscope. — The Bowdoin Scientific Review describes a simple device hit upon in the laboratory at Brunswick, specially adapted to blow-pipe determinations: "If the lenses be removed from an ordinary spectacle frame, and one of them be replaced by a very small direct-vision spectroscope, we have the instrument in question. The direct-vision spectroscope may consist of the following parts: a compound prism consisting of one flint and two crown-glass prisms, suitably united, and an achromatic lens, all properly mounted in a small tube having an adjustable slit exactly in the focus of the achromatic lens. This instrument may be worn like ordinary spectacles; thus releasing the hands of the operator for necessary manipulations. By this device we are enabled with one eye to study the spectrum while with the other we direct the operations necessary to its production.

☞ Prof. Edward S. Morse, whose scientific researches have during the past two or three years excited great interest in the scientific world, is one of the most attractive and instructive lecturers upon science, before popular audiences, that we have ever known. His lectures upon "How Animals Move," "How Animals Eat," etc., will delight any lyceum audience in the country. His blackboard illustrations cannot be surpassed. We do a service to the community, in recommending Prof. Morse to the attention of lyceum committees. He can be reached by addressing him at the Peabody Academy, Salem, or at the rooms of the Natural History Society, Boston.

☞ With this month's paper we send reminders to the few subscribers who have not already paid for Vol. V. As these bills have to be prepared in advance of the mail, it is possible that some may be sent to those whose money was received too late to be credited in this month's issue. If this happens, we beg the indulgence of our friends. Persons sending drafts or checks will please make them payable to the order of Geo. S. Chase.

In this connection we would call special attention to our club list of magazines and journals on page 43. Those who wish to subscribe for any of these periodicals can obtain the renewal of the Journal *gratis* by sending their subscriptions through us.

☞ The notice of the offer of the Lamb Knitting Machine, as a premium for sixty subscribers, is unavoidably crowded out of our advertising columns this month; but our friends will understand that, as already announced, the offer holds good *until November 1st.*

LITERARY NOTES.

The *Annual Record of Homœopathic Literature* for 1870, edited by Dr. C. G. Raue, has been issued by Messrs. Boericke and Tafel, of New York. It is a handsome volume of more than four hundred pages, exclusive of some eighty pages of "Statistics" added by the publishers; forty-four of these being filled with the names of homœopathic physicians in the United States.

The American reprint of the *Chemical News* has been given up, and in its place we have *The American Chemist*, which looks very much like it, but on examination will be found to be largely made up of original articles that will compare not unfavorably with those in its English prototype. The new monthly is edited by Prof. C. F. Chandler and W. H. Chandler, A. M., and is published by Messrs. W. Baldwin & Co., of New York. By an arrangement with them, we are able to furnish it with the Journal at *five dollars* a year, which is the regular price of the *Chemist* alone.

Scientific Opinion, noticed in our July number, has been merged in *The British Mechanic and Mirror of Science*, a weekly paper published by E. J. Kibblewhite, 31 Tavistock St., Covent Garden, London. This journal, which for *twopence* (four cents of our money) gives twenty-four closely printed quarto pages of excellent reading, illustrated with good wood cuts, appears to be very successful, having recently absorbed not only *Scientific Opinion*, but the *British and Foreign Mechanic* and another *Mechanic*. It is a very Aaron's rod among contemporary English journals of popular science.

The Appletons have issued their *Annual Cyclopædia* for 1869, of which it is enough to say that it is fully up to the standard of the eight yearly volumes that preceded it. Encyclopædias in general begin to be out of date as soon as they are completed; but by this annual supplement, published in style uniform with the original work, the *New American Cyclopœdia* renews its youth every twelvemonth, and thus keeps constantly "up with the times."

Messrs. Wilson, Hinkle, & Co., of Cincinnati, have sent us *The Elements of Astronomy*, by S. H. Peabody, A. M., of the Chicago High School. It seems to us one of the best of the half dozen textbooks of Astronomy published within the past year or two. It is intended to be a part of "Ray's Mathematical Series," which is so extensively used at the West.

The first number of a semi-monthly journal of medical and surgical science, called *The Medical Times*, is announced for October 1st, by Messrs. Lippincott & Co., of Philadelphia. The price is to be $4.00 a year, and we will furnish it *with the* Journal on receipt of that amount. The name of the publishers is a guarantee that it will take a high rank among its professional contemporaries.

In reply to several inquiries, we would say that the article on "The Microscope in Medicine," in our August number, was an extract from *Clinical Lectures on the Principles and Practice of Medicine*, by Prof. John Hughes Bennett, of Edinburgh. The fifth American edition of this standard work, from the fourth London edition, was lately published by Messrs. W. Wood & Co., of New York.

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — home, science, arts, agriculture, medicine, etc. — will be answered under this head, but *only when the subject is one of general interest to our readers.*

T. B. M., Chester, N. J. — There are countless recipes for cologne-water. One that will furnish "a good article at a moderate price" is the following: oil of bergamot, lavender, and lemon, each one drachm; oil of rose and jasmine, each ten drops; essence of ambergris, ten drops; alcohol, one pint. Mix and keep well stoppered in a cool place for two months, when it will be ready for use.

F. R., Washington, D. C. — There *is* ordinarily "air diffused through water." If your friend who disputes the fact were a fish, he would find that he could breathe well enough in water in its natural condition, but would soon die of suffocation in water from which the air had been removed by an air-pump.

L. B. S., Boston, asks whether any of our correspondents can give the exact locality, or addresses, of the grape-sugar manufactories mentioned in our September number.

He also makes the following suggestion: "For apothecaries' labels, why not transcribe the recipe and place it on the package, keeping the original, numbered and on file?"

Our friend appears to doubt some of the stories of adulteration given by us. We can assure him that they all come from the best authorities.

J. S., Mobile, Ala. — Phalon's "Vitalia" *is* one of the "hair restoratives" that contain lead, as may be seen by Prof. Chandler's Report, referred to in our July number. It has 4.69 grains of lead to the fluid ounce, whether the statement of the advertisements that it is "without sediment" be true or not.

Violet Ink. — Several correspondents have asked for a recipe for violet or "mauve" ink. We cut one from the *Druggist's Circular* some time ago, but have mislaid it. These inks, however, are not to be recommended, as they are all more or less liable to fade.

Medicine.

BEHIND THE BARS.

A series of very remarkable papers, with this caption, have appeared in the *Boston Courier* during the year past, and they are not yet completed. These papers discuss the subject of our asylums for the insane, and the plans or systems adopted in treating those unfortunate beings who are placed "behind the bars." The writer is evidently a highly cultivated, discriminating, and candid man or woman, who has had experience as patient in one of our first-class Massachusetts asylums; and the descriptions given of the treatment are evidently founded upon personal observation and experience. We must confess to a feeling of perplexity and astonishment as we read these disclosures. They are clearly not the vagaries of an unsound mind, they do not spring from wounded pride or from resentment, they are not sensational, but they are calm, clear, fair, explicit.

The writer describes the day and night routine of the asylum, the system and duties of nurses and assistants, and the intercourse of the attending physicians with the patients; and if what is presented is true, it is evidently some one's duty to inquire into the treatment pursued in these institutions. No charges of gross cruelty or intentional neglect are made, and we fail to observe any desire to cast blame upon individuals; but the revelations in regard to the *system* are startling. We are all of us, at any moment, liable, through disease or morbid mental disturbance, to be precipitated into a condition where our friends will regard it as an act of mercy and kindness to place us "behind the bars." We all have an interest, a very deep interest, in the conduct of our asylums for the insane; but physicians more than others should most fully and clearly understand the exact situation in which they place their patients when they direct their removal to these asylums. We have never yet, in our experience with the

world, found anything so perfect that it did not have faults; and we have certainly learned that what we regarded as most perfect and desirable was just what needed to be thoroughly reformed or changed. It may be that our asylums, which appear when we visit them so cleanly, so orderly, so cheerful, are, after all, conducted on a wrong plan, or that the *system* is very defective. The gentlemen who have them in charge are good men, kind men, skillful men; but all this does not prevent them from falling into a routine so detrimental to the interests of the sick and suffering ones in their charge, that important changes may be needed. In stating that the physicians who have control of the asylums in Massachusetts are good and skillful men, we state what is true. Several of them are our warm personal friends, and we know they are incapable of doing any act of unkindness to a patient or of knowingly allowing such on the part of assistants. Assuming, then, that the statements of the writer of the articles in question are faithful records of facts, how do we explain the apparent inconsistencies of the position? Simply by reference to the *system* of hospital treatment for the insane, which it is quite easy to believe is objectionable in several important particulars. Massing together in one large building two, three, or five hundred human beings suffering from various forms of mental hallucination, and subjecting them to the routine treatment of a hospital, may not be, nay, cannot be, the best plan of treatment. More than one half of those who are placed in asylums are sufferers merely from nervous derangements which rest and quiet, with sound sleep, will cure. Such ought not to be placed in the same building with those who are confirmed maniacs, or those who are demented. As the nature and treatment of mental derangements are better understood, we are confident that a system of quiet retreats situated in the country, each having but few patients, and these carefully classified, will be found to be much the best. But we have not time or space properly to discuss this most important question. It is the intention, we believe, to publish the *Courier* articles in book form, as soon as the series is completed; and then, having the whole matter before us, we shall refer to it in a more extended manner.

Cincho-Quinine. — The San Francisco apothecary and medicine manufacturer, Mr. W. T. Wenzel, must be highly delighted with his experiment in obtaining gratuitous advertising, as we notice that nearly all the so-called "pharmaceutical" journals have copied his "paper" upon Cincho-Quinine, in whole or in part. Hereafter, if any enterprising druggist wishes to rise to the dignity of a "chemist," let him sit down, and, with the aid of the U. S. Dispensatory and some elementary work upon chemistry, "construct" an "analysis" of some medical compound, no matter what, and send the results to the nearest "pharmaceutical" publication. Like the advertisement of the old physician whose "sands of life have almost run out," it will "go the rounds," provided it is sufficiently sensational. We have once remarked in the Journal that the statements of Mr. Wenzel respecting cincho-quinine were unreliable and absurd. The compound, as prepared by Messrs. J. R. Nichols & Co., contains all the alkaloidal principles of bark, and is constituted precisely as described in an article published in this Journal. It is a very important remedial agent, and one which is fully appreciated by thousands of physicians in all sections of the country.

OUR MEDICAL EXCHANGES.

The American Practitioner for September has original articles on the Safety of Chloroform in Labor, by Professor L. P. Yandell; on a case of Tetanus treated with Calabar Bean and Hydrate of Chloral, by Dr. Preston Peter; on a similar case treated with Calabar Bean, by Dr. Edward Richardson; and on the cause of Malarial Fevers, by Dr. Duff Child; with Reviews, Clinic of the Month, Notes and Queries, etc.

The New York Medical Journal has a paper of twenty-eight pages on Intra-Uterine Medication, by Dr. F. D. Lente, and a continuation of one on the Internal and External Use of Mineral Waters by Dr. Adolph Kessler; with much valuable matter under the heads of "Clinical Records from Private Practice," and "Reports of the Progress of Medicine."

In the *Chicago Medical Journal* the leading articles are on Uterine Fibroid of the Posterior Wall successfully Removed, by Dr. A. Reeves Jackson; a Statistical Report of Diseases of the Ear, by Dr. E. L. Holmes; and on Hydrate of Chloral, by Dr. J. C. Bascom. The translation of Prevost's "Experimental Investigations relative to the Directions of Rotary Movements due to Unilateral Encephalic Lessons" is continued.

In the *Baltimore Medical Journal* we note, among other original matter, interesting papers on the Diffusion of Disease, by Dr. T. S. Latimer, and on the Anatomical and Physiological Differences between the Caucasian and African Races, by Professor H. L. Byrd.

The Indiana Journal of Medicine is publishing by installments an elaborate paper by Dr. R. E. Haughton, on the Repair of Wounds by Granulation. The editorial articles on Medico-legal Investigations and on the Hygiene of the Farmhouse are likewise noteworthy.

The Journal of the Gynœcological Society of Boston (we wish it could abridge its name!) is, as usual, excellent in its way. We understand that this magazine will be considerably enlarged next year.

The leading article in the *Boston Medical and Surgical Journal* for several weeks has been an able discussion of "Aphasia and the Physiology of Speech," by Dr. T. W. Fisher. Dr. W. W. Wellington's discourse on "Modern Medicine," delivered before the Massachusetts Medical Society at their last annual meeting, is reviewed at length, and highly commended, in the number for September 15th.

MEDICAL MEMORANDA.

Dickens and the Doctors. — In an article on the death of Charles Dickens, the *British Medical Journal* remarks: —

"How true to Nature, even to their most trivial details, almost every character and every incident in the works of the great novelist whose dust has just been laid to rest, really were, is best known to those whose tastes or whose duties led them to frequent the paths of life from which Dickens delighted to draw. But none, except medical men, can judge of the rare fidelity with which he followed the great Mother through the devious paths of disease and death. In reading "Oliver Twist" and "Dombey and Son," or "The Chimes," or even "No Thoroughfare," the physician often felt tempted to say, "What a gain it would have been to physic if one so keen to observe and so facile to describe had devoted his powers to the medical art." It must not be forgotten that his description of hectic (in "Oliver Twist") has found its way into more than one standard work in both medicine and surgery (Miller's "Principles of Surgery," second edition, p. 46; also, Dr. Aitken's "Practice of Medicine," third edition, vol. i. p. 111; also several American and French books); that he anticipated the clinical researches of M. Dax, Broca, and Hughlings Jackson, on the connection of right hemiplegia with aphasia (*vide* "Dombey and Son," for the last illness of Mrs. Skewton); and that his descriptions of epilepsy in Walter Wilding, and of moral and mental insanity in characters too numerous to mention, show the hand of a master."

To make Hydrate of Chloral Palatable. — The following combination serves to intensify the action of the chloral, and covers the acrid taste: —

Hydrate of chloral, . . .	ʒss.
Chloroform water, . . .	ʒij.
Syrup orange, or tolu, . .	ʒiij.
Tincture of ginger, . . .	6 to 12 drops.
Water, ...	℥jss.

The chloroform water is prepared by dissolving half a fluid ounce of chloroform in one gallon of water.

Hydrate of Chloral. — The advantages of chloral over all other hypnotics are concisely stated in the *Lancet* thus: —

1. It is more uniformly certain in its action. 2. It has no depressing influence. 3. It does not cause constipation. 4. It does not produce nausea. 5. Its effects are more lasting.

It is the most valuable means of producing sleep known to physicians. The only difficulty is to fix the exact dose for each case; but this is obviated by beginning with half-drachm doses, and increasing them by ten grains until the limit is found.

A Harmless Hair Dye. — The *Cincinnati Medical Repertory* states that a substance for a safe and effective hair dye can be found in the black walnut. This can be obtained by macerating the green hulls in water; the coloring principle is taken up, and this is imparted to the hair by application; but it should be applied carefully, as it will stain the skin also.

After the hair is thus colored, the following mixture applied for a few nights will improve its appearance much more than any of the ordinary hair oils. Mix equal parts of water and glycerine, and to each pint of the mixture add lac sulphur ʒij, and a few drops of oil of bergamot. Before this compound is applied, it should have a severe shaking, so as to mix the sulphur with the fluid. Apply once or twice a week at night.

The Bullet-cure for Ileus. — The old remedy for colic, of a bullet taken into the stomach, has been revived, in a modified form, by Dr. Maydieu, of Argent, France. In the *Journal de Med. Pratique*, Dr. M. declares that, after seventeen years of the ordinary treatment, in which he always failed, he has been invariably successful in the twelve cases which he has treated with *shot*. He mixes No. 5 shot, after careful washing, with olive-oil sufficient to cover them, and gives a dessert-spoonful every half-hour. In five or six hours the vomiting ceases, gases are expelled, and the bowels are moved. Warm baths, fomentations, and injections of milk and honey, are always superadded.

Apropos of this treatment, the *Pacific Medical and Surgical Journal* tells the following anecdote. Some forty years ago, a travelling preacher in England was taken sick with colic, in the house of a kind old lady, where he was spending the night. The good lady brought a bullet, which, after warming, she induced him to swallow. He was soon relieved from pain, and then began to reflect on the course of the bullet, and at last suggested to his nurse a doubt whether a body so heavy could find its way through the intestinal labyrinth, fearing that it would lodge there permanently. "You need not be the least

said," said the lady, cheeringly, "for that very bullet has gone through *me* at least twenty times!"

MEDICAL AGRICULTURE. — At a recent meeting of the Paris Surgical Society, M. Marc Sée related a case of what he termed "epidermic grafting." The patient had his arm caught in some machinery, the soft parts of the anterior and external portions of the fore-arm and of the elbow being lacerated and crushed, the bones not sustaining any injury. The wound was dressed with pure alcohol, and its surface, after the elimination of the superficial portion which became gangrenous, was covered with granulations. M. Sée then took two small shreds of epidermis detached from the inner side of the arm by means of a lancet, and applied them to a prominent part of the wound. Some days afterwards a new graft was formed by depositing on the surface of the wound epidermic particles obtained by scraping the cutaneous surface of the arm with a lancet. The same day, M. Reverdin, an *interne*, who is the inventor of this form of grafting, applied to the wound several small epidermic shreds taken from the leg and kept *in situ* by a strip of diachylon. In a day or two these different grafts had taken hold, and soon after the epidermic islets extended and united, so as to produce cicatrization over a notable portion of the wound. The process of proliferation of epiderm cells replaces that of suppuration at the points invaded by the islets so that the process of healing is considerably expedited.

CELESTIAL PHARMACY IN NEW YORK. — Ling Wu, a Chinese charlatan, has taken up his abode in Gotham, where he advertises his imported materia medica of 300 "remarkable medicines," with imported apothecaries to dispense them. Referring to this addition to the medicinal advantages of the metropolis, the *Medical Gazette* states that the San Francisco custom-house authorities recently seized an invoice of "remarkable Chinese remedies," consisting of pickled monkeys, dried toads, and such like articles. An elegant Mongolian prescription might read: —

℞. Pulv. unguis pollicis pedis . . grs. v.
Bufonis exsiccati rasi . . . ʒ j.
Caudæ soricis ustæ, q. s. ad. gratum saporum.

Tritura bene, et in chartulis v. divide, quarum capiat æger unam bis in die.

THE EFFECT OF HEAT ON ORGANIC GERMS.

FROM the last of a valuable series of articles on "Microscopic Organisms in Milk," contributed to *Scientific Opinion* by Mr. C. S. Wake, we extract the following curious facts concerning the effect of heat upon organic germs: —

"The effect on organic germs of exposure to great heat is still unascertained, and I determined to try the effect of continued boiling on milk. For this purpose I kept a small quantity of the liquid, in a covered saucepan, on the fire for ten minutes after the first ebullition; but, as I might have expected, the milk at the end of that time was completely desiccated, and there remained only the burnt remnants strongly attached to the bottom of the saucepan. Not to be beaten, however, I scraped off some of this residue and placed it in a bottle about half full of distilled water. On examining this infusion in a week's time, I was surprised to find that it contained animal life in great abundance. Each particle of burnt substance was surrounded by a mass of organic matter, and had attached to it great numbers of small infusoria, which endeavored, by continual jerking movements, to free themselves. I let this infusion stand for about three weeks longer, and the phenomena it then presented were extremely curious. From many of the masses of burnt matter long filaments had grown, and to these were attached numerous spores or germs, connected by very fine fibres with a few larger round bodies, resembling somewhat the original milk globules, but, still more, encysted infusoria. Occasionally, moreover, there were small fungoid stems, evidently due to the union of several oval bodies, and probably forms of the ordinary milk fungus. Among the black burnt particles were several pieces of a lighter color, which I thought might perhaps be foreign matter. On examining this, however, it was found to present exactly the same phenomena, the whole mass of matter consisting, apparently, of a fine fibrous substance, containing numerous large and small spherical bodies, and having many infusoria attached to it. The filaments were more abundant, and the minuter forms of infusorial life were also more plentiful than in the case of the darker particles of matter. My attention was, however, chiefly attracted by several strange-looking bodies, of irregular form, which I could not understand. On altering the position of the lens, a greater number of them became visible, and I then found that they were unmistakably amæbal organisms. I never saw so many of these creatures together before, there being dozens of them within the field of the microscope at one time. They were all of analogous character, and not unlike small forms of *amœba princeps*, presenting the club-like protrusions of this organism. The alterations of shape which they underwent often succeeded each other very rapidly. That these amæbæ had come from the mass of burnt matter was evident. They were, as a rule, almost close to it, and might have been squeezed out of it by the pressure of the glass covering placed on the slip. On examining another mass of matter which had been more perfectly desiccated than that just described, several of these organisms were visible in a cleft which divided two portions of the mass. From a third piece of this substance the amæbæ appeared to be issuing while in the field of the microscope. In fact, such an origin for them will alone account for their marvelous abundance. But what explanation can be given of their presence in such a peculiar position? The only suggestion I can offer is that the spherical bodies, of which a great portion of the burnt matter appeared to be composed, were in reality amæbæ *sarcoblasts;* with the figures of which, given by Dr. Wallich, they well agree. This, of course, only half meets the difficulty. The presence of the sarcoblasts in desiccated milk requires also to be accounted for, and this is a question the solution of which it may be as well for me not to attempt. I may mention that I preserved the slip which showed such an extraordinary number of amæbæ, fastening down the glass cover with asphalte, and on examining it under the microscope I now find that the amæbæ have taken an encysted form; at least, I can find nothing but a number of circular bodies to which to refer them. It should be added, that some of the larger round bodies attached in clusters to the fungoid filaments bore a dark *green* tint, which gives them a very characteristic appearance, and I could fancy that some of the larger infusoria present in the infusion also have this tint. Most of the infusoria are of the same character, a form which I do not recognize as having met with elsewhere. When in a particular position, they have much the shape of *Kolpoda cucullus*, but they are very slow in their movements; and if they turn over, as is often the case, they are then seen to be very broad, and their resemblance to cucullus is lost. It may be as well to state that large bodies, like starch cells, are occasionally to be met with in this infusion, but whence derived I cannot say. These bodies, however, are peculiarly plentiful in an *almond* infusion; with which I am experimenting, and in which, as I expected from the general similarity in appearance, under the microscope, of milk of almond and that of the cow, I have already met with the ordinary milk fungus and the ovate cells with which it is associated."

FALSE PRETENSES OF QUACKS.

ONE of the dodges of nostrum venders, and a very successful one, too, is the adoption of the title "Reverend." *Rev.* Mr. —— has a recipe which has cured him of consumption, and out of motives of pure benevolence he will furnish it free of cost to any one who will send for it, and inclose a postage-stamp to pay return postage. The recipe comes, but it contains an ingredient or two that you search for in vain at your druggist's, under cover of names which cannot be found in any medical or botanical work; but our benevolent "Rev." has a supply (and a pretty large one it must be!) which he brought with him from foreign parts, and he will furnish the medicine already prepared for — only two dollars! This class of impostors have no "local habitation." Their letters are addressed to a certain street and number, but they can never be found at home. They operate through the mails alone.

Another of the class accompanies the advertisement of his nostrum in newspaper and railway car with what purports to be his "counterfeit presentment," with black coat, white choker, flowing hair, and preacher-looking countenance.

The *old nurse* dodge is another. A druggist concocts a lethean mixture, calls it "Nurse Thompson's Soothing Syrup," and anon all good nurses and careful mothers, who think that if their babies "sleep" they "do well," supply themselves with, and keep constantly on hand, the dangerous opiate compounds, which too often give their innocent babes the "sleep that knows no waking." The slaughter of the innocents by these soothing mixtures is fearful, and we have no doubt that much of the high rate of infant mortality during the summer months is due to their use.

Another of the false pretenses resorted to by these reckless deceivers is the assumption of the name of some well-known benevolent association. There is one indigenous to this city that has assumed the name of an association that was organized many years ago in New Orleans specially for the purpose of mitigating the horrors of that terrible disease, the yellow fever. This mock association is a snare to our susceptible young men, who by the hundred are duped by the specious advertisements in country newspapers into the belief that for some fancied secret ailment they will find a remedy by applying to an institution conducted on such *benevolent* principles. The fool and his money soon part!

The *American Agriculturist* in each successive number does an excellent work in exposing quackery and imposture of all kinds. The various devices of our modern quacks are made so apparent that only the most willful will be deceived by them.

In a recent article on the abuses of the title "Reverend," the *New York Tribune* has the following very apt remarks: —

"We trust that respectable clergymen will pardon us if we say that the profession itself is partly to blame for the free use which is made of it (the title 'Reverend') by unscrupulous adventurers. Whether out of amiability of temper and the desire to oblige, or for some other reason less creditable, clergymen have always been too ready to lend the influence of their names to render advertisements pungent and persuasive. Almost any member of the medical faculty will testify (sometimes with tears in his eyes) that quacks and nostrum manufacturers are constantly cheating ministers out of certificates and recommendations. In respect to pills however inert, of potions however nasty, of infallible remedies, of panaceas and catholicons, ministers are the most credulous of mankind. They will discard the fine old family doctor who has gratuitously physicked and bled them for years, and take to their respectable bosoms any errant and arrant empiric whose fawning may secure their attention, and whose fluent tongue may cheat their understanding. They swallow the

mixture: their parishioners swallow the mixture. One congregation doses itself because another has; and the result, glorious and golden, is the sale of innumerable bottles of cheap tinctures and countless boxes of good-for-nothing pills at comparatively exorbitant prices — a cruel fraud if medicine be really necessary, and an insult, if it be not, to many an unoffending stomach." — *Phil. Med. and Surg. Rep.*

THE COMPOSITION OF CHLORODYNE.

Mr. Edward Smith reports, in the *Pharmaceutical Journal*, an inquiry into the composition of this well-known secret remedy. Hitherto, of the formulæ which have been published, two — one by Dr. Ogden, the other by Mr. Squire — have attracted most attention in this country. The difference between these lay essentially in the presence of Indian hemp and capsicum as indicated by Ogden, their absence in the formula given by Squire. But besides this, the proportion of morphia, as given by the two authorities, differed greatly. About the three important ingredients — chloroform, morphia, and hydrocyanic acid — there can be no doubt; no more can there be about oil of peppermint and treacle. The question is whether anything else exists in the compound. Mr. Smith thinks there is no Indian hemp, because the alcoholic extract is soluble in water; but then there is capsicum, as, after the chloroform and either, which also give pungency to the mixture, have been distilled off, the substance left behind has a hot peppery taste. He seems to have taken much pains with the analysis. Here is the result of it: —

℞ — Chloroformi, f ℥ iv.
Morphiæ mur., gr. xx.
Æther. rectif., f ℥ ij.
Ol. menthæ pip., ♏ viij.
Acidi hydrocyanici dil., f ℥ iv.
Tinct. capsici, f ℥ vj.
Mist. acaciæ, f ℥ j.
Theriacæ, ad f ℥ v.

This is not quite so dark as the original, as no caramel is used. Mr. Smith suggests for it the title Liquor Chloromorphiæ Co., as not likely to be confounded with that of any other compound.

A SIMPLE AND CHEAP STOMACH-PUMP.

Prof. John T. Hodgen, in the *St. Louis Medical and Surgical Journal*, thus describes a simple and efficient substitute for the stomach-pump: —

"About a year ago, I had a case of stricture of the œsophagus so narrow that my patient could not swallow even liquids. To sustain life, I resorted to a small stomach-tube (a gum catheter, in fact), as a means of injecting liquid nourishment; to this I fixed the elastic tube of one of Davidson's syringes.

"On one occasion the vessel containing the liquid happened to be higher than the patient's stomach, and I observed, while the syringe was not being used, that the liquid continued to flow into the stomach — the action being that of a siphon. I at once, to test the siphon, substituted a simple elastic tube for the syringe, and found the stomach could be as readily emptied as filled. Thus I conceived the idea of using a siphon instead of a stomach-pump, and have used the same in a case of poisoning recently, with the most complete success.

"I attach four feet of india-rubber tubing to a stomach-tube, fill both with water by simply dipping it in the liquid end-first, then, compressing the elastic tube between the thumb and finger to keep the fluid from running out, introduce the stomach-tube, lower the outer end of the elastic tube, and the contents of the stomach pour out as readily as if from an open vessel. When the fluid ceases to flow, I dip the outer end of the tube beneath the surface of water, elevate the vessel containing it, and the stomach is soon filled; lower again the outer end of the tube, and the stomach is emptied. This can, of course, be repeated as often as is necessary.

"The advantages claimed for this simple contrivance are, that it may be almost always improvised, is of speedy and easy application, has no valves to become obstructed or deranged, and is less expensive than a stomach-pump."

PROTOXIDE OF NITROGEN AS AN ANÆSTHETIC.

A valuable article on this subject recently appeared in the *Philadelphia Medical and Surgical Reporter*. The conclusions to which the writer arrives may be briefly stated as follows: (1) that persons breathing protoxide of nitrogen exhale a larger amount of carbonic acid than while breathing common air; (2) that its action is essentially oxidation, and that the excess of carbonic acid in the system is merely incidental, and in no wise sufficient to produce anæsthesia; (3) that its inoffensive effects are due to its action as an oxidizer; (4) that no subsequent depression follows, but rather a rapid reaction, because, acting by oxidation, the products of its combinations are speedily eliminated from the system; and (5) that its remarkably powerful action is due to its entering into new combinations, just at the moment of its liberation, when in its nascent state.

In closing, the writer expresses his "profound conviction that the pure protoxide of nitrogen, administered within proper limits, is harmless in its action, while if made from contaminated materials, if generated at too high a temperature, if used immediately after it is made, if the impurities ordinarily found in it be not removed, if inhaled in sufficient quantity to produce profound anæsthesia after being prepared for a few days, or if the administration of the *pure gas* be persisted in beyond *certain limits*, it is capable of an immense amount of mischief."

VALUABLE FORMULÆ.

Neuralgic Pill. — Dr. T. C. Osborn (*New Orleans Journal of Medicine*) gives the following as very effectual in cases of neuralgia: —

℞. Zinci cyanuret, . . . gr. vj.
quiniæ sulphat, . . . gr. ix.
morphiæ sulphat, . . . gr. iss.
ext. belladonnæ, . . . gr. iij.
Ft. pilulæ no. vj.

Dose, one pill every six hours until the pain is relieved.

Epsom Salt. — In reply to a query propounded by the American Pharmaceutical Association, in regard to the best method of disguising the bitter and disagreeable taste of Epsom Salt, Mr. Isaac W. Smith, of Philadelphia, suggests the following: —

℞. — Rad. glycyrrhizæ cont. (deprived of outer bark), ℥ iv.
Aq. bullient, Oij. vel q. s.

Mix, and allow to stand, with occasional stirring, until cold; then express through muslin, adding more water if necessary, until the residue no longer tastes; then filter, and to the filtrate add magnesiæ sulphatis, ℥ iv; finally, evaporate to dryness over a water-bath. Each ounce of the compound represents about one ounce of the crystallized salt.

Coughs. — For the harassing and annoying coughs that frequently accompany many acute diseases, and arising from nervous irritation of the larynx, pharynx, palate, or other parts of the throat, an invaluable remedy is: —

℞. Sulph. Morphia, . . . gr. j;
Dil. Sulph. Acid, . . . dr. j;
Simple Syrup, ... oz. ij.

Mix. Half a teaspoonful to be given upon the tongue, and swallowed slowly. The persistent hackings of bronchial difficulties, and even of consumption, are often speedily relieved by it.

An excellent cough mixture, for constant use the office or family, is this: —

℞. Syrup Tolu, ... oz. j;
Syrup Peru, ... oz. j;
Syrup Sanguinaria, . . . oz. j;
Syrup Lobelia, ... oz. j;
Tr. Wintergreen, . . . dr. j. M.

Dose, half a teaspoonful three or four times daily, whenever indicated.

To Preserve Pathological or Anatomica Specimens. — The alcoholic solution of corrosi sublimate is one of the most serviceable fluids f this purpose: —

Hydrarg. Bichloridum, . . oz. iv;
Alcoholicum, ... O. j.

Wash the substances well in water, immerse the in the solution and let them remain for a couple months, then take them out and dry. Animal pr parations thus treated are almost imperishable.

THE

Boston Journal of Chemistry

IS PUBLISHED MONTHLY BY

H. O. HOUGHTON & CO., Boston.
HURD & HOUGHTON, New York

TERMS, ONE DOLLAR PER ANNUM, IN ADVANCE
FIFTY CENTS FOR SIX MONTHS.

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Of the numbers mentioned, we have a few copies left, which w will forward to our friends, at the following prices, viz.: Vol. I. three numbers, twenty-five cents; Vol. II., eight numbers, fifty cents; Vol. III., ten numbers, fifty cents. Vol. IV. and V. have been stereotyped as issued, and we are able to furnish back numbers since July, 1869, to any extent. Price, single copies, ten cents six copies for fifty cents.

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BOSTON JOURNAL OF CHEMISTRY,
150 Congress St., Boston, Mass.

Boston Journal of Chemistry.

VOLUME V. BOSTON, NOVEMBER, 1870. NUMBER 5.

Familiar Science.

THE WONDERS OF MICROSCOPY.

WE have a glass slide upon which, in a space less in diameter than the head of a small pin, are arranged, in perfect symmetrical order, *one hundred and four diatoms.* These wonderful vegetable or animal organisms are placed upon the glass in accordance with exact or scientific classification, and represent most of the existing and extinct species. They are not frustules or fragments, but perfect specimens, so admirably prepared that when the glass is placed under the microscope with a first-class half-inch objective, they are seen each distinct and perfect, with all the wonderful and beautiful curves, lines, and cells, which so astonish every observer. This great work of microscopic art is due to the consummate skill of J. D. Möller, a German microscopist. How he is able to accomplish this feat, is no better understood than the process or art by which M. Nobert of Pomerania is able to rule upon glass lines so fine that it requires more than 12,000 to cover the space of an inch. The little speck upon the glass in which are arranged these beautiful organized bodies, is scarcely perceptible to the naked eye; and yet, in this infinitesimal speck, the bodies are grouped with ample spaces between, and the order of arrangement and method is the same as would be observed by a scientific entomologist in grouping one hundred specimens of moths or butterflies upon a sheet of paper. In the speck, a whole volume of scientific information is embraced: it is an anatomical and palæontological museum, which can be studied only by the aid of a microscope of the most perfect construction. We have spoken of this plate, for the purpose of affording our readers some idea of the wonderful results of modern scientific skill in one department of study and research. Such facts cannot fail to awaken, even in the most indifferent, a respect for scientific investigation, and also for the investigators who are doing so much to bring to light the hidden things in nature.

WHAT SHALL WE USE FOR WATER-PIPES?

[Concluded.]

IN the October number of the JOURNAL, we had under consideration pipes for water conduction, constructed of lead, tin-lined lead, tin, and galvanized iron. We come now to consider plain

IRON PIPE.

Water, when it is brought in contact with the metal iron, oxidizes or rusts it more or less rapidly; but it is not rendered poisonous thereby. Neither the oxide, nor any of the salts of iron able to be formed from water contact, are in the least degree hurtful to the animal economy; and therefore iron conduit pipes are perfectly free from danger under all circumstances. Iron pipes are cheap, easily put in position, are free from the trouble of leakage, and are *safe.* What possible objections, then, can be urged against them? The objections relate wholly to matters of convenience and economy. The rust of iron, which sometimes is formed in considerable quantities, is liable, when the water is used for laundry purposes, to stain clothing; and this causes a good deal of scolding on the part of washerwomen and tidy housewives. Also, tea made of water containing iron-rust is changed into a pale ink; and many vegetables boiled in it are considerably discolored. These are some of the inconveniences resulting from the use of iron water-pipes; but the fact that by rapid oxidation they are often speedily filled up or destroyed may be regarded as the most weighty objection. In some localities and under some circumstances, small service-pipes rust slowly, and will continue intact for many years; under other circumstances, they are soon destroyed. Iron pipes have so many desirable points, we often advise their employment for conducting water to dwellings. No iron pipe of less diameter than one inch should ever be used; those which are smaller soon fill up, and are rendered worthless. A good way to obviate the objectionable feature of rust is to coat the interior with hydraulic cement. The Melrose and Malden Aqueduct Co., who have just introduced the waters of Spot Pond into those towns, are using a cement-lined iron service-pipe, and we predict for it entire success. It is cheap and durable, and oxidation is wholly prevented by this device. Large pipes are now successfully constructed of cement, with a thin iron pipe upon which it rests, interiorly and exteriorly. Pipes of this kind which have been several years in use, we believe, continue to afford the highest satisfaction.

GUTTA-PERCHA PIPE.

In seeking for a satisfactory material for water-pipes, the curious vegetable substance, *gutta-percha*, has been used to some extent. All metallic contamination is at once entirely avoided by the employment of this material, and apparently it has much to recommend it to favor; but, like a thousand other good things, it has objectionable features. Gutta-percha imparts to water in contact with it an unpleasant taste, and also, in some localities, it undergoes a kind of spontaneous decomposition, by which it is rendered worthless. If, however, these objections did not exist, we presume the item of *cost* would come in to drive it in a great degree from the market. At the present time we think but little of this pipe is used in any section of the country for water conduit.

BRASS PIPE.

Compound metals used for water-pipes must be looked upon with disfavor by chemists. And yet some alloys resist oxidation or other chemical change in a most remarkable manner. We know of no subject which more imperatively demands patient and careful investigation than that of *alloys.* It is a curious fact that aluminium and magnesium, when combined with each other and with other metals in certain proportions, will oxidize so rapidly as to fall into a powder almost instantly; while in other proportions the compound resists the action of oxygen to a degree approaching that of the noble metals. A mixture of copper and zinc may possibly be devised, which, when formed into pipe, will convey water safely; but of such we have no knowledge. A brass water-pipe is now being manufactured and introduced, we learn; but such should not be hastily adopted by any one.

CLAY PIPES.

The common glazed clay or "stone-ware" pipe has been used to a considerable extent for conducting water, and where the pressure is slight it may serve a good purpose. There is a difficulty, however, in securing the sections free from minute orifices which render them leaky, and also it is troublesome to form tight joints. When made of extra thickness and put in position with care, the clay pipe of small calibre may conduct water under a moderate head, for many years, with great satisfaction. That which passes through will of course be as pure as the mountain or meadow stream at its source, and this is a point of the first importance.

A CARBON WATER-PIPE,

so called, was manufactured and introduced some years since, but we have learned but little regarding its success. It was made, we think, of asphalt and sand principally, and had the merit at least, of indestructibility. The difficulty and cost of construction may perhaps have proved obstacles in the way of its production; and so it has disappeared from the market. In addition to the varieties of water-pipe described, we may name the glass and the porcelain-lined iron pipes, as worthy of notice. Iron pipe has been successfully lined with glass, and we believe the cost was not so great as to prove a bar to its general employment. Nothing could be constructed sweeter and cleaner than pipe of this nature; and we regret to learn that its manufacture has been abandoned in this city. We venture to hope that some one will resume its fabrication, and we feel assured that it might become a profitable business.

We have thus briefly and plainly brought under notice the various kinds of water-pipes which have been used; and the objectionable or desirable features of each have been pointed out.

THE CONCLUSION

of the whole matter may be presented in a few words. Leaden pipes may be employed to conduct water from ponds and rivers or open reservoirs, under *ordinary conditions*, with safety. But since disturbing agencies of a local character are liable to occur, of which water-takers can

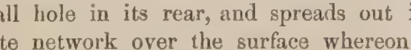
have no knowledge until evil consequences result, it will be better to substitute some kind of pipe which is safe under all possible conditions. Neither tin-lined lead, galvanized iron, or brass pipes meet this want. Iron pipes are entirely unobjectionable on grounds of safety; and the other undesirable features which have been named are not of so serious a nature as to lead to their rejection for common use as service-pipes. By lining the interior with cement or glass, a conduit pipe is produced, which leaves a better one hardly to be desired. Block-tin water-pipes are safe and excellent, but costly. Those who do not mind expense can resort to this pipe for water conduction, with assurance that they are fully protected from danger. It is quite probable that not many years will elapse before new devices for conducting water to dwellings, which are safe and cheap, will be afforded us, as this is an important question towards which many competent and ingenious minds are turned at the present time.

CURIOSITIES OF VISION.

We presume that most of our readers have a general notion of the structure and working of the human eye. They know that the little sphere, of an inch or so in diameter, which forms the eye-ball is a *camera*, essentially like the one used by the photographer to throw the image of external objects upon the surface prepared to receive it and placed within the apparatus. The mere forming of this picture inside the eye is not, however, *seeing*. The picture might as well be anywhere else if there were not some means of making the mind aware of its existence. The *optic nerve* answers this purpose — a branch of the brain which enters the eye through a small hole in its rear, and spreads out in a delicate network over the surface whereon the picture is formed. The impression made by the rays of light upon this network of nerves is telegraphed to the mind, which then *sees* the object, or, rather, from seeing its image in the eye, comes to recognize the existence of the object itself outside the eye.

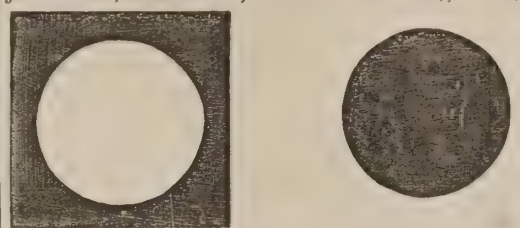
If the optic nerve should be severed, the picture in the eye might be as perfect as before, but we should nevertheless be blind to it. If any portion of the network of nerves just mentioned should be paralyzed, we should cease to see the part of the picture formed on that portion of the eye's inner surface. If the entire image of some small object should fall upon that insensible spot, we could no more see it, even though looking straight at it, than if we had no eyes or kept them shut. Now it is a curious fact that there *is* such a "blind spot" in every human eye; and, what is more curious, it is found to be just where the optic nerve enters the eye — the very place which we might suppose would have the keenest sight of all.

Here is a simple little experiment by which we can prove the existence of this blind spot in our eyes. Shut your left eye, and with the right one look steadily at the cross just below,



holding the paper ten or twelve inches from the eye. Now move the paper slowly toward the eye, which must be kept fixed on the cross. At a certain distance the other figure — the black dot — will suddenly disappear; but, if you bring the paper nearer, it will come into view again. You may not succeed in the experiment on the first trial, but with a little patience you can hardly fail; and the suddenness with which the black spot vanishes and reappears is very striking. Now, examination has shown that when it disappears its image falls exactly on the spot where the optic nerve enters the eye; thus proving that spot to be blind.

Let us try another experiment, which will serve to illustrate a law of light familiar enough to the scientific student, but not to people in general. Look at the black and white circles just below, and decide, without measuring them,



which is the larger. You say the white one — do you not? But if you measure them carefully, you will find that they are of just the same size. In general, when a white or bright object is seen against a black ground, it appears larger than it really is; while a black object on a white ground appears smaller than it really is. This peculiar effect is called *irradiation*, and it is due to the fact that the impression produced upon the retina of the eye by a bright object extends beyond the outline of the image.

We have a marked instance of irradiation in the case of the moon when it is a few days old. The new moon seems to be part of a considerably larger sphere than that of the old moon which it is said to "hold in its arms." The Astronomer Royal of England, Prof. Airy, has recently shown that this has led to an error in the commonly accepted measurement of the diameter of our satellite. He measured the *dark* moon, and found its apparent diameter about two seconds less than that which had been obtained by the most careful measurements of the bright moon.

Recurring to the figure, it will be noticed that the brighter the light upon the paper, the greater will be the difference in the apparent size of the two circles. If you do not see the difference well, it is because the paper is not properly illuminated, or because you hold it too near the eye. If the width of the column allowed putting the circles farther apart, it would be better. Other experiments of the same kind will readily suggest themselves to the reader.

TRAPS TO CATCH SUNBEAMS.

If the reader is not familiar with scientific treatises on the subject, it may be news to him that there are two kinds of heat, known respectively as *luminous* and *obscure*, and that some of their properties are remarkably different. Luminous heat is that which is radiated from a luminous source, as the sun, or a blazing fire, or a red-hot iron ball; while obscure heat is that which comes from any source which is not luminous, as a vessel filled with hot water, or an iron ball heated below redness. Now, it is a singular fact that these two kinds of heat have not the same power of making their way through various bodies. Luminous heat will pass readily through some substances that are quite impermeable to obscure heat; while, on the oth hand, the latter easily makes its way throug certain substances which oppose the passage c the former. Glass, for instance, is as tran parent to luminous heat as it is to light, b allows scarcely a ray of obscure heat to traver it; as you can easily prove by putting a pla of glass before a ball heated below redness, only to a dull red, and holding a thermomet on the other side of the glass. The mercu will be affected very little, or not at all. however, you substitute a plate of rock-salt f the glass, the mercury rises at once. If we di solve iodine in bisulphide of carbon, we get liquid which is wholly opaque to luminous hea but perfectly transparent to obscure heat.

The solution just described enables us to sho that luminous heat is always accompanied l obscure heat. If we let a beam of the form strike upon a thin layer of the liquid, a delica thermometer placed on the other side will ris indicating that rays of *obscure* heat have com through. Of course, these obscure radiatio must have formed part of the luminous bea As they were invisible, their existence could proved only by thus sifting them out, so speak, from the luminous rays with which th were blended.

These facts about the two kinds of heat w serve to explain why it is warmer inside a ho house on a sunny day than it is outside. T glass roof of the building allows the sunbeam with all their luminous heat, to pass through i but when they fall upon the plants and furn ture within, they are radiated back as obscu heat, and cannot penetrate the glass. They a caught in a trap, from which they cannot escap They may, to be sure, get out by *conduction* that is, by working their way, so to speak, fro particle to particle of the glass; but that is very slow process, and thousands will be e trapped while one is getting clear in that way.

The watery vapor which is always present our atmosphere answers the same purpose as t glass of the hot-house. It lets the sunbeams pa down through it; but when they are radiat back from the surface of the earth as obscu heat, it bars their progress. They cannot retu by the road they came; they are taken captiv and must stay here and work for us morta instead of flying away again, and wasting thei selves in the boundless regions of space.

We can understand now why it is warmer the foot of a mountain than on its top, thou the latter is more directly exposed to the sol rays. In the upper regions of the atmosphe there is less watery vapor to absorb the obscu radiations from the surface of the earth. W must bear in mind that the air receives t greater part of its heat, not directly from abov but indirectly by radiation from the earth belo and that the watery vapor in its lower stata like a glass roof interposed between these stra and those higher up. It is warmer beneath th vaporous canopy than above it, just as it warmer inside the hot-house than outside.

A patent has been taken out in England for hollow iron curb-stone, inside of which telegra wires may be put, instead of being buried in t earth, as is often done there. The new plan w save a good deal of labor in taking up the roa ways and pavements for the repair of the lines.

SINGULAR EFFECT OF THE SUN'S HEAT.

SOME of our readers may have heard of the singular motion of sheets of lead on roofs caused by the action of the sun's heat. In a recent English journal, we find the following detailed account of an experiment, which any one interested in the subject can very easily repeat:—

"The fact of the descent of a sheet of lead when placed upon the inclined surface of a roof, however low the pitch, especially in summer, has long been known; I myself first observed it on the southern side of the roof of the choir of Bristol Cathedral, in 1855. I have verified it by the following experiment:—I fixed a deal board 9 ft. long and 5 in. broad to the southern wall of my house, so as to form an inclined plane, and upon it I placed a sheet of lead, turning its edges down over the side edges of the board, and taking care that it should not bind upon them, but be free to move with no other obstruction than that which arose from its friction. The inclination of the board was 18° 32′, the thickness of the lead $\frac{1}{8}$ in., its length 9 ft., and its weight 28 lbs. The lower end of the board was brought opposite to a window, and a vernier was constructed which could be read from within, and by which the position of the lead upon the board could be observed to the 100th of an inch. I began to measure the descent of the lead on the 16th of February, and recorded it every morning between seven and eight o'clock, and every evening between six and seven o'clock, until the 28th of June. In the night, between sunset and sunrise, the lead scarcely descended at all. It was on days when the thermometer in the sun varied its height rapidly and much—as on bright days with cold winds, or when clouds were driven over the sun—that the descent was greatest. So remarkably, indeed, was this the case, that every cloud which shut off the sun for a time from the lead, and every gust of wind which blew upon it in the sunshine, seemed to bring it down a step. On such days it would descend from to $\frac{1}{4}$ an inch. On the contrary, when the sky was open and clear, and the heat advanced and receded uniformly, the descent was less, although the difference of the extreme temperatures of day and night might be greater. It was least of all on days of continuous rain."

THE AMAZON.

THIS great river rises in the little Peruvian Lake of Lauricocha, just below the limits of perpetual snow. For 500 miles it flows swiftly through a deep valley. Then turning sharply eastward, it runs 2,500 miles across the great equatorial plain. Two thousand miles above its mouth its width is a mile and a half, increasing to over 10 miles at the head of the delta, where it divides, and, after running 200 miles, presents a front of 150 miles upon the ocean. For a great distance it is bordered by side-channels or "bayous," as they are called upon the Mississippi, named by the Indians *igarapés*, or "canoe-paths." From Santarem, the principal town above Pará, one may paddle a thousand miles parallel to the river without once entering the stream. For twenty-five degrees of latitude every river that flows down the eastern slope of the Andes is an affluent of the Amazon. It is as though all the rivers from Mexico to Oregon united their waters in the Mississippi. A half score of these tributaries are larger—the Danube excepted—than any European river out of Russia. The volume of its waters is greater even than the breadth of the river would indicate. At Nauta, 2,200 miles from its mouth, the depth is 40 feet, increasing rapidly as it approaches the ocean. The largest ocean steamer could doubtless steam 2,000 miles up the Amazon.

The vegetation of the valley is exuberant. There is a bewildering diversity of grand and beautiful trees, a wild, unconquered race of vegetable giants, draped and festooned by creeping plants. The moment you land upon the shore you are confronted by a solid wall of vegetation, through which, if you wish to proceed, you must hew your way with axe or *macheta*. Palms, of which thirty varieties are noted, constitute the majority of trees. Then there are "cow-trees," a hundred and fifty feet high, yielding a milk of the consistency of cream, used for tea, coffee, and custards. The "caucho," or rubber-tree, though of a different species from that of the East Indies, produces a gum which constitutes most of the rubber of commerce. Agassiz puts this tree, forty or eighty feet high, in the same class with the "milk-weed" of our American pastures. Of ornamental woods there is no end. Foremost among these is the *Moira-Pinima*, or "tortoise-shell wood," the most beautiful in grain and color in the world. Enough of this is wasted every year to veneer all the dwellings of the civilized world. For many years to come the exports of the Amazon Valley must be mainly the products of its forests. Yet, strangely enough, timber is now one of the chief articles of import at Pará. A city of 35,000 inhabitants, lying on the verge of a great forest, buys pine boards from far-away Maine! This folly will in time come to an end. Contrary to all that we might expect, the climate of the Amazon Valley is temperate rather than tropical. It is more equal than in any other region of the world. Year in and year out it ranges from 74° to 87°—the fair mean being 80°.

The above facts have been gathered from Professor Orton's "The Andes and the Amazon" (lately published by the Harpers) which is the best account of this grandest of rivers and the mountain region whence it flows, that we have ever read.

THE LEAF AS A WORKER.

WHEN did the leaf begin its work? It was the *first* to rise on creation's morn and go forth to labor. Ere the almost shoreless ocean dashed upon the low Silurian plain, the leaf was at its work. And through all the long ages it has worked—worked to develop better and higher forms of life. And the earth's broad face is written all over with the evidences of its faithfulness.

Now what does it do? It pumps water from the ground, through the thousands of tubes in the stem of the tree (the tubes which itself has made), and sends it into the atmosphere in the form of unseen mist, to be condensed and fall in showers—the very water that, were it not for the leaf, would sink in the earth, and find its way perchance through subterranean channels to the sea. And thus it is that we see it *works* to give us the "early and the latter rain." It works to send the rills and streams, like lines of silver, adown the mountain and across the plain. It works to pour down the larger brooks which turn the wheel that energizes machinery, which gives employment to millions. And thus a thousand wants are supplied—commerce stimulated—wealth accumulated—and intelligence disseminated through the agency of this wealth. The leaf does it all.

It has been demonstrated that every square inch of leaf lifts three five-hundredths of an ounce every twenty-four hours. Now, a large forest tree has about five acres of foliage, or six million two hundred and seventy-two thousand six hundred and forty square inches. This being multiplied by three five-hundredths (the amount pumped by every inch) gives us the result—two thousand three hundred and fifty-two ounces, or one thousand one hundred and seventy-six quarts, or two hundred and ninety-four gallons, or eight barrels. The trees on an acre give eight hundred barrels in twenty-four hours. An acre of grass, or clover, or grain, would yield about the same result.

The leaf is a worker, too, in another field of labor, where we seldom look—where it exhibits its unselfishness—where it works for the good of man in a most wonderful manner. It carries immense quantities of electricity from the earth to the clouds, and from the clouds to the earth. Rather dangerous business transporting *lightning*. I think it would be considered contraband by the "U. S.," or "Merchant's Union," or any common carriers; but it is particularly fitted for this work. Did you ever see a leaf entire as to its edges? It is always pointed, and these *points*, whether they be large or small, are just fitted to handle this dangerous agent. These tiny fingers seize upon and carry it away with ease and wonderful despatch. There must be no delay; it is "time freight." True, sometimes it gathers up more than the *trunk* can carry, and in the attempt to crowd and pack the baggage the trunk gets terribly shattered, and we say that lightning struck the tree. But it had been struck a thousand times before. This time it was overworked.—*American Entomologist.*

THINGS WORTH NOTING

TO RENDER WOVEN FABRICS INCOMBUSTIBLE.—The tungstate of soda has long been known as an excellent article for this purpose, but the tungstate of ammonia answers the purpose even better. A concentrated solution of this salt is to be diluted with water to the specific gravity of 1.140. The goods are moistened with the liquid just before starching, and they can then be ironed and finished without the least difficulty. The most delicate colors are not injured by the process. Cloth thus prepared cannot be set on fire; it may be charred by intense heat, but not ignited. For muslins and children's dresses, and especially for the dresses of ballet-dancers, nothing could be more convenient or more efficient as a protection against accidents from fire.

CHEAP MOSQUITO BAR.—A correspondent of the *American Entomologist* writes: "There is a mosquito bar in vogue among the plantation hands and boatmen in some parts of the South, which answers every purpose to the letter; it is common petroleum. A small quantity is dropped on a piece of cotton, and then squeezed out as dry as possible, after which the cotton is rubbed over the face and hands. No mosquito will alight where the scent has been left. I have tried it, and then exposed myself to clouds of them, on various occasions, without experiencing the least annoyance."

HARNESS BLACKING.—An English scientific journal gives the following as a composition that has been thoroughly tested, and which keeps leather (of boots and shoes, as well as harnesses) in excellent condition:—

2 oz. best white wax, $\frac{1}{2}$ oz. Prussian blue, $1\frac{1}{2}$ oz. ivory black, $\frac{1}{4}$ pint of spirits of turpentine, 1 tablespoonful spirits of wine. Melt the wax, over a slow fire, in an earthenware vessel, then add the blue and black, taking care to put in the black gradually at first, or it will boil over; when cool, add the spirits. Stir it well from first to last. After applying it to the leather, polish with a soft cloth or brush.

OLD RIBBONS RENEWED.—Wash in cool suds made of fine soap, and iron when damp. Cover the ribbon with a clean cloth, and pass the iron over that. If you wish to stiffen the ribbon, dip it, while drying, into gum arabic water.

HOW TO CLEAN OIL-CLOTHS.—If you wish to have them look new and nice, wash them with soft flannel and lukewarm water, and wipe perfectly dry. If you want them to look extra nice, after they are wiped drop a few spoonfuls of milk over them, and rub them with a dry cloth.

The Arts.

BROMINE.

A VERY good illustration of the curious fact that increased consumption of an article lessens its price is afforded in the case of the element *bromine.* Five years ago it was sold in this country and in Europe as high as eight dollars a pound; now the price is less than a dollar and a half the pound, and the consumption has increased in a thousand-fold ratio. As a manufacturer of chemical substances, we did not have occasion to purchase for manufacturing purposes twenty pounds a year until after 1865, when a great demand sprang up for the bromides of potassium, sodium, and ammonium. Some idea of the increase in consumption may be formed from the statement that we have ordered of the salt-makers in Pennsylvania quantities as large as five thousand pounds, or *two and a half tons*, at one time, during the past year. Our bromine supply formerly came from Germany, the Stassfurt salt-mines furnishing it in considerable quantities after they were opened; but now our own strong salines in Pennsylvania, Ohio, and West Virginia produce it in amounts fully equal to the demand. It is indeed a singular element, very closely allied to iodine in its characteristics, but having different medicinal properties. The two salts, bromide and iodide of potassium, are consumed in vast quantities in medicine. The method of manufacture is nearly the same, the salts resemble each other very closely, and yet the effects upon the animal economy are entirely dissimilar.

NOTES OF NEW INVENTIONS.

NOVEL SEA-GOING VESSEL. — The model of a sea-going vessel of very original build is now to be seen in the port of Algiers. A general idea of the construction is obtained if we imagine a steamer cut in two, and the severed parts made the support of a bridge four times the length of the original vessel. This bridge has an air-chamber in its entire length, so that if by accident it should become parted from the supports it cannot be submerged. It is destined for the cargo, but cabins in the form of boats are so arranged along the sides of the bridge that, in case of accident to this latter, they may be navigated separately. Thus there are three chances of safety if the construction goes to pieces. The supposed advantages are great speed (since, the larger part of the vessel not being in contact with the water, the resistance is so much diminished,) safety, and great space for cargo.

OBTAINING HIGH TEMPERATURES. — A very useful invention of Mr. Coffey is now to be seen in operation at Messrs. Doulton and Watts's, of Lambeth. It is a new mode of obtaining high temperatures for the evaporation of liquids without the use of high pressure or superheated steam, and is, in fact, a modification of the circulating system, heated water being replaced by heavy paraffine oils. These circulate exactly like water. A close system being made, the oil heated in a coil of pipe placed in a furnace rises first to an air-tight tank, from which it runs through pipes and the jackets of pans, descending as it cools to the coil of pipe in the furnace. With this apparatus a temperature of 600° or 700° F. may be safely maintained without any of the risks arising from the use of steam at high pressures, and, as will be easily seen, with a much less expenditure of fuel. A pyrometer is contrived to show the exact temperature of the oil as it leaves the tank, and means are provided for regulating and keeping the temperature uniform.

NEW METHOD OF PURIFYING WATER. — It is claimed that metallic iron affords the readiest and simplest means of disinfecting water and of keeping it fresh. The water of the Thames, taken to sea in iron tanks, soon becomes perfectly sweet and remains so during a long voyage. A small piece of iron or a few nails in the water in which cut flowers are put will keep the water sweet. The experiment has been tried of putting some iron filings in a vessel with a very small quantity of water and then placing a leech therein. After six months had passed, the water was found quite fresh and the leech alive and healthy. These facts are curious and suggestive.

LIGHTING GAS BY WATER POWER. — A Mr. Hunter, in England has invented what he calls a "hydraulic gas-lighter." By one operation the tap is opened, a match struck, and the gas lighted. A service pipe is to be laid throughout the district to be lighted, with branches to each lamp. The pipes are charged with water, and the pressure required is given and maintained from a tank placed at the required elevation. Inside each lamp post is to be placed a small cylinder, to the piston of which is attached a rod. The top of this rod is serrated, and gears into a toothed wheel attached to the plug of the lamp tap, which is turned round and opened as the rod rises. A small fusee drops from a reservoir, and is carried by a swivel plate to a piece of roughened spring on which it is rubbed and ignited. It is then carried round past the burner, the gas is lighted, and the fusee drops to the bottom of the lantern. In the morning, when the gas is to be extinguished, the pressure of water is taken off the cylinders, and an escape tap opened, the pistons drop with the weight of the rod, and the taps are turned off. It is proposed that as the lamps are cleaned weekly, the lamp cleaner shall supply the reservoir with a week's supply of matches.

RENDERING GOODS WATER-PROOF.

THE *Manufacturer's Review*, which is excellent authority on such matters, gives the following methods of water-proofing goods, in addition to those published in our August number: —

1. *Impregnation with Caoutchouc.* — Take 100 grammes of a concentrated solution of caoutchouc in turpentine, and 30 grammes of alumina, and mix the two substance well together. The cloth is laid upon a table, the mixture spread over it, and permitted to dry, The thickness of the covering of course depends upon the number of coats put on. If the reverse side is changed in any way, it is cleaned with alcohol.

2. *Water-proof "Double-Stuff."* — The principal peculiarity of this fabric is the joining of two waterproof tissues without preventing the passage of the air, with the aid of any of the mixtures already described, or of the following preparation: 2 gallons of water, $1\frac{1}{3}$ pounds of powdered (burnt?) alum, and $1\frac{1}{8}$ pounds of white lead. These are mixed, and after the white precipitate formed has settled, the clear liquid is decanted, and the goods immersed in it till they are thoroughly impregnated. They are then placed into an ordinary soap-bath, washed with pure water, and dried. Next in order comes the application of caoutchouc by spreading the solution in *oblique* stripes upon the cloth, and producing similar stripes on the cloth which is to be laid upon the first, but in such a manner that if the two are put together, these stripes shall cross each other at right angles. Small squares are thus formed, which allow the air access and the perspiration to escape, without the rain being able to penetrate through the double cloth.

3. *Preparation for Cotton, Linen, Silk, and Woolen Goods.* — This preparation, which is free from smell, and resists mordants, contains principally alum and carbonate of lime. It is prepared as follows: Dissolve 222 pounds of crystallized alum in 24 gallons of water, and add 88 pounds of carbonate of lime (chalk), add after this $3\frac{1}{2}$ pounds of sandarac which has previously been dissolved in alcohol, mix the whole, allow it to settle, decant the clear solution, and apply it at a temperature of 140–160° F.

MEMORANDA IN THE ARTS.

CHINESE GOLD LACQUER. — The gold-lacquer lining of a Chinese cabinet in the Museum at Cassel peeled off, and thus gave Dr. Wiederhold the opportunity of studying the composition of this substance. On examining it he found particles of tinfoil attached to the lacquer, so he comes to the conclusion that this material formed the ground upon which the lacquer varnish was laid. His attempts to imitate the varnish were perfectly successful, and he gives the following directions for the preparation of a composition which closely resembles the true Chinese article. First of all, two parts of copal and one of shellac are to be melted together to form a perfectly fluid mixture, then two parts of good boiled oil, made hot, are to be added; the vessel is then to be removed from the fire, and ten parts of oil of turpentine are to be gradually added. To give color, the addition is made of solution, in turpentine, of gum gutta for yellow, and dragon's-blood for red. These are to be mixed in sufficient quantity to give the shades desired.

PRESERVED BREAD. —Preserved bread has been suggested by M. Maurice as a substitute for biscuits for the use of sailors, soldiers, and travellers. The bread is made in the ordinary way, and is then thoroughly dried. It is afterwards exposed to high pressure steam for a short time, and is subsequently submitted to hydraulic pressure to reduce the bulk. The cakes so produced will keep, it is said, for years, if protected from moisture. They are necessarily hard, but are masticated as easily as biscuits. The process by which these cakes are made is long and troublesome, and the only advantage that they can possess over biscuits consists in the circumstance that they have undergone the primary fermentation which some writers on dietetics allege to be absolutely necessary to produce bread of a perfectly wholesome character.

IRON AND HYDROGEN. — A curious observation has been made by M. Caron on an alteration produced in iron when it is kept melted for some time in an atmosphere of hydrogen. The metal increases somewhat in density, and becomes soft and malleable as copper. Re-melted in a crucible it becomes scaly when cold, doubtless in consequence of the evolution of absorbed hydrogen. Are we to regard the softness and malleability as the properties of an alloy of hydrogen and iron?

THE FIRST LOCOMOTIVE. — The French claim the honor of having constructed the first locomotive. It was made by one Crugnot in 1760, the same eventful year which saw the birth of Napoleon I., Wellington, Humboldt, and several other celebrated characters. The first engine is still preserved in the Conservatoire des Arts et Métiers at Paris.

LIQUID ALLOY OF SODIUM AND POTASSIUM. — Melt together four parts of potassium (which fuses at 122° F.) and two and a half parts of sodium (fusing at 194° F.) This mixture, which has the appearance and consistency of mercury, has its point of solidification at 47.40° F., and is consequently liquid at ordinary temperatures. It is prepared under naphtha.

ECONOMICAL PAINT. — Skim milk 2 quarts, fresh slacked lime 8 oz., linseed oil 6 oz., white Burgundy pitch 2 oz., Spanish white 3 lbs. The lime to be slacked in water, exposed to the air,

mixed in one fourth of the milk; the oil, in which the pitch is previously dissolved, to be added a little at a time; then the rest of the milk, and afterwards the Spanish white. This quantity is sufficient for 27 square yards, two coats.

CHEAP AND FINE VARNISH FOR WOOD. — The beautiful varnish which is applied to Connecticut clock-cases, wooden picture-frames, and other cheap objects, is in appearance equal to the elaborate finish of the finest furniture, such as pianos, etc. It is made by mixing two pounds of copal varnish with half an ounce of linseed-oil varnish. The mixture is shaken often to mix it well, and is then placed in a warm spot. The wood to be varnished is prepared with a thin coat of glue-water, dried slowly, and rubbed down with fine pumice-stone or something equivalent. In light-colored wood, a light pigment, such as chalk, is added to the glue-water; in dark wood, an equally dark pigment is added. When ready, the articles are varnished with the above mixture, and, after drying, rubbed with a solution of wax in ether, thus getting a high polish.

Agriculture.

SHORE PENCILINGS AT LAKESIDE, NO. 3.

THE cool winds and the hoar frosts of the autumn months have aided in the sad work of stripping the trees, shrubs, and grasses of their rich summer attire, and they are now for the most part standing cheerless and bare. Here and there a late-blooming flower may be seen, or a narrow patch of green grass in some warm sheltered nook, on the margin of the lake; but the great and active operations of Nature in building up and sustaining vegetable structures have ceased, and soon a snowy mantle will be cast over field and wood, and the deep sleep of winter will commence. The corn, wheat, and other grains, with the roots and grasses, have been safely housed; and notwithstanding the extreme drought, most glorious crops have been secured. The farm-work of the summer months is ended; and the herds seek shelter in barns, the squirrels in trees, and the birds take flight to a sunnier clime. We must imitate their example, and flee from our lake-shore retreat to the library or parlor, where the genial heat from the blazing wood in the open fire-place dispels all feelings of sadness or discomfort, and puts us in a mood even to welcome the reign of snow and ice. As we look out upon the bare fields this morning, we are led to pencil down some thoughts upon the *winter life of plants.* It is an error to suppose that in winter, in our climate, there is a dead calm in plant life, and that Nature is wholly palsied in her movements. Wherever the rays of sunlight fall, there is never perfect rest; and this relates to the vegetable as well as to the animal world. Sunlight is pregnant with life, no matter how slant may be the rays, or how few the hours during the twenty-four they may fall upon the earth. In winter the really useful plants cannot grow, but in the lower forms of cryptogamic plants the processes of vegetation are quite active. The mosses, lichens, liverworts, etc., resist cold wonderfully, and they will grow at very low temperatures. We find them under snow-banks and sheets of ice in winter, keeping up an active circulation, so active that they are able to ripen their sporangia or mature their fruit, with the thermometer close upon zero. Lichens are so constituted as to be able to reverse the order of nature, and take their winter nap in summer. In the cold months their vegetating period occurs, and they are then most active. The lichens are a very low order of plants; but we must not look upon them with contempt, for from their existence, or by their creation, life upon our planet is rendered possible. The poor, humble lichens came before man; and man would never have come at all, if the lichens had not preceded him. These plants are the very first which made their appearance upon the rocks, when our earth was barren and chaotic; and dying there, they prepared the way for a higher vegetation. At the present time there are few rocks so barren or smooth that the tenacious lichens will not fasten upon them, and flourish through storm and cold, as do the cereals in the best of soils and in the warmest sunshine. Suppose the reader becomes interested in these statements, and starts out botanizing some day in the coming winter months. Such an excursion will by no means be devoid of interest or instruction. Everywhere on rocks, fences, and fallen trees, and in the pebbly bottoms of brooks, the rich mosses will be found in great variety; and their study will open up new ideas of the wonderful nature of plant structures, even in their lowest forms.

But activity in plant life in winter is not alone confined to the cryptogamia. It is during this inclement season that many of our forest trees ripen and perfect their seeds. The firs and pines are not like the deciduous trees, which allow the moisture they contain to freeze in winter. The temperature of a pine-tree under the bark never falls below the congealing point, no matter how severe the cold may be outside. These resinous trees keep up a kind of low "tree heat," as do the bears a low animal heat, in freezing weather. Consequently the circulation of sap goes on, and the immature seeds are ripened. In some localities in the northern part of our country, those evergreens grow which bear true leaves, like the ivy, laurel, or perhaps the holly. We call these plants evergreens; but in fact they change their leaves as do the deciduous varieties. The change is made gradually, one leaf dropping off when another has grown to replace it, and so the tree is never wholly deprived of its foliage. It is probable that in winter there is considerable vegetative activity in these evergreens, as it is impossible that these changes can take place when the sap is completely dormant. Sunlight and warmth are agents of tremendous power in connection with plant activities. If in the depth of winter a mild day occurs, we shall find, by making incisions in the stem or branches of trees, that the slumbering forces are partially awakened, and the sap is in motion.

If we allow that in the higher orders of flowering plants winter is a time of repose, it can hardly be supposed that there is no interchange of matter between the air and the body of the plant, for some such movement is needful to its life. The hibernating animals in their dens are practically dead, but still a feeble form of life remains; the heart slowly beats, and waste goes on. There is, in fact, a continuous interchange of particles between the air and the body, and so there must be between the air and all plant structures. Men and animals sleep during the night-time, but the functions of life go on undisturbed. Winter to deciduous trees and herbaceous plants is their night-time, when they sleep, to recuperate their vital energies, and become prepared for the labors of reproduction when the spring opens. As is the case with human beings, it is better that this sleep be continuous and undisturbed, in order that full strength may be had for work in the season of activity. A winter in which there are many fitful changes, first warm and then cold, is unfavorable for the growth and perfection of seeds and fruit; and trees and plants suffer more from these causes than from drought or wet in summer.

We have spoken of the trees as being bare of foliage in winter; but this is not absolutely true, for trees have winter leaves as well as summer leaves. The winter leaves are less apparent, but they are no less real or perfect. If we take from a tree one of its buds, and examine it carefully, we shall see that it is composed of a little bunch of true leaves, nicely compressed together in layers, resembling fish-scales. These are the winter leaves of trees, and every species has them perfectly characteristic of its kind.

This winter dress of trees is no apparel suddenly formed, or put on late in the autumn; it is the growth of all the spring and summer months. During the hot season, when the sap is active, it was diverted away from the buds, by the great demands of the expanding summer foliage, so that their growth was slow. They remain immature until the summer leaves begin to fall, when the sap flows towards the buds, and they are perfected. The winter dress of trees has a purpose in the economy of plant life. The structure in winter does not demand nutrition, but it must have protection, and this the buds afford. In them is stored up all the beauty and glory of the vegetation of the coming year, and thus they possess an interest of the highest kind. Nature is very careful of these buds, for it seems to be understood that in them exist latent forms of life, most intimately connected with the welfare of the race. In order fully to protect them, they are compressed together very tightly in the smallest possible space, and are covered in under an air-tight and water-tight roof. The outer layer of buds is either covered by a warm coat of fine hairs, or cemented closely with a resinous or glutinous secretion, which resists the action of water. How wise and careful is Nature in all her wonderful operations! Can we doubt for a moment the existence of a great and good Being, who guides and directs all these movements?

But we perceive that the great interest of our topic is leading us along into a field which is almost boundless in extent. We would like to walk awhile longer therein, if we were sure our readers would follow us with the enthusiasm which we cannot help feeling ourselves. If they desire to accompany us another day on a similar excursion, we will perhaps look more closely into the winter life of plants.

TREE PLANTING. — The State of Iowa planted, last year, about 15,000,000 trees, and will set out a still larger number this year. Two farmers, in one township, have set out this spring 25,000 trees. This is at the rate of about five trees, annually, for each inhabitant — none too many to meet the demand for fruit, commerce, fuel, and timber.

ARTIFICIAL BUTTER.

HAS the chemist's skill attained to such results as enable him to manufacture the delicious and important food substance known to us as *butter?* This is an interesting question. Through recent foreign advices we learn that M. Méye, a Parisian chemist, is actually making good, palatable butter out of a variety of animal fats, by a process which is patented in nearly all the countries of Europe. His claim is that by subjecting sweet lard or other animal fats to great pressure, by which the stearine is extracted, an oily material is obtained, the composition of which is identical with butter. After obtaining this "oily material," he subjects it to a variety of chemical processes, which result in securing the flavor and physical characteristics of prime butter. The patent specifications and claims are presented with much detail; and the reader who is interested in butter necromancy is carried along through all the steps by which unsophisticated grease becomes sophisticated fat, and ultimately butter, of a character which would pass unchallenged through the hands of a first-class St. Albans butter inspector. This is certainly very important scientific intelligence, if true; but we are not yet ready to break up or burn up our churns, and send our cows to the butcher. We prefer to wait for further advices. Butter is a delicate animal compound, which, in our view, cannot be fabricated or imitated successfully by any chemical processes whatever. Doubtless a substance can be produced which may serve as a fair substitute for butter among certain classes in Europe; but the fastidious taste of large consumers, both in that country and in this, can never be satisfied with butter coming from other sources than the sweet grasses of the hills and meadows, or from the cereal grains, transmuted or changed by the subtle chemistry of the animal organism. In this connection, we cannot help remarking that the present aspects of chemical science and research are wonderful and interesting in the highest degree. The attempts which are being made to construct organic bodies of the most delicate and complex nature seem almost presumptuous, or perhaps audacious. In an article which will be published shortly, we shall bring under review the triumph of chemistry during the past decade in that department which relates to organic substances.

LARGE GRAPES.

THE party of editors who examined our graperies at Haverhill on the 20th of September expressed surprise, not only at the size of the bunches, but at the size of the berries. We have been led to measure some of them, and find that we have Golden Hamburgs measuring $3\frac{5}{8}$ inches in circumference, and Black Hamburgs $3\frac{3}{8}$ inches. The clusters on some vines weigh nearly two pounds. These vines are five years old, and their vigor and productiveness can hardly be surpassed. *Quality* in grapes is an important feature that producers and consumers often overlook, both in those raised in cold houses, and out of doors. The saccharine qualities and the fine flavor of grapes are greatly enhanced by proper and favorable methods of cultivation; and we hesitate not to say that one pound of Black Hamburgs or Frontignacs produced by our methods of fertilizing the borders is worth more than two grown under ordinary conditions. Our method is to supply to vines little or no excrementitious manures, but to depend upon those chemical or special agents which enter so largely into the structure of both vine and fruit. Upon this our success in grape culture depends. In a future number of the JOURNAL we will present the details of this method, as we believe the matter is of interest to all engaged in the delightful and profitable work of cultivating vines.

THE ROSTIEZER PEAR.

IN remarking upon pears and grapes in the last number of the JOURNAL, we stated that the Doyenne d'Eté was the only early variety of pears worth raising in this section. In saying this, we certainly did injustice to that delicous little pear, the *Rostiezer*. We have a half-dozen trees of this variety, which, the present season, filled many a hand-basket with the rosy-cheeked morsels. The Rostiezer, in our view, is a better pear than the Seckel, which it resembles in many points. This is saying a great deal; and as it matures its rich juices before the "dog-days" commence, we must reckon it among the earliest varieties. The tree is tolerably vigorous, with long, branching limbs; and the fruit grows in clusters, numbering a half-dozen or more. It needs a good, moderately moist soil and careful cultivation. As regards trimming, when on quince stock, we say "let it alone;" and this we say of nearly or quite all the varieties of dwarf pear-trees. We have had a sad experience in following the instruction of wise men who presume to give advice regarding the trimming of pear-trees. Lop off those branches which grow inordinately or abnormally, and leave the rest to nature. This advice comes from experience. Those of our readers who have space for the cultivation of but a few varieties of pears should include one or two Rostiezers in the collection, as they are indeed an early and delicious fruit.

NOTES FROM ABROAD.

VINE LEAVES AS FODDER. — It is stated by *Les Mondes*, that in France vine leaves and the cuttings of young vine twigs are largely used in a green state as fodder for cattle, and are also partly salted for winter forage. This new utilization of material will furnish food for large numbers of cattle in vine-growing countries.

OZONE FROM PLANTS. — Professor Mantegazza, of Milan, has shown that the cultivation of our common herbs and flowers is worth something more to us than arises from the pleasure they give to the senses of sight and smell. They are in reality great store-houses of health, since they evolve quantities of ozone, which is developed by the direct action of the sun's rays, and, in some cases, continues to be evolved during the dark. Lavender, cherry-laurel, narcissus, hyacinth, and mignonette are mentioned as among the most valuable of these ozone makers. Professor Mantegazza suggests that great benefit would be derived from planting these and other herbs and flowers in marshy and unhealthy districts.

BEET-ROOT CULTIVATION IN PRUSSIA. — The raising of the beet for sugar manufacture has extended very rapidly in Prussia. Be ween 1836 and 1870 the production had increased a hundred fold. The increase in the yield of sugar from a given weight of the roots has also increased; it used to be five per cent., but is now nearly seven per cent.

WAR AND AGRICULTURE. — The *Journal de l'Agriculture* computes that the losses of the French farmers in the districts invaded by the Prussians amount to more than *eight hundred millions of dollars* (in gold). More than ten millions of acres have been overrun, and the loss of crops and cattle cannot be reckoned at less than eighty dollars an acre. It will be a long while before the country will recover from the evil results of this exchange of the sword for the ploughshare.

COLORS OF FLOWERS. — An English writer says that "the three primary colors, red, blue, and yellow, are not to be found pure in any species of flower." Thus we have red and blue in the fuchsia, but no yellow; yellow and red in the rose, but no blue; blue and yellow in the pansy, but no red; and so on. If this is universally true, it is certainly very curious. According to Helmboltz and other modern authorities, however, the three primary colors are red, *green*, and blue, and not red, *yellow*, and blue, as maintained by Brewster.

GRAPE-VINES.

"HAVE YOU A CHOICE GRAPE CUTTING THAT YOU WANT TO GROW? — Then go to the woods, dig some roots of a wild vine, cut them into pieces of about six inches long, cut your choice grape-vine or cutting into pieces of only one, or at most, two buds; insert the lower end by the common cleft-grafting method into the piece of wild vine root, plant it in the earth, leaving the bud of the cutting just level with the top of the ground. Every one so made will grow, and in two years become bearing plants."

The above is a clipping from an old newspaper, and concisely describes the process of manufacturing grape-vines, successfully tried with the root of an old Isabella vine in Pawtucket last November.

Our woods are full of wild grape-vines, and there are tons of choice cuttings which must necessarily be clipped from valuable cultivated vines this winter. Now, let every one who wants a grape plantation, and who cannot afford to purchase the best early varieties, go to his neighbor in November, and ask him for trimmings of Concord, Rogers's Hybrids, Delaware, or other most desirable *early* vines; then let him provide himself with a grape-vine root, either wild or of some hardy garden variety like the Isabella, — ripening too *late* to be valuable here, — and proceed to graft and plant as above.

But, after having planted and left the bud of the cutting just level with the top of the ground, do one thing more. Cover the bud with a mound of earth a foot high for the winter, and carefully uncover it in the spring. Or, if you choose, invert over the bud a very small flower-pot, cover this with a handful of straw, and bury the whole for the winter under a pile of earth. C.

CHEMICAL FLORICULTURE. — A correspondent of *The English Mechanic* mentions as a novel fact that the common hydrangea (*Hydrangea hortensis*) has flowers of a pale blue color in Cornwall, but when transplanted to another part of England produces pink blossoms. We have noticed the very same change of color in the flowers of this plant here in Massachusetts when removed from one soil to another only a few miles distant. The writer just mentioned was led to try the effect of certain chemical substances upon the hydrangea, and found that by mixing iron filings with the soil in which it grew, he was able sometimes, but not always, to change the pink of the flowers to blue. Cuttings taken from plants thus changed, and grown without the iron filings, invariably went back to the original color. He thinks that this is a solitary instance of such a change in a plant produced by chemical means. Can this be true?

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, NOVEMBER 1, 1870.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

SCIENCE AND WAR.

Two of the most scientific nations of the world are now engaged in a horrible war; and all the aid which modern chemistry and engineering skill can furnish is enlisted in the dreadful work of destroying human life. This is completely reversing the great ends for which science is or should be prosecuted. It is the proper mission of science to prolong life, and to render human beings happier whilst they live. But war, that demon of the bottomless pit, neutralizes everything that is good and humane in this world. It ruthlessly seizes hold of every secret thing or process which science extorts from nature, and by the aid of which mankind can be rendered more distressed and miserable, and uses it in unstinted measure day and night. In both France and Germany, all scientific research, except in one direction, is suspended. The eminent *savans* are all engaged in devising new and more dreadful agents of destruction, or in efforts to ward off or mitigate the effect of blows received. The world has yet to find a better or more efficient agent of destruction than the old compound of charcoal, sulphur, and nitre. Some of the monks and ecclesiastics of mediæval times thought that gunpowder came to us through the suggestions of the devil; that it was no discovery, in any proper sense, but simply a diabolic revelation of the nature of an infernal mixture. In these more enlightened or less superstitious times, we are led to regard the discovery of gunpowder as a remarkable accident. It resulted from no scientific deductions, for they had no science. No one had any knowledge of the fact that a mixture of the three ingredients of gunpowder, when touched by a spark, would be instantly decomposed, forming a large volume of gases, of vast elastic force. Science had nothing whatever to do with the discovery of gunpowder; and the hypothesis of the monks, referring it to diabolic agency, is quite unsatisfactory to us heretics. The discovery of pyroxyline or gun cotton, and the series of explosive bodies of similar chemical constitution, was no accident, but came through the natural channels of scientific deduction. So also of nitro-glycerine, dualine, and that class of bodies of which we have recently heard so much. These new and terrible agents of destruction do not appear to play a very conspicuous part in the operations of either the French or German combatants. The reason is, that they are of such unstable character that they are dangerous to friends as well as foes, and also they can only be used under conditions which are not often favorable in war. So far as field operations go, it may be proved that gunpowder of fair quality, used in connection with an old "King's-arm" musket, is a better "armament" for ordinary soldiers than "sharp" powder with needle guns or Chassepot rifles. Battle shooting is, most emphatically, random shooting. In some of the recent engagements, it is reported that several of the French regiments exhausted seventy rounds of ammunition to a man, without, so far as could be learned, killing a dozen of the enemy. It would be a curious result, if, after all that science has accomplished in improving gunpowder and guns, the world should go back to cheap powder and smooth-bore muskets. Sharp-shooters are undoubtedly of great service in the field, and they require the best and most accurate weapons; but the rank and file may do better with arms that do not afford facility for very rapid or accurate shooting. As regards the great German chemists, they are just now very much engaged in fabricating or devising disinfectants to ward off disease in the crowded camps and hospitals. Hofmann writes to England, in the most imploring tone, begging the chemists there to send over ship-loads of carbolic acid, chloride of lime, permanganate of potassa, etc. He thinks the camps will soon become "hot-beds of contagious diseases," unless they are thoroughly disinfected. Let us hope that this useless, disgusting, cruel war will soon close, and that science may be turned from the arts of war to the arts of peace.

MAN AND MONKEYS.

PROF. GILL, at the Troy meeting of the American Association for the Advancement of Science, read an elaborate paper "on the Relations of the Orders of Mammals," in which the following is given as the conclusions of his researches upon the natural history of man: —

"There is scarcely a proposition in biology more demonstrable than *that man is the derivative from the same immediate stock as the higher anthropoid apes*, and probably after the culmination to nearly the same extent as at present of the differentiation of the order into families and subordinate groups."

This will do for Prof. Gill; and with such beliefs he must permit us to congratulate him upon his illustrious ancestry. Now, will he inform us if it is true that apes were changed into human beings from biting off each other's caudal extremities in some fierce encounters in a remote age? This is a favorite theory, or belief, with some speculative gentlemen; and if he will present his views upon it, another important "biological" question may be removed from the field of controversy.

THE TESTING OF KEROSENE.

IN a former article on this subject, we referred to some of the criticisms made by eminent English chemists upon the mode of testing petroleum oils prescribed in the act of Parliament. In the recently revised act, which appears to have been prepared with much care, new and more minute directions are given for applying the "flashing" test. As they are of general interest, we reprint them in full from the official text: —

"The cup which is to hold the oil shall be of thin sheet iron or of metal blackened on its inner surface; it shall be two inches deep and two inches wide at the opening, tapering slightly towards the bottom; it shall have a flat rim projecting from the edge of the cup, by which it shall be supported in a metallic vessel four inches and a half deep and four inches and a half in diameter; it shall also have a wire stretched across the opening, which wire shall be so fixed to the edge of the cup that the upper side of the wire shall be a quarter of an inch above the upper side of a circular wire, which shall be fastened round the inside of the cup a quarter of an inch below its upper edge. The thermometer to be used shall have a round bulb about half an inch in diameter, and shall be graduated upon the scale of Fahrenheit, every ten degrees occupying not less than half an inch upon the scale.

"When the instrument is to be used, the petroleum to be tested shall be poured into the cup till the liquid rises just to the upper side of the circular wire. The outer vessel shall be filled to within an inch of its edge with water, and a small flame shall be applied to the bottom of the outer vessel. When the temperature of the water has risen to 80°, the cup which contains the oil to be tested shall be placed in the outer vessel, and the thermometer shall be inserted into the oil, so that the bottom of the bulb shall be immersed about one inch and a half beneath the surface. A covered screen, blackened on the inside and provided with a hole in the cover for the passage of the stem of the thermometer, shall be placed over the apparatus, and shall be of such dimensions as to surround it about two thirds, and to reach about eight inches above the level of the vessels. The temperature shall be raised gradually, so that it shall require about five minutes to raise the oil from 80° to 95°.

"When heat has been applied to the water until the thermometer has risen to about 90° Fahrenheit, a very small flame, such as that from a piece of burning twine, shall be passed quickly across the surface of the oil, on a level with the wire. If no pale blue flicker or flash is produced, the application of the flame is to be repeated for every rise of two or three degrees in the thermometer. When the flashing point has been noted, the test shall be repeated with a fresh sample of the oil, using water at a temperature of 80°, as before, withdrawing the source of heat from the outer vessel when the temperature approaches that noted in the first experiment, and applying the flame test at every rise of two degrees in the thermometer.

"N. B. — In performing the test, the operator must be careful not to produce any current of air which would remove the vapor from the surface of the oil, either by breathing upon the surface or by any sudden movement."

SULPHITE OF LIME. — This article, which Prof. Horsford suggested fifteen years ago for arresting the fermentative process in cider and wines, has continued to grow in favor ever since. With its use, good cider can be preserved for many months in a sweet and palatable condition. It is easy to use, and perfectly safe. Messrs J. R. Nichols & Co., of this city, chemists, are the only parties who sell the genuine article, as prepared by Prof. Horsford.

MOVEMENT OF MICROSCOPIC GRANULES.

I HAVE just read the article by Mr. C. T. Wake, in the October number of the JOURNAL, "on the effect of heat on organic germs." The article is very interesting, as a confirmation of the theory of spontaneous generation, or it proves that experienced microscopists like Mr. Wake can make mistakes. It is not credible that organic germs could have retained vitality after exposure to the heat which he applied to the milk; it is not credible that eggs of infusoria like *kolpoda* could have been in the milk, if that had not been exposed to the air; and it is to be presumed that Mr. W. would not have experimented on milk that had not been protected. Is there any other source of error? Mr. W. says he put the burnt "residue" in a bottle half full of distilled water — size of bottle not given. Now I have shown in this JOURNAL that I had found it impossible to procure distilled water perfectly pure. What germs were in the distilled water the experimenter did not know. Like hundreds of others, he takes it for granted that there can be none, and then attributes everything he discovers to the matter experimented upon, and not to the medium used. But what did he find besides the kolpoda-like animal? Something like *amœbæ*, an object about the nature of which very little is known, and a "mass of organic matter" which "had attached to it great numbers of small infusoria, which, by continual jerking movements, endeavored to free themselves." Here is where I believe the great mistake of eminent microscopists has often been made, probably in part owing to inferior instruments. They have assumed that a body with a "jerking movement," or any movement, must be an infusorium, or a germ, or some organic being. This is the important point now for the study of microscopists. In August of this year, Mr. D. S. Holman, of Philadelphia, brought to me a slide which he wished examined. It was placed under the microscope with a *good* objective, and I saw the field filled with an immense number of minute spheres, all in movement, as lively as a party in a ball-room. I at once saw that they were what I think have been called monads by some writers, germs by others, and "bioplasm" by Beale. Mr. Holman then informed me that what I saw was albumen — white of eggs — coagulated by carbolic acid; that it was prepared, mounted, and completely sealed up from access of air, in July, 1869; and that the lively movement had been going on constantly (at least it was always seen when looked at) ever since. I can add that it is going on up to the present time. A few days since, with the view of verifying Mr. Holman's experiment, I prepared some white of egg myself, and have obtained the same results. The whole field of the microscope is filled with minute granules, particles, monads, or germs, all dancing together. Now here we have matter in which it is impossible (if human reason can pronounce an opinion on the subject) that any animal or vegetable life can exist, and yet in which there is present that one evidence of life, motion; and this motion has continued in the first-mentioned slide unchanged for fifteen months. Nor is this all. I have prepared slides of inorganic matter, — *e. g.*, minute particles of chalk and china clay, suspended in a solution of glycerine in alcohol (can any life be sustained in such a medium?) — and these not only present the same movements, but an expert eye cannot distinguish a particle of organic from one of inorganic matter, with the same magnifying power. This movement of particles of matter in a fluid is no new thing; it has been known for years, and the text-books on the microscope all caution novices against being deceived by it; yet I have good reason for thinking that many who are experts have been so deceived. For a continued exhibition of the phenomenon, I believe it to be essential that the matter should be so near the specific gravity of the fluid as to remain in suspension. In the case of chalk and of clay, the particles in time settle in contact with the glass, and then are motionless until dislodged by jarring them.

C. S.

THE SUMMER OF 1870.

PROF. LOOMIS, of New Haven, gives in the *College Courant* a summary of the meteorology of the past summer, from which it appears to have been a very remarkable season, both for its high temperature and the small amount of rain. Meteorological records have been kept at New Haven from 1778 to the present time, and the past summer was the hottest known in all that time. The next hottest was that of 1780, the mean temperature of which was about three quarters of a degree below that of 1870.

By means of observations made less than a hundred miles from New Haven — at Newport, Rhode Island — this comparison can be extended fifteen years further back, to 1763. The hottest summer during this period was that of 1773, the mean temperature of which was just the same as that of 1870. If, however, we take the *four* months, June, July, August, and *September*, we find that they have averaged hotter this year than for any year since 1763, a period of 108 years.

The deficiency in the amount of rain is quite as remarkable as the high temperature. After giving a tabular statement of the amount of rain for the first nine months of 1870 compared with 28 preceding years, Prof. Loomis remarks: "It will be seen that in January we had considerably more rain than usual; but since that time each month has shown a deficiency, which in eight months amounts to twelve inches. For the past five months, the deficiency is 10.76 inches; that is, the aggregate fall of rain has been *less than half the average*, while the temperature has been *the highest known for more than a century*. The fall of rain for the past five months has been less than for the same months in any year embraced in the record. It is not strange, then, that this vicinity should have suffered from drought, and it is only remarkable that the injury to vegetation should not have been more serious than it has been."

CURIOSITIES OF NAMES. — In looking over the long list of physicians who are subscribers to the JOURNAL, we have been quite amused at the curious names of some of them. We have upon our books *Dr. Death*, *Dr. Slaughter*, *Dr. Dye*, *Dr. Coffin*, *Dr. Toombs*, and *Dr. Graves*. This sombre list is lighted up by one *Dr. Life*, one *Dr. Strength*, and *Dr. Joy*. Dr. Drinkwater just balances Dr. Rumn on the liquor question; and Dr. Grant and Dr. Lee are doubtless as successful in fighting disease with pellets and powders as certain other gentlemen of the same names have been in fighting other kinds of battles with *bullets* and *powder*. We have equal confidence in the skill of Dr. Death and Life, and believe them both to be intelligent, worthy gentlemen; for otherwise they would not be patrons of our JOURNAL.

OUR PROSPECTUS. — We solicit attention to the new prospectus of the JOURNAL, which may be found in the advertising department of the current number. Our friends have certainly been very kind in obtaining new subscribers, for which we desire to express thanks. The JOURNAL, with a united effort on the part of its readers, may soon become the most widely extended publication in the world, as it is now the best patronized of the journals of science. Reader, please hand this number to a neighbor, and ask him to subscribe. You will thus do both him and us a service.

EDITORIAL NOTES.

CEMENT WATER-PIPE. — In our articles on water-pipes we omitted to direct attention to a form of pipe constructed wholly of hydraulic cement. It is very cheap; and when it is desired to construct aqueducts for supplying barns, stables, and private establishments, nothing can be better. It is formed by digging a trench below the frost line from the spring or reservoir, and then using a flexible rubber hose pipe, of the desired capacity, as a *mould*. Cover it with cement, of an inch or two in thickness; and as it hardens, draw it along, adding fresh covering of cement until the whole line is completed. In this way an expert workman will construct many rods of the pipe in a day, and it will cost comparatively but a trifle. This pipe is very strong and durable, and conducts water without any deleterious contamination.

A SEVERE TEST FOR A LIGHTNING ROD. — A powder magazine at Venice, containing 300,000 kilogrammes of gunpowder (about 300 tons) was struck by lightning this summer. The platinum point of the lightning-rod was melted, and the rod split and twisted, but the electric charge was safely conducted to the earth without doing any other damage. That lightning-rod may be said to have saved a city, for the explosion of such a quantity of powder would have laid all Venice in ruins.

A FOOL'S PERSISTENCY. — The truth of Solomon's assertion as to the result of the pulverization of a fool in a mortar was admirably illustrated in England not long ago. A Mr. John Hampden, of Swindon, offered the scientific world a wager of £500 that the surface of water was perfectly level. The wager was accepted by a man of no less note than Mr. A. R. Wallace. The trial was carefully arranged, and Mr. Wallace was of course successful in demonstrating a distinct convexity of the water of the Bedford Canal between two points selected by the parties. The arbitrator handed over the stakes to Mr. Wallace, and we might suppose that Mr. Hampden would be wiser as well as poorer for the experience. Not a bit of it. On the contrary, he publishes a pamphlet, of which the following is the title-page: —

"*Is Water Level or Convex after all? The Bedford Canal Swindle Detected and Exposed.* The Controversy ended, as all such impious frauds must end, in victory for truth, and the defeat and disgrace of those who oppose it. 'Knowest thou not this of old, since man was placed upon the earth, that the triumphing of the wicked is short, and the joy of the hypocrite but for a moment?' — JOB xx. 4, 5. Swindon: Alfred Bull, Printer, Victoria Street. 1870."

In this precious production, which will doubtless be immortalized in some future "Curiosities of Literature," he uses more of invective than of logic, and abuses without stint all the parties concerned in deciding the wager against him. Of Mr. Walsh, the editor of the *Field*, who was the referee, for instance, he says: — "Take these editorial functionaries away from their scissors and paste-pot, and they are found to be as great blockheads as other men — mere slaves to the popular taste, and most of them as venal as any hireling in existence. There is no doubt some moral or pecuniary pressure was brought to bear on the late decision, and, like all cowards, Mr. Walsh was afraid to uphold the truth, and the palpable evidence of the reports against the array of scientific opinion which he knew would be down upon him in the event of his giving judgment favorable to the anti-Newtonian theory." He speaks of scientific men as a class who, "next to horse-dealers and jockeys, bear the reputation of being the most tricky and unscrupulous in their assertions;" and generally he speaks of Mr. Wallace, by implication, as a liar, a cheat, and a swindler.

It will be noticed that the pamphleteer puts a scriptural motto on his title-page; but we cannot

help thinking that a more appropriate one would have been the aphorism of Solomon's to which we alluded in the beginning of this note.

LUNAR HEAT. — Some recent observations upon this subject have been made in Paris, by M. Baille, at the Ecole Polytechnique, and M. Marié-Davy at the Paris Observatory. The former employed a concave mirror of 39 centimetres aperture to condense the moon's rays upon his pile, and also made use of a Thompson's galvanometer. The one conclusion at which he arrived was, that the full moon, at Paris and in the summer months, gave as much heat to his pile as a radiating surface 6.5 centimetres square, maintained at boiling-water temperature and placed at a distance of 35 metres.

CHEMICAL TRANSMUTATIONS. — Linen can be converted into sugar; sugar into alcohol and carbonic acid; alcohol into ether and water. Sugar can also be converted into oxalic acid; and likewise into pure charcoal and water. Alcohol will readily change into acetic acid, or vinegar. Coal-tar is transformed into dyes that surpass the Tyrian purple of old. Starch may be transmuted into gum, alcohol, sugar, vinegar, or oxalic acid; and these are but a few of the magical changes which modern chemical science has made "familiar as household words."

LAWS GOVERNING DISTILLATION. — Volatility alone does not determine which of mixed liquids will distill over first. Quantity has something to do with it. If the less volatile be in large excess, it tends to come over with the other. But there is still another law. The comparative density of the vapors produced affects the result; the denser vapor having a tendency to be evolved in greater quantity. Dr. Van der Weyde thus closes an article on this subject in *The Technologist:*

"These facts prove that the amount of vapor developed from liquids is regulated by volume and not by weight, or, in other words, that of two liquids possessing the same boiling point, but of which the densities of the vapors differ, the same volumes of vapors will evolve, and that, consequently, the liquid emitting the densest vapor will evaporate in larger quantity; or that if there be two liquids of which the boiling points differ, and that with the lowest boiling point possesses the lightest vapor, the greater volume of the vapor generated from the latter will produce less liquid after recondensation than the lesser volume of the vapor evolved from the less volatile liquid, the latter thus more than compensating the former, and resulting in the apparent anomaly that from a mixture of two liquids of different boiling points, the least volatile may sometimes distill over in the largest quantity."

CLEANSING SOLUTION.

A VERY cheap and simple fluid for removing grease-spots from woolen clothes may be made by dissolving one ounce of crystallized carbonate of ammonia (the sesquicarbonate) in one pint of water. Scour the woolen fabric with a piece of cloth or sponge wet in this solution. It is not necessary to follow the solution with water, or to do anything but let the cloth dry spontaneously. As the sesquicarbonate of ammonia of the shops is apt to have lost part of its ammonia and to have become an inert bicarbonate, we advise adding to the above solution one drachm (a teaspoonful) of aqua ammonia.

Made thus, the preparation does not really cost, *for materials*, more than three or four cents a pint, though, of course, it costs more to prepare and dispense it. But a grease-spot removed by it never reappears. Of the hundred preparations for this purpose which we have made and tried, none has ever been so efficacious. C.

COTTON-SEED OIL AND SPONTANEOUS COMBUSTION.

THE president of one of our large insurance companies sends us the following note: —

"The JOURNAL OF CHEMISTRY recently contained an article on cotton-seed oil, in which you speak of its being used for adulterating olive-oil. I wish to inquire if cotton-seed oil is not dangerous, as specially liable to spontaneous combustion. A large manufacturer in this vicinity informs me that he has abandoned the use of olive-oil because he has had several instances of spontaneous combustion occur from the use of it as adulterated with cotton-seed oil. Your articles on kerosene oil have been very valuable to insurance companies, and you will confer further favors upon them and the community by giving your views upon the above points."

REMARKS. — We suppose our correspondent wishes to inquire if cotton-seed oil, when used in connection with rags, cotton waste, saw-dust, etc., is not liable to cause spontaneous combustion. No oils by themselves in quantity will ever spontaneously ignite. They must be spread about or subdivided so as to present to oxidizing agencies a large extent of surface, as they do when cotton fibres or saw-dust are saturated with them. As regards cotton-seed oil, we have not yet been able to subject it to experiment; but we think it is much more dangerous than animal oils and fats, or olive-oil. Linseed-oil has been regarded as the most hazardous; but we judge from its nature, and the source from whence it is derived, that cotton-seed oil is equally dangerous.

We think many more fires are caused through the agency of oily rags than is generally supposed. Painters, grainers, and varnishers should be watched constantly by builders and owners of buildings who employ them, as they often throw oily rags into dark corners, where they spontaneously ignite and cause serious conflagrations.

LITERARY NOTES.

THE Harpers have published an *Index to Harper's New Monthly Magazine*, Vols. I. — XL. An examination of its pages will show the encyclopædic comprehensiveness and variety of the forty volumes. For those who can afford to buy but few books, the set furnishes quite a complete "Family Library." It would not be easy to find anywhere else so much good reading at so moderate a cost.

We are informed that the same house will soon publish Shakespeare's *Merchant of Venice*, edited with Notes by W. J. Rolfe, A. M., formerly Head Master of the High School, Cambridge, Mass. It is to be handsomely printed and illustrated, so that it will be a very pretty little book, even if it has no other merit. It is intended for household reading, as well as for educational use.

Messrs. Scribner & Co. have completed their cheap reprint of Froude's *History of England* with Vols. XI. and XII., and Mommsen's *History of Rome* with Vol. IV. The latter contains an excellent Index, which gives it a decided advantage over the English edition. Two new volumes of the "Library of Wonders" have also appeared: *Light-houses and Light-ships*, and *The Wonders of Acoustics*. The former appears to have the English wood-cuts, which are very good, and is every way commendable; the latter is quite inferior in its illustrations, — apparently cheap copies from the French originals, — and the mechanical execution generally is below the average of the series. We note some palpable misprints, as "rat" for "ut" in the old Latin Hymn of St. John, from which the names of the musical notes were taken.

In giving an account of buildings badly constructed for acoustic purposes, the author says: "In the Church of St. Paul, Boston, which has the same defect, the preacher's voice *can only be heard once a year*, on Christmas Day, when it is decorated in such a way that the arches are less sonorous." For the sake of the worshippers at St. Paul's, we hope that this statement of the case is not literally exact.

Notices of several other books are unavoidably deferred.

THE DEVELOPMENT OF SPECIES BY NATURAL SELECTION.

WE hear a great deal about this "theory of natural selection," which is gaining general acceptance among scientific men; but many people have very crude notions concerning it. The doctrine, concisely stated, is simply this: that all the varied species of plants and animals have been developed from a few simpler forms by natural processes; that the surrounding conditions of climate, etc., produce modifications, and those are perpetuated which suit the varied conditions. In other words, nature does just what man does when he produces new varieties. Some people are terribly afraid of the doctrine, because they suppose that it dispenses with creative action; whereas it really teaches that the creative power is everywhere present, acting now and forever, instead of acting once for all. Rightly understood, it teaches, as the great Teacher taught, "that the sparrow falls not to the ground unheeded by its Father and ours; that each springing seed, each blade of waving grass, and the humblest insect, whose life is but a summer day, is part of a great whole pervaded by the universal life, of which these different forms are the actions and development."

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — home science, arts, agriculture, medicine, etc. — will be answered under this head, but *only when the subject is one of general interest to our readers*.

S. J. S., MEDFIELD, MASS. "Since putting in the galvanized iron pipe, our tea-kettle is lined with an insoluble grayish white crust, after boiling the water in it. . . What is this powder?" It is probably carbonate of zinc, which has been removed from the zinc covering of the pipe by the action of carbonic acid upon the metal. The same morning on which your inquiry was received, *three other* instances of like character came to our knowledge. It is quite time this miserable business of using galvanized iron pipes for water conduction was stopped.

S. C. T., BRANDON, VT. A leather strop used for improving the cutting qualities of razors does not accomplish that end so much by wearing away the hard steel as by adjusting the edge, so that it can act directly upon the beard. The fine edge of a razor, when examined by a microscope of high power, resembles a *saw*, the teeth of which are jagged and irregular. The strap adjusts these thin bits of steel, so that they stand in line, and they then can *saw off* the beard with greater facility.

J. T. K., HADDAM, CT. The enlargement of the tonsils in children is a very common affection, and should excite no uneasiness. The operation of removing them is by no means severe, not so much so usually as extracting a tooth. Sometimes astringent gargles will afford relief; but if the difficulty is chronic or persistent, removal is the only cure.

M. R., CONCORD, N. H. You should correspond with *Messrs. Lebosquet Bros. of Haverhill, Mass.* This house constructed the wrought iron furnace used by us last winter, and the work gave entire satisfaction. As stated in the last JOURNAL, we have confidence in their skill and integrity, and no other parties will be likely to construct it as well. They have had experience, and now possess all the facilities for its manufacture.

H. B., INDIANAPOLIS, IND. Your inquiry is of the character of hundreds which we receive, and to which we cannot reply. The information you seek is solely for your personal benefit, and therefore we can give it no consideration.

A. O. N., writes us from Norway, Me., as follows: "In my family we use water drawn through 100 feet of galvanized iron pipe. Since it was put in, the whole family have been troubled with *very sore mouths*. It appears different from common canker, having a more extended and severe inflammation. Is this due to the galvanized iron pipe?" Probably the zinc salt formed in the water is the *chloride*, which has *caustic* properties of ex-

traordinary character. The affection of the mouth which you describe is precisely what we might expect to result from using water containing minute quantities of chloride of zinc.

F. C., Springfield, Mass. To present fully the methods of detecting adulterations in cider, vinegar, spices, and articles of food, would require the space of a book. We have only room in the Journal for brief explanations.

C. W., Tully, N. Y. The ashes from blacksmiths' shops are coal-ashes, and have no more fertilizing value than the same kind of ashes from other sources. They are worth but little.

J. O. W., Chicopee, Mass. The *jute* used so generally by the ladies in the place of hair is probably not very liable to become infested with animal life, and yet such instances have occurred. One marked case has come to our knowledge, and caused the lady great inconvenience and alarm. If we belonged to the "better part of creation," we would not pile this fibrous material upon our head, even if it is fashionable to do so.

D. N., Jackson, Mich. No; rain-water is not so well adapted to culinary use as spring-water. Rain-water is very nearly pure, and pure water is not adapted to the wants of the system. Wash your floors and clothing in rain-water, but seek spring or pond water for drinking purposes.

E. M. A., Ripley, Miss. The hydrate of chloral does not appear to produce injury when long continued, and in most instances it does not lose its hypnotic effects. Still, we do not approve of taking any kind of medicine longer than it is absolutely needed.

J. V. D., St. Lawrence, Wis. All the chemical substances for removing superfluous hair from the face are uncleanly, and often produce disagreeable effects upon the skin. We know of nothing which we should be willing to recommend for the purpose.

F. A. M., New Sharon, Mo. The specimen you send of an article sold to the farmers of your section, for "improving cattle, horses, sheep, hogs, etc., and for increasing the milk of cows," is mostly composed of *ground linseed.* It has a little bitter principle added, which appears to be that of *gentian.* Linseed is excellent for improving the condition of animals, and promoting a flow of milk; but when you purchase it of a charlatan, who charges "$3.00 for a box holding five pounds," you are certainly *cheated.* Now, we appeal to your common sense, is it not preposterous to suppose that any "peddler" or other person can furnish a substance in a *five-pound package* worth $3.00 for feeding to animals? Farmers and others must not be so *easily duped.* They must not allow their hard earnings to be filched from them by designing men. Use a little "common sense."

B. M. A., Potsdam, N. J. Salt is of no use to soils when used alone. Indeed, in our experience its application has injured the crops.

D. E. T., Rouse's Point, N. Y. Hydrate of chloral undergoes change, if mixed with water and other substances, and is allowed to remain for several weeks. For use in the case of infants, the crystals may be dissolved in anise-seed cordial, or some other pleasant aromatic.

J. W. A., Pawtucket, R. I. Flax-dust from flax-mills, we think, must have considerable fertilizing value. It is certainly worth experimenting with.

J. B. L., Fort Smith, Ark. The deposit of black oxide of manganese to which you refer may become of some value if the use of oxygen increases. At present the article is so cheap in the market, it will hardly pay to open up new sources of supply.

S. B., Deerfield, N. H. Kerosene barrels cannot be cleansed so as to be suitable for cider or any other beverage. — We prefer to apply top dressing on grass lands, early in the spring.

L. M. D., Northampton, Mass. The seed-corn we furnished to several farmers last spring, and we learn that it has proved very satisfactory. We did not suppose that it had any special excellences; but we think from our own great success in corn-raising, and that of others who used the seed, that it is worthy of attention as an early and prolific variety. We call it the "Boardman" corn, from the name of the gentleman who furnished us the seed. Our corn crop the present season has ripened splendidly, and the ears are perfect. We can furnish you, and any of your neighbors, with what seed you may want for next season's planting, at the price seedsmen may fix upon.

D. E. B., Portland, Me. If proper care and skill are exercised, cider can be manufactured of a quality equal to the best of wine. In the first place, make it late in November, so that the fruit may ripen; second, cast out of the heap all that are decayed, and then with a hose-pipe, if you have water-head, wash the apples clean. Grind fine, press, and barrel the juice the same day. Strain it into the casks from the press, through coarse sand — the layer three or four inches thick. Put the casks into a moderately cool place, and watch the fermentation. As soon as the first fermentation is completed, and when the cider is sparkling and sweet, add to each barrel four ounces of isinglass, or fish-glue, dissolved in one gallon of warm cider. Turn it into the bung-hole, leaving ample space for it. (At least two gallons should be drawn from the cask.) What is known as "Cooper's" isinglass is the best. At the end of a month, the cider will be ready to bottle, or to rack off into a sweet clean cask for use. The tap should be about four inches from the bottom of the cask in drawing off, and all below rejected. If the cider is not drawn off, put into the cask six ounces of sulphite of lime (Horsford's) after fermentation. This will keep it sweet.

Medicine.

WHO IS TO BLAME?

We recently made a brief call upon a first-class apothecary in a neighboring city, who does a large prescription business. The clerks and proprietors were busy behind the counter making up prescriptions from shelf bottles, apparently with as much indifference to the responsibilities of the work as the farmer engaged in digging his potatoes or husking his corn. Everything was working smoothly, until one of the clerks was observed to put down the bottle which he held in one hand, and take the prescription which he had in the other to the proprietor, when, after a short consultation, the work was resumed, and the prescription completed. We begged permission to look at the prescription. It read as follows: —

℞. — Elix. Proprietatis . . . ℥ij.
Aqua . . . . . . ℥ij.

The inquiry made by the clerk was, whether the word "aqua" *meant* water or "something else." He was told it meant *aqua ammonia*, and that agent was used in the mixture. This procedure seemed to be so much a matter of course that we ventured to inquire if such liberties were often taken with prescriptions, and the reply was, "Yes; we often have to correct physicians' blunders, and we are obliged to *guess* at their meaning very often." "In substituting ammonia for water, what *strength* of the agent did you use?" we asked. "Oh, the *common* strength.' We did not venture to make further inquiries, although perplexed to think that after an experience of twenty years in manufacturing the agent, we were ignorant of the nature of that of "*common* strength." Now, as regards this prescription, it is hardly presumable that the physician meant to add *water* to the tincture of myrrh and aloes, although that was demanded. Obviously the document was *carelessly* written, and the word "ammonia" omitted. Assuming that the apothecary was right in his *guess* at what was meant, how improper and dangerous is the custom of taking such liberties! Then, again, look at the recklessness of using aqua ammonia of *unknown strength.* It might have been of 26° B., or it might have been of but 3°. This case illustrates the carelessness of the physician on the one part, and the boldness or recklessness of the apothecary on the other. We have good reasons for believing that such instances are by no means rare; and in view of the serious consequences which have resulted and which are liable to result from them, we are led to ask, Who is to blame?

The druggists as a class in this country are wonderfully sagacious, and cannot be excelled in quickness of perception; but they learn the "trade" too imperfectly. The basis upon which rests the fabric of American pharmacy is indeed peculiar. The free-and-easy way in which our young men without education, without proper qualifications, slide into the business of the apothecary is one of the singular things in this singular country. There are no laws regulating pharmaceutical matters; nobody inquires into the qualifications of those who come forward, "open shop," and presume to dispense medicines. The business, so far as the public and we may say physicians concern themselves, is unfortunately on a par with other departments of trade.

It is a matter of regret that we have no schools of instruction of a sufficiently high an reputable character, to which young men ca resort and fit themselves for the duties o the profession. There are plenty of "Col leges of Pharmacy," so called, in almost ever city and large town; but they are of a char acter hardly to command attention or respect What is needed are schools with teachers of high order, men who are thoroughly acquainte with practical science in all its branches. Th course of instruction should be as thorough an systematic as a college course of study; and thos who cannot learn pharmaceutical chemistry i its practical details should not be allowed to as sume the duties and responsibilities of an apoth ecary. The occupation is an honorable one, an it needs to be elevated to a position where i will command the confidence and respect ac corded to the learned professions.

There is too much truth in the statements o apothecaries that many physicians are hardl competent to prescribe properly. The educatio of medical men is very defective; and in ac quaintance with medicinal agents and skill i prescribing, the druggists are often their superi ors. They acknowledge this by leaning upo them, and in being influenced and controlled b them. A physician, to be qualified properly t discharge the duties of his profession, shoul thoroughly understand the physical and chemica character of drugs. He should be able promptl to detect sophistications, and judge of the qual ity of medicinal agents. Chemistry and phar macy are very superficially taught in our medi cal schools. But little practical information i imparted in this direction. The time of study is too limited, and the standard of requirement is too low. And then again, in prescribing by written order there is unnecessary haste an carelessness, and often the chirography is s abominable that it is liable to be misunderstood It may be that an entire revolution is needed i the methods of prescribing for the sick. Ther are very grave evils connected with the presen plan, and it is easy to conceive of a better. W have some decided views upon these points which we may express at a future time.

CASES TREATED WITH HYDRATE O CHLORAL.

The Journal has so wide a circulation that it i probably read by more physicians than any othe medical publication. This is my excuse for sendin you this record of some cases treated with *chlora* I received an ounce from J. R. Nichols & Co., and judging from its effects, should think it a reliabl preparation.

An elderly lady, since dead, was suffering fro malignant disease of the stomach, with stricture o the œsophagus. The pain and nervous disturbanc were so great that she could get no sleep. Wit great difficulty of swallowing she took 20 grains o chloral in syrup. In less than half an hour she wa sleeping soundly, and breathing naturally. Sh slept seven hours, and woke refreshed, and wit no untoward symptoms. As she soon left the plac to enter a hospital in Leavenworth, I had no op portunity of repeating the remedy.

The next was a case of deep interest, and migh be called a *test case.* A married lady, thirty-seve years of age, and highly nervous organization, ha for years been subject to attacks of convulsions which, from the history, I suppose to be hysteric So severe were they that it took several persons t

ld her, and they lasted several hours, leaving her ıch prostrated. In former attacks she has been rtially controlled by chloroform. I learned that ere were always well-marked premonitory sympms, and, being in attendance on a sick child of rs, recommended that chloral be procured, and 20 ains in syrup be administered on the occasion of e next attack. It was but twenty-four hours be-e all the symptoms showed themselves. The loral was administered, and in a short time she ept. All nervous disturbance disappeared, and in c hours she woke, feeling refreshed and well. hough this was six weeks since, she has as yet had return of attack.

I am now giving the chloral to a child of five ars for epilepsy. There is a distinct aura, man-sted by pain in the top of the head. As soon as e first symptoms appear, she takes eight (8) grains syrup, — she sleeps for from three to seven hours, ring which the nerves are quiet, and she wakes though nothing was the matter. Since she has ken it, now four weeks, there has been but one veloped paroxysm, and that was in the night, and e symptoms, instead of appearing from once to ice a day, are from four to five days apart. I ve great hope that by persistently watching and lowing up the treatment, and thus arresting the roxysms, the system will fully react, and a radi-l cure result. BENJ. WOODWARD, M. D.

WYANDOTTE, Kansas.

ERYSIPELAS.

My attention has been drawn to an article in the URNAL entitled "A Specific in Erysipelas," ac-edited to *Medical and Surgical Reporter.* I n testify as regards the "*specificity*" of one of e ingredients entering into the combination recom-ended by Dr. Garretson, to wit, sulphate of inine. In the May number of the *New Orleans Medical and Surgical Journal* for 1867, I contrib-ed an article on erysipelas, in which I spoke of inine as the remedy *par excellence* in that disease. y method of using it is by inunction, covering the flamed parts thickly by an ointment made by com-ning sulphate of quinine with lard, taking up as ıch of the quinine with the lard as possible. My actice with it has been uniformly successful. ery likely the muriated tincture of iron would be good adjunct, as the tincture of cinchona certainly ould be, acting as additional tonics.

The opinion advanced by me in the article al-led to was that erysipelas originates from a cryp-gamous plant of the order *Fungi* which I desig-ted as *fungus erysipelatosus.* This plant distrib-es its sporules, which take root only on a soil, so speak, adapted to its growth.

I have noticed such a resemblance between the flammation of erysipelas *per se* and that produced the poison oak, that I am led to the belief their igin is the same. In this section of the country Central Louisiana) the poison oak grows abun-ntly. Erysipelas is very common here, and in most stances it is difficult to distinguish it from the in-ammation produced from the oak. Indeed, there nothing to distinguish the latter, except the fact actually having come in contact with the oak, and the inflammation making its appearance immedi-ely afterwards. Inunction with quinine readily res the poison from the oak.

The same rules which govern in erysipelas gov-n also in inflammation from the oak. The oak is obably milder; and while it may not be identical th erysipelas, it is probably a species of the same der. I speak exclusively of the poison, taking the ound that is a parasite belonging to the oak.

The sulphate of quinine acts by destroying the tality of the sporules; and if the doctrine of Dr. alisbury of Ohio be correct, that malarial disease iginates in the same way from a cryptogam, then the theory of quinine destroying the vitality of the sporules will apply to its remedial effect in intermittents.

I would remark *en passant* that the hydrate of chloral I obtained from your laboratory is the most perfect medicine in its way I ever used.

J. F. GRIFFIN, M. D.

EVERGREEN PARISH, La., *September* 22, 1870.

TINCT. FERRI CHLOR. IN ERYSIPELAS.

DR. T. TEMPLE, of Amherst, Mass., writes as follows regarding the use of this remedy: —

"In the September number of the JOURNAL OF CHEMISTRY is an interesting article taken from the *Medical and Surgical Reporter*, entitled "A Specific in Erysipelas." Permit me, if you please, to say through your columns that I have used the muriated tincture of iron as an external remedy during the last eight years, and with the same uniform success that Dr. Garretson claims for his formula of Tinct. Ferri Chlor. combined with Tinct. Cinchonæ and Sulph. Quiniæ, though not with such instantaneous relief as he represents in his cases. I have long been convinced that the Tinct. Ferri Chlor., as an external remedy, was far superior to Tinct. Iodine or Nitr. Silver, which have been so extensively used heretofore in that dreaded disease. The late Dr. Gray of Springfield, Mass., was a firm believer in the Tincture of Iron treatment for Erysipelas, and used it, both externally and internally, with the most satisfactory results. Whether the combination of Cinchona and Quinine with the iron adds to its efficacy, or not, is a matter that may need to be determined. The effects of the muriated tincture alone as an external application have been entirely satisfactory, so far as my experience is concerned; and the testimony of other physicians who have used it confirms my own. I think it is as nearly a specific for Erysipelas as any remedy known is for any other disease. If any of my medical brethren who give the remedy a thorough trial, desire to return to the old plan of treatment again, their experience will be worth relating."

INTRATISSULAR INJECTION OF CHROMIC ACID FOR THE DESTRUCTION OF TUMORS PROBABLY MALIGNANT. — In the *Philadelphia Medical and Surgical Reporter*, June 18, 1870, Dr. Daniel Leasure of Alleghany City gives an account of a tumor of the neck (probably malignant) treated by the injection of chromic acid. It was situated on the right side, one inch and a half by two inches and a half longest diameter. On the 17th September, 1869, it was injected by a hypodermic syringe with sixty drops of a solution of chromic acid, 100 grains to the ounce of water.

On the day following and on the third day it was injected as before. No serious irritation. On the 30th September repeated, the tumor softening. 17th October, the same. 15th November, the tumor had collapsed. An opening formed, and matter was discharged. Poulticed, and on November 29th, reported well. There was a small cicatrix, three lines in diameter, at the seat of the late opening, which so closely resembled in color the surrounding skin as to be scarcely noticed. In June, 1870, no sign of return. Two other similar cases treated with like success. The use of chromic acid in this manner is new. Acetic acid was suggested by Dr. Broadbent, but with unsatisfactory results. We look on Dr. Leasure's report with the greatest interest, deeming the action of chemical substances on living heterologous tissues a subject yet unexplored, still of very great promise of usefulness. *

The anatomist who has discovered a new muscle in the human body has taken out a patent, and no one can use the muscle without paying royalty.

MEDICAL MEMORANDA.

THE good results of compulsory vaccination in Ireland are shown by the fact that there was but one death from small-pox in the whole island during the last three months. — A foreign medical journal recommends chewing the leaves of the olive tree as a remedy for laryngitis. — Eight cents is the regular fee of a "regular" Chinese doctor in his native country. — A recent royal decree permits women to practice medicine in England, after passing the ordinary examination.— Dr. Ballot, a Dutch physician, prefers buttermilk to sweet milk for infants that cannot be nursed by the mother; it is boiled for a few minutes with a little wheat flour and sugar. — The *Pharmaceutical Journal* recommends, as a good general excipient for pills, two drachms of powdered tragacanth and six drachms, by measure, of glycerine, mixed in a mortar. It soon becomes a firm, tenacious mass, which keeps well, and but a small quantity is required, even with such substances as quinine or iodide of potassium. Pills made with it do not become hard. — In Vienna, opening abscesses under water, and applying plaster of Paris, is being tried with satisfactory results. — Kerosene oil is recommended as an antidote for bee-stings; and, according to other authorities, it is an excellent application for burns and scalds. If the liquid can be used to neutralize a part of the mischief it causes, let us be duly grateful. Will our homœopathic friends claim it as an instance of *similia similibus?* — By order of govenнment, the chief alkaloids of Peruvian bark have been tested in India in 2,472 cases of fever; and the result, as stated in the *Medical Times*, is that the sulphate of quinidia has an antifebrile power equal to the sulphate of quinia; that the sulphate of cinchonidia is slightly less efficacious; and that the sulphate of cinchonia, though inferior to the others, is a very valuable agent in the treatment of fevers. — A Prussian chemist has devised a process for detecting *strychnia* by saturating the suspected substance with ammonia, and allowing it to dry spontaneously; then heating it with a little amylic alcohol, and adding a few drops of the liquid to sulphuric acid and bichromate of potash; when, if strychnia be present, the well-known coloration characteristic of the alkaloid will be obtained. —In Birmingham, Eng., a druggist named Weston was fined 20 shillings for neglecting to have his child vaccinated; and W. D. Hall, a "herbalist and anti-vaccination lecturer," for a similar offense, was mulcted in the same amount. The magistrates also ordered the children to be vaccinated. — We find the following useful hint in the London *Chemist and Druggist:* "As it is of importance in the use of lunar caustic to have it free from all infecting matter from previous use, I took some common matches, and cut off the igniting portion; I then dipped their ends into lunar caustic, melted; by so doing, I obtained what I called caustic matches, which enabled me to use a fresh piece of caustic daily, free from infecting matter, which would not be the case if the same piece of caustic were used repeatedly, and not carefully cleansed. Besides which, this plan enables a minute point of caustic to be ready at any moment when required."

POPULAR SUPERSTITIONS IN ENGLAND.

A clergyman, writing to "Notes and Queries," gives the following sketch of a dialogue between himself and an old dame of his parish: —

"*Parson* — Well, Dame Gray, I hear you have a charm to cure the toothache; come, just let me hear it. I should be so much pleased to know it.

Dame — O, your reverence, it's not worth telling.

[Here a long talk — parson coaxing the dame to tell him — old lady very shy, partly suspecting he is quizzing her; partly that no charms are proper

things; partly willing to know what he thinks about it.] At last it ends by her saying —

"Well, your reverence, you have been very kind to me, and I will tell you: It's just a verse from Scripture as I says over those as have the toothache: 'And Jesus said unto Peter, what aileth thee? And Peter answered, Lord, I have toothache. And the Lord healed him.'

P. — Well, but Dame Gray, I think I know my Bible, and I don't find any such verse in it.

D. — Yes, your reverence, that is just the charm. *It's in the Bible* but *you can't find it!*"

He also gives the following popular recipe for the whooping cough: —

"I know," said one of my parishioners, "what would cure him; but m'appen you wouldent believe me." "What is it, Mary?" I asked. "Why, I did everything that everybody teld me. One teld me to get him breathed on by a pie-bald horse. I took him ever such a way, to a horse at ———, and put him under the horse's mouth; but he was no better. Then I was teld to drag him backward through a bramble-bush. I did so; but this didn't cure him. Last of all, I was teld to give him nine fried mice, fasting, in a morning, in this way: three the first morning; then wait three mornings, and then give him three more; wait three mornings, and then give him three more. When he had eaten these nine fried mice, he became quite well. This would be sure to cure your child, sir."

TO MAKE SUGAR-COATED PILLS.

The *Druggists' Circular* gives the following method of imitating the sugar-coated pills that are made on a large scale: "Take the white of an egg, and in an evaporating dish beat with it as much powdered sugar, passed through a very fine sieve, as will make rather a thick fluid. Then place it in a water-bath and evaporate to dryness, stirring constantly, that no sugar may be deposited. Pulverize and set aside for further use, marking it "Albumen c. Saccharo," or similarly. When pills are to be coated, they first must be rolled (in a mortar) in an ethereal solution of balsam of tolu, in order to prevent the coloring of the sugar; and besides this, the coating will dry more rapidly, the pills become firmer, not being able to absorb the water (moisture) of the "paste." From the mortar the pills are transferred to a sheet of writing-paper, with the sides bent upwards, shaking being continued till they are perfectly dry. Then to a small quantity of the saccharated albumen add a few drops of water, at the same time beating for a short while, so that a thick paste will be formed. Into this mass the pills are stirred, and, when moistened on all sides, quickly poured into a wooden pill-box, which has been previously filled about one third with the finest powdered sugar obtainable, and immediately shaken, or rather rolled, in a lively way and with great force, separating from time to time those cohering. When no more sugar will adhere, they are dried over a gentle fire, taking care not to bring them too near the stove, lest they should crack. Shaking, of course, must be continued till dryness is effected. If necessary, the sugar coating is repeated. No tin box must be employed, for then the pills will be turned black. Glass is too smooth."

"MIXED CHOCOLATES." — A colored *brother* called at a drug-store saying, "Missus wants two ounces mixed chocolates." The druggist asked if he was sure "missus" said mixed chocolates. "Yes, sah — sure, the baby is sick, and she wants two ounces mixed chocolates." The medicine man resorted to the usual oracle provided for such occasions, namely: "What sounds most like it?" — "Ah, your missus sent you for chalk mixture, did she?" "Ye — yes, sah — dat's so."

POISONOUS EFFECTS OF ORANGE-PEEL.

Dr. GIBBONS writes as follows to the *Pacific Medical and Surgical Journal*: "Many years ago we had in charge two little girls, sisters, four and six years of age, who were seized with violent inflammation of the bowels from swallowing the rind of the orange. One of them died in convulsions, and the other had a narrow escape. Since that time quite a number of instances similar in character have come under our observation. Quite recently we have seen a child, something over a year old, that was attacked with violent dysenteric symptoms, for which no cause could be assigned. The symptoms were so identical with those which we had previously noticed to arise from poisoning by orange-peel that we were induced to inquire particularly if the child had an opportunity of getting this substance in its mouth. We were informed that it had been playing with an orange and nibbling at it just before the attack of disease. The discharges from the bowels were frequent and painful, and consisted of blood and mucus. After a week of severe enteric inflammation, the child died. We have no doubt that the disease was brought on by the rind of the orange. Though but a small quantity must have been swallowed, yet a very small quantity of such an indigestible and irritating substance will often produce the most serious consequences. The oil of the rind is highly acrid, and adds greatly to the noxious quality of the indigestible mass. We learn that it is a common practice among children at some of our public schools to eat the rind, and that juvenile merchants have been known to trade off the inside of the fruit for the skin."

POPULAR POMADES.

Cold Cream.

Spermaceti	$2\frac{1}{2}$ ounces.
White wax	1 ounce.
Oil of sweet almonds	10 ounces.

Melt over a water-bath, and pour into a mortar. Triturate and beat until a white cream free from grains is obtained, adding by degrees —

Triple rose-water	2 ounces.

Towards the end of the operation perfume with —

Oil of rose	10 drops.
Tincture of benzoin	5 "
" " ambergris	2 "

Beat again. The more it is beaten, the whiter and better it will be.

Pomade a la Sultane.

Spermaceti	2 ounces.
White wax	1 ounce.
Oil of almonds	4 ounces.
Rose-water	1 ounce.
Mecca Balsam	4 drachms.

Melt together over a water-bath the wax, spermaceti, and oil. Pour into a marble mortar, and beat until homogeneous. Lastly, add — beating all the time — the balsam and rose-water.

Pomade with Butter of Cacao.

Prepared grease	8 ounces.
Almond oil	5 "
Butter of cacao	10 "

Melt; pour into a mortar; triturate well, and perfume with essence of vanilla.

Pomade to Paste Wigs.

Isinglass	1 ounce.
Water	8 ounces.

Melt and add —

Alcohol	8 ounces.
Tincture of benzoin	3 "
Turpentine	2 "

Place over a water-bath, and mix.

Druggists' Circular.

MEDICAL MAGAZINES FOR OCTOBER.

The New York Medical Journal has original communications on Sympathetic Ophthalmia, by Dr. R. Pooley; Embolism in its Relation to Disease, by Dr. W. Coles; the Relations between Physicians and Apothecaries, and between these and their Respective Patients and Patrons, by Dr. J. H. H. Burge; the Influence of Excessive and Prolonged Muscular Exercise upon the Elimination of Effete Matters by the Kidneys, by Prof. A. Flint, Jr.; and on the Early Symptoms and Treatment of Pott's Disease of the Spine, by Dr. J. A. Wood.

The American Practitioner has leading articles on Pelvic Rachitis, by Dr. J. T. Whittaker; Hydrate of Chloral in Insanity, by Dr. J. Rodman; Malarial Fevers and their Treatment, by Dr. J. Hale; Immovable Apparatus in Diseases of the Knee-joint by Prof. R. O. Cowling; a Case of Cholera Infantum by Dr. B. M. Wible; and on a case of Ovariotomy by Prof. D. W. Yandell.

In the *Chicago Medical Journal*, Dr. I. N. Danforth discusses the Cell Theories of Huxley and Virchow; Dr. A. R. Jackson, Non-Ovarian Menstruation; Dr. J. E. Thornburgh, Scorbutic Dysentary; Prof. D. T. Nelson, a Case of Fracture of the Spine; Dr. D. Greenberger, Teaching the Deaf and Dumb to Speak; and Dr. J. E. Harvey, Cerebro-Spinal Meningitis.

Most of our medical exchanges for the month fail to reach us before we go to press.

NÉLATON. — A good anecdote is told of Nélaton. Going through one of the streets of Paris one day he came upon a crowd standing in front of a drug store. There a man lay stretched out who had been terribly wounded in the abdomen by a sharp buggy shaft, so that a large part of his intestines protruded. His life could be saved only by a very difficult and dangerous operation; but Nélaton was equal to the occasion; and soon his patient, quite a wealthy man, was sent home out of danger. For three weeks Nélaton heard nothing more of him; but then he made his appearance, and asked his preserver how much he owed him. "Hundred and fifty francs," replied the surgeon. "That is too much," said the man, "but give me a specified bill: here is your money." Nélaton sat down and wrote as follows: "For adjusting a metre and a half of the intestinal canal, at a hundred francs per metre, one hundred and fifty francs."

MEDICAL FEES IN PRUSSIA. — These are regulated by law on decidedly economical principles. For a first visit within the city limits, a physician is allowed to charge from 50 cents to \$1; for each subsequent visit, 25 to 50 cents; if at a distance of from one to five miles from town and suburbs, his first visit may be from 75 cents to \$1.50, and subsequent ones from 50 to 75 cents. For a first visit at night he gets, if it be in town, from \$1.50 to \$2.25; if more than a mile out of town, from \$2.25 to \$3; following night visits being, in town from 75 cents to \$1.50, in the country from \$1.12 to \$2.25. He may not charge for more than two visits a day, unless they be made by special request, nor must his fees for all attendance on any one patient within twenty-four hours, exceed \$2.25.

THE BONES OF LUNATICS. — According to a paper presented to the Pathological Society by Dr. Dickson, paralytic lunatics have always soft and brittle bones. This fact will be useful to the keepers, who will, in future, know how to explain any half-a-dozen broken ribs or so. We really think that Dr. Dickson should have waited for further researches into the subject before publishing so startling, and, for unhappy lunatics, so dangerous a generalization.

Boston Journal of Chemistry.

VOLUME V. BOSTON, JANUARY, 1871. NUMBER 7.

Familiar Science.

SPONTANEOUS COMBUSTION.

INSTANCES of spontaneous combustion are so common now-a-days that we cannot help thinking that people are becoming more careless than they used to be, or else they are ignorant of the nature and the causes of this kind of combustion. The latter, we doubt not, is more frequently the case, and this is our reason for taking up the subject here.

Our readers are aware that ordinary burning is nothing but rapid *oxidation*, or the union of the combustible substance with the oxygen of the air. But they may not all be equally familiar with the philosophy of *slow* combustion, which is a more gradual oxidation of a substance. The *decay* of animal and vegetable substances is a process of this sort. When a log of wood rots in the forest, it is as really burned up as when it blazes on the hearth of an old-fashioned fireplace. The carbon and hydrogen which make up the greater part of its bulk are oxidized in the former case, as in the latter, and the products of the combustion — carbonic acid and water — are the same. And it has been proved that the *heat* generated in both forms of burning is precisely the same; the only difference being, that in ordinary burning it is all set free in a short time, while in decay it is developed so slowly that we do not perceive it.

The *rusting* of metals is another instance of this slow combustion, the *rust* being the metal after it is burnt, or oxidized. Heat is generated in this process, as in that of decay; and if the rusting can be made sufficiently rapid (as when a large pile of iron filings is moistened and exposed to the air), the rise of temperature is readily detected. A remarkable case of heat developed in this way occurred in England during the manufacture of a submarine cable, and is described in Rolfe and Gillet's "Natural Philosophy:" —

"The copper wire of the cable was covered with gutta-percha, tar, and hemp, and the whole inclosed in a casing of iron wire. The cable, as it was finished, was coiled in tanks filled with water: these tanks leaked, and the water was therefore drawn off, leaving about 163 nautical miles of cable coiled in a mass 30 feet in diameter (with a space in the centre 6 feet in diameter) and 8 feet high. It rusted so rapidly that the temperature in the centre of the coil rose in four days from 66° to 79°, though the temperature of the air did not rise above 66° during the period, and was as low as 59° part of the time. The mass would have become even hotter, had it not been cooled by pouring on water."

In this case the heat set free caused the oxidation to go on faster and faster; and this is what occurs in spontaneous combustion, which is simply "rapid combustion developed gradually from slow combustion." There is no more common source of such combustion than the oily rags used by painters in their work, or the cotton waste used for wiping machinery. When such substances have become saturated with oil, if they happen to be thrown into a heap, the oil begins to oxidize slowly; but the heat produced makes the oxidation more and more rapid until the mass bursts into a flame. Oils that oxidize readily, like cotton-seed oil, are especially liable to take fire. Oil spilt on dry sawdust has been known to ignite in the same way.

It sometimes happens that hay, cotton, and many forms of *woody fibre*, — as tow, flax, hemp, rags, leaves, spent tan, straw in manure heaps, etc., — when stacked in large quantities in a damp state, take fire spontaneously. Here the oxidation is merely that of incipient decay or fermentation, which is promoted by the dampness. The confined heat accumulates, as in the case of the oily rags or cotton, until it is sufficient to cause rapid combustion. According to M. Chevallier and others, pulverized charcoal, prepared for making gunpowder and stored in heaps, has been known to ignite, when neither oily nor damp; the very slow action of the oxygen of the air upon the charcoal itself being gradually accelerated by the heat produced until it set it on fire.

Whether grain or seeds of any kind be liable to spontaneous combustion is doubtful; though several French savants came to the conclusion that a barn had caught fire from the spontaneous ignition of damp oats stored in it. But however that may be, it will be evident from the facts we have given that many fires, involving great destruction of property, have been the result of spontaneous combustion; and it is probable that many conflagrations ascribed to incendiarism have really owed their origin to the same cause.

THE AURORA.

THE brilliant auroral displays of the present season have attracted great attention on both sides of the Atlantic, and we have received several letters from patrons of the JOURNAL, asking us to take up the subject in one of our articles on "familiar science." We will therefore attempt to state as briefly and simply as possible the main facts known about the aurora, and also the most plausible theory of its nature and origin.

We will not dwell upon the various appearances which the aurora assumes. These are familiar to our readers, and besides they are so varied that space would fail us for describing them. And what description could do justice to their wonderful beauty and splendor? Even the poet's pen, dipped in the colors of the rainbow, could not transfer to paper the flashing glories that light up the whole canopy of heaven in the grander displays of the aurora; much less could plain prose hope to portray them adequately.

We may remark, however, that the most common form of the aurora is a pale diffused light near the horizon, like the first glimmering of the dawn; and hence its name, from *Aurora*, the Roman goddess of morning. In the northern hemisphere it is known as the *aurora borealis*, or "northern morning." Tennyson several times speaks of it by this simple Saxon translation of the Latin name; as in "The Talking Oak," —

> "The northern morning o'er thee shoot
> High up in silver spikes!" —

and in "Morte d'Arthur," where the gleam of Arthur's sword Excalibur is compared to "a streamer of the northern morn." The phenomenon as seen in the southern hemisphere is sometimes called *aurora australis*, or "southern morning." In its complete form it consists of a dark bank, or segment of a circle, of a hazy or slaty appearance, surmounted by an arch of light, from which luminous streamers quiver and flash upwards. These sometimes appear to unite near the zenith, forming what is called a *corona;* and sometimes several auroral arches are seen at once.

The distribution of auroras over the surface of the earth is very unequal. At Havana, but six have been recorded within a hundred years. As we travel northwards from Cuba, they increase in frequency and brilliancy; they rise higher in the heavens, and oftener reach the zenith. If our journey northward lies along the meridian of Washington, we find, on an average, near the parallel of 40°, only ten auroras annually. Near the parallel of 42°, the average number is twenty a year; near 45°, it is forty; and, near 50°, it is eighty. Between this point and the parallel of 62°, auroras are seen almost every night, high in the heavens, and as often to the south as the north. Farther north, they are seldom seen except in the south, and from this point they diminish in numbers and in brightness as we approach the pole. If we make a like comparison for the meridian of St. Petersburg, we shall find a similar result, except that the auroral region lies farther to the north than in America. In the same latitude, we have more auroras in this country than are seen in Europe.

It will be observed that the popular notion that auroras are most frequent in the extreme polar regions is erroneous. In latitude 78° the average number is but ten a year; and at the north pole they are probably as rare as at the equator.

Auroras are sometimes of vast extent, being seen at the same time in both hemispheres. That of August 28th, 1859, was visible from California eastward to Russia, and from Jamaica northward to an unknown distance in British America; and that of September 2d, of the same year, was seen at the Sandwich Islands, throughout North America and Europe, and in those parts of Northern Asia where the sky was clear;

and there were auroras at the same time in South America and Australia. The auroral displays of the past autumn appear to have been of almost equal extent.

The *height* of the aurora above the earth has been quite accurately determined by observing its elevation above the horizon from several different places. From a large number of such observations, it is concluded that the height is seldom less than 45 miles, and that it is often as great as 500 miles. Some persons have believed that they saw auroras at a height of less than one mile, or below the clouds; but it is probable that the clouds were very thin, and that the auroral light was seen shining *through* them.

Many people have imagined that the aurora is sometimes attended with a peculiar rustling or crackling *sound;* but there is no satisfactory evidence that this ever occurs. The sounds in question have probably been due to the wind, the cracking of ice and snow, or other causes independent of the aurora.

Auroras are not equally frequent at all hours of the night, or at all seasons of the year. In our latitude they increase regularly in number from sunset till about midnight, and then diminish regularly till morning. In Canada the maximum is at 11 o'clock; farther north, at midnight; and still farther north, in Arctic regions, an hour later. In this part of the world they are more abundant in summer and autumn than in winter and spring.

The number seen in different *years* is also variable. A period of about sixty years from one maximum to another has been made out with tolerable certainty, with a subordinate period of about ten years; that is, there is a maximum every ten years, and a more remarkable maximum every sixty years.

The aurora is in all probability an *electrical* phenomenon. We will state very concisely the chief reasons for this theory of its origin.

The effects of the aurora upon telegraph wires are identical with those of an electric current. *Sparks* can be drawn from the wires during the auroral display, and *heat* is also generated. The characteristic *shock* caused by electricity can likewise be obtained from the wire; and *magnetism* is developed, — in some cases so abundantly that telegraphic signals can be sent without the aid of a battery. The magnetic needle is also affected by the aurora precisely as by an electric current; and *chemical decomposition* has been accomplished by its agency. The luminous phenomena of the aurora, with their varied colors, quiverings, and flashings, may be readily imitated by sending an electric charge through glass vessels containing rarefied air.

There is found to be a remarkable coincidence between the periodicity of the aurora and that of the *variation of the magnetic needle;* and the maxima of these periods coincide, moreover, with that of *the sun's spots.* These three sets of phenomena appear, therefore, to be connected in some way which scientific men do not yet fully understand.

Some of the recent auroras have been examined with the spectroscope. The spectrum of the light is not continuous, but is made up of several lines, among which are a red and a green one that may be due to hydrogen; but further observations will be necessary to settle the question.

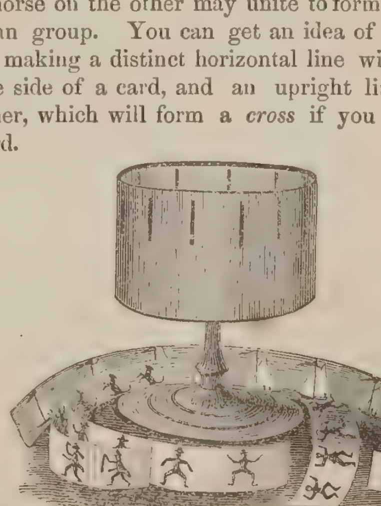
PERSISTENCE OF VISION.

In our November number, we referred to certain "curiosities of vision," but we by no means exhausted the subject. Some of the most singular optical illusions are the result of what is called "persistence of vision," and this we will make our theme to-day.

There are many paradoxes in science, and one of them is, that we see things after they are out of sight; or, to state it in a less familiar way, the impression made by light on the retina of the eye does not cease when the light is removed, but continues for about the eighth of a second afterwards. That is a very brief time, to be sure, but it is long enough to give rise to many peculiar effects. We all know that if a stick with a spark of fire on the end of it be whirled round rapidly, we see a circle of light. The end of the stick appears to be at every point of the circle at once, which of course it cannot be. "Seeing is believing," we say; but in this case, as in many others, the ancient "saw" fails us. The luminous impressions made by the spark at different points succeed one another so rapidly that they appear continuous.

We know also that when a wheel is turning very fast, we cannot distinguish the spokes. In this instance the successive impressions, being made on the same part of the retina, obliterate one another, so that instead of seeing *more* than actually exists (as with the lighted stick), we see *less* than we are looking at. It will seem to be another paradox when we assert that if we could look at the whirling wheel for only the thousandth part of a second instead of a whole second or more, we should see every spoke as distinctly as if the wheel were at rest; but we shall prove this before we get through.

Many optical toys have been made which depend upon this law of vision. The *thaumatrope* is one of the simplest of them. Two pictures are put on the opposite sides of a circular piece of card, which is twirled rapidly by means of strings fastened to opposite points of its edge. The two images combine in the eye, and we see one picture made up of the two. A bird may be put on one side of the card, and a cage on the other, and we see the bird in the cage when the card is twirled. So a man on one side and a horse on the other may unite to form an equestrian group. You can get an idea of the effect by making a distinct horizontal line with ink on one side of a card, and an upright line on the other, which will form a *cross* if you twirl the card.



The *zoetrope,** of which we give a figure, is another ingenious and amusing contrivance, the effects of which are due to the same cause. It is a cylindrical box, open at the top, turning upon an upright axis. Around the upper part of the box is a row of vertical slits. The successive positions which a moving body assumes are represented in order upon a strip of paper; and this paper is put within the box, which is then whirled rapidly. If we look through the slits, the pictures come before the eye one after another, and the impression of each lasts till the next arrives, so that they all blend together, and the object appears to be actually going through the motions depicted.

* This is a foreign invention, but a very neat form of it is made in this country by Messrs. Milton Bradley & Co., of Springfield, Mass.

The *intermittent* view of the pictures which is got by looking through the narrow slits is essential to the effect. If we look in at the top of the box, so as to see the pictures all at once as they are turned round, they will blend undistinguishably, like the spokes of the wheel in rapid rotation. The slits, by interrupting the view, limit the *time* that each is visible, and allow an interval for the perception of one impression before another is made upon the retina. The adjustment of the number and breadth of the slits, so that the successive impressions may blend in such a way that the motion may appear natural and at the same time be clearly seen, is a matter of considerable nicety.

There are many other curious things about the zoetrope, but we must not dwell upon the instrument longer; nor can we refer to other forms of it, some of which have attracted much attention from scientific men, especially Faraday, who has given the results of his investigations in the "Memoir on Optical Deceptions," in his *Experimental Researches in Chemistry and Physics.*

We have said above that if our view of a swiftly rotating wheel could be limited to a very small fraction of a second, we should see it as distinctly as if it were motionless. We can accomplish this by lighting up the wheel by an electric spark in a dark room. Wheatstone has proved that the duration of the spark is not more than $\frac{1}{24000}$ of a second; and viewed under this brief illumination, a wheel rotating at the rate of a hundred times in a second appears to be absolutely at rest. A single picture of it is formed in the eye, and the light is gone before a second impression can be made upon the retina. For the same reason, objects made visible by a flash of lightning appear stationary, no matter how fast they may be moving.

The fact that we do not cease to see objects while *winking* is of course explained by this principle of persistence of vision. The eyes are closed for less than the eighth of a second, and the impression upon the retina is renewed before it has time to fade away.

THE CIRCULATION OF MATTER.

Everything around us is in a state of change. Spring and autumn present to us annually the life and the death of the year. Vegetable nature shoots and flowers and decays, while the fruit which it bears passes into animal life, again to return to its original dust, and again to pass, in endless alternation, into new forms of life and beauty. The oak and the nettle, the poison and its antidote, the lion and the ephemeral insect, the sovereign and the serf, consist of the same matter differently combined; and the atom which to-day forms a part of any of them may in a brief period be the constitu-

ent of another, or may by turns occupy an essential place in them all. Nor is this transference of matter limited to the existing cycle. An atom which lay at the bottom of the primeval ocean may now be borne on the pinion of the eagle, and that which lived and breathed in the earliest age may now be asleep among the ashes of our fathers.

This incessant transition of matter from one phase of existence to another was well described by Bryant as

> "the circle of eternal change
> Which is the life of nature;"

and by Longfellow, in his "Rain in Summer:"—

> "Thus the Seer,
> With vision clear,
> Sees forms appear and disappear,
> In the perpetual round of strange,
> Mysterious change
> From birth to death, from death to birth,
> From earth to heaven, from heaven to earth;
> Till glimpses more sublime
> Of things, unseen before,
> Unto his wondering eyes reveal
> The Universe as an immeasurable wheel
> Turning forevermore
> In the rapid and rushing river of Time."

STORING OXYGEN.

Among the conclusions in Dynamical Geology adopted by scientists, and the inferences fairly deducible from them, are:—

1. That the earth was formerly a heated mass of liquid matter, necessarily repelling all vital gases and moisture; and that only a crust of variable thickness, at best thirty to sixty miles, has become sufficiently cooled to receive them.

2. That one half the weight of this cooled crust is oxygen.

3. That no condition or relation of elements and forces can increase, reduce, or destroy matter.

From the premises the inquiry arises as to the mission and place of the vital elements, especially oxygen, during a process which has gradually stored away in the cooling rocks many thousand times as much of it as now remains in surface activity.

If the cooled crust is fifty miles in thickness over continental plains, undisturbed ocean beds, or tracts soonest relieved from heat, the weight of oxygen which has become fixed by storing away is over a hundred thousand pounds per square inch.

If the gas so absorbed attended the planet in the commencement of the process in a free state, its pressure must then have been distributed quite uniformly about it. But from solar influence, sphericity and rotation of the earth, and interior heat currents, the process of cooling and loading must have been locally helped or hindered by the apparent caprices and chances which usually attend atmospheric phenomena, so that the crust becomes twice as thick in some places as in others; and we infer that the plains receiving this weight in excess must by depression overweigh and balance up other regions which have been less loaded.

If, then, plains corresponding with the bed of the Northern Atlantic on the one hand, and the valley of the Mississippi on the other, receive different measures of oxygen, and both of them receive much more than does the strip of surface between them, we can infer that the very different measures of elevation of these three divisions of surface, as they appear to-day, result from the difference in the loading of ponderable gases. This difference may be 50,000 pounds per square inch, and the plains receiving such excess of weight, resting upon an elastic or liquid base, must become depressed, and portions between them — sutures to those armor-plates — are slowly forced up into mountain ranges, in direct compliance with the simplest law of nature, — gravitation.

If there was formerly a thousand times as much free oxygen about the earth as to-day, then there has been at succeeding periods every other lesser measure of it down to the present, during nearly all which reach of time the heat and density of the atmosphere were intolerant of air-breathing life. And the naturalist will choose his period in the latter part of that vast stretch of time for the introduction of the gigantic tree ferns, and other extravagant forms of vegetation. An intensely stimulated life is crowded upon every opportunity for it. Heat was then the chief hindrance to growth, and only mountain-tops and polar circles were first endurable.

Atmospheric pressure develops heat; so from the presence of oxygen we infer weight, pressure, force, — heat. Solar heat depends on atmospheric pressure. Mount Washington is sterile under the brightest July sun. No warmth is felt above the lowest mile of air, and a temperature of 100° prevails at the fiftieth mile above the surface.

Are we not asking too much of the sun in assuming solar heat to be positive? Has the "Newtonian law" received sufficient attention? Will not gravitation be yet credited as the force which develops the most mysterious and perplexing appearances? When the earth shall have absorbed the ponderable elements for which it has an affinity, and which press upon it with immense power, will it not have arrived at the condition of the moon? Is not absolute cold a profound rest of matter, — equilibrium?

W. D. H.

THE ALLIGATOR.

We take the following from an entertaining article on "Florida" in the December number of *Lippincott's Magazine*:—

"The female alligator will not allow the male to approach her nest. He has a gluttonous habit of eating all the eggs, thus necessitating her laying more, which she does not like to do. So, whenever she catches him in that neighborhood, she thrashes him on general principles, — he either has done mischief or intends it: at any rate, he is meddling in domestic matters, and deserves snubbing. I am told that it is really amusing to see the big bully stick his tail between his legs and sneak off, the very image of a hen-pecked husband, after one of these conjugal scoldings. He is not by any means a model husband; and although he takes his thrashing kindly, he revenges himself by watching until the eggs are really hatched, and then eats up as many of the causes of the family dispute as he can catch. Young alligators don't like to know their own fathers.

"I heard of but few instances where these creatures have attacked grown men: they are fond of children, and show their attachment to the offspring of other people as they do to their own. In one instance, where a man on horseback was crossing a ford, he was seized by the leg; but when his dog plunged in, the alligator left his leg to take the more delicate morsel. In another instance, an alligator struck at a mule pulling a cart, and bit out two spokes from one of the wheels, leaving a tooth sticking in one as a memento of the visit. He hurried off with great speed, on the lookout, I suppose, for a dentist.

"'Gators like dogs, pigs, and young darkies. The dog is a special favorite. The whine of an alligator is easily mistaken for that of a puppy, and may mislead a young and inexperienced dog. A wise Florida dog will not go boldly down to the water to drink; he learns by experience after having been eaten once or twice. If the shore is open, he will draw all the alligators to one place by barking, and then scamper off to some other place where the coast is clear; or he will creep down to a moist spot, tail down, body crouched, eyes skinned and ears up, pushing his paws before him slowly to feel the water, lapping it without noise, and then sneaking away again.

"The alligator has his uses: near every house you find more or less swamp, and in every swamp more or less alligator. I heard one lady complain very much because some traveller had killed her alligator. He lived near, and killed snakes, frogs, young wild-cats, and other varmints: thus he earned his board, and was consequently protected; besides this, he was useful in preventing young children from straying too far from home."

USEFUL RECIPES.

Indelible Blue Ink. — Dissolve five parts of oxide of molybdenum in the smallest necessary quantity of muriatic acid; also dissolve two parts of extract of liquorice, and six of gum arabic, in two hundred parts of water. Mix the solutions, and write with them on the linen to be marked. After writing, moisten with a solution of chloride of tin in water. This is an ink not only indelible in ordinary washing, but in acids and alkalies. It cannot possibly be removed, except by destroying the article written upon. In fact, it is an utterly indelible blue dye, while the black so-called indelible inks may be removed by cyanide of potassium.

Common Writing Ink. — The *Technologist* says: "In the recipes generally given for making ink, it is recommended to *boil* the ingredients. This is a very serious mistake. It should always be made with cold water. By this latter process, more time is of course necessary to make it; but then the ink is very superior, and entirely free from extractive matter which has no inky quality, and which only tends to clog the pen and to turn the ink ropy and mouldy. Take gall-nuts, broken, one pound; sulphate of iron, half a pound; gum acacia and sugar-candy, of each a quarter of a pound; water, three quarts. Place the whole of these ingredients in a vessel where they can be agitated once a day; after standing for a fortnight or three weeks, the ink is ready for use. Logwood and similar materials are often advised to be used in conjunction with the gall-nuts; but they serve no good purpose, unless it be to make a cheaper article, which fades rapidly."

The following recipe is recommended for indorsing ink, black or colored: To make one pound, take balsam of copaiba, nine ounces; lamp-black, three ounces; indigo and Prussian blue, of each one ounce and a half; Indian red, three quarters of an ounce, and dry yellow soap, three ounces; grind all these ingredients on a slab to an impalpable smoothness, and the ink is then fit for use. The colors may be varied for different inks, such as chrome yellow and indigo for green ink; carmine and Indian red for red ink; vermilion, verdigris, etc. For such, the lamp-black and other colorings are to be left out of the recipe, but the other ingredients remain the same.

To Soften Kid Boots. — Melt a quarter of a pound of tallow, then pour it into a jar, and add to it the same weight of olive oil, stir, and let it stand till cold; apply a small quantity occasionally with a piece of flannel. Should the boots be very dirty, cleanse with warm water. It will soften any leather.

Bronzing for Leather. — A small amount of so-called insoluble aniline violet is dissolved in a little water, and the solution is brushed over the articles; it will dry quickly, and perhaps may have to be repeated. Shoes that are treated in this way present a beautiful bronze color.

Varnish for Oil Paintings. — Dextrine 2 parts, alcohol 1 part, water 6 parts. Varnish for drawings and lithographs: Dextrine 4 parts, alcohol 1 part, water 4 parts. These should be prepared previously with two or three coats of thin starch or rice boiled and strained through a cloth.

To make a new rope as limber and soft as an old one, boil it two hours in water, and then thoroughly dry it in a warm room.

The Arts.

MEMORANDA IN THE ARTS.

CARTRIDGES. — Gunpowder was at first always placed in the guns loose, by means of long ladles; and, in spite of the inconvenience and danger of the practice, it was three hundred years before any attempt was made to place it in cartridges. These were at first used only when rapid firing was necessary; and their employment did not become general, owing to the danger in serving the guns with them. Being made of parchment, paper, canvas, or linen, they were more or less incombustible, and left burning fragments in the bore, which had to be carefully removed before a fresh charge was put in. The vents of the gun were frequently choked, and the pieces rendered unserviceable, by fragments of the cartridge-bag forced into them. It was not till 1778 that Sir Charles Douglas suggested serge as a proper material for cartridges; and when his proposals were not treated with the attention they merited, he placed the whole ammunition of his ship in proper cartridges at his own expense. The advantages of serge as a material for cartridges, on account of its total consumption by the flame of the powder, are so great that its use soon become universal.

HYDROSTATIC WEIGHING MACHINE. — The London *Engineer* describes a new weighing apparatus invented by a Mr. Duckham. The principle consists simply in filling a cylinder open at the top with water, or oil by preference, and suspending the machine to a crane. A piston passes downwards through the cylinder and terminates in an eye, to which the articles to be weighed are attached. The machine is connected with a dial gauge, the indicator of which is worked by the liquid displaced from the weigher. On the load being removed, the liquid is returned to the cylinder. A peculiar merit of this machine is its lightness, a machine of 84 pounds' weight being equal to weighing ten tons. Others much lighter are capable of performing very delicate work, and others again can be made proportionately heavier which can weigh up to 100 tons. The machine has been tested in weighing the armor plates of the iron-clad turret ship *Abyssinia.* These are from eight inches to ten inches thick, weigh from seven to ten tons each, and are shipped and weighed by one process — lifted, slung, and weighed all at once.

FOOD FROM GUM TRAGACANTH. — A "Prepared Tragacanth" is put up in cans in Holland, and sold as an article of food. It is intended to answer the same purpose as arrow-root. Besides the pure tragacanth, it contains an aromatic gum and something resembling corn flour. Physicians speak well of it as food for invalids and infants "brought up by hand." We believe it is not yet introduced into the American market.

COLORED LINES IN STOCKINGS. — The reader has probably noticed that all good stockings are marked at the top with colored lines, the threads of which the lines are formed being dyed either blue or red. The dyes are not what are called "fast" colors, but are "fugitive." The lines are placed there by the manufacturer to show that the texture of the material of which the stockings were made was not injured when the articles were bleached by the action of chlorine. Although chlorine when carefully used, and when the goods are not exposed too long to its influence, is comparatively harmless, still, if employed in excess, it so destroys the texture of the stockings, that they quickly come into holes; hence the adoption of these colored lines, as before the chlorine can injure the material to this extent the red or blue color of these lines will be removed. Any stockings which do not show these colors are always sold at a lower price; but, for the reasons intimated above, they are dear at any price.

BOVINE, A NEW ARTICLE OF FOOD. — This article, prepared in Texas, is simply beef cut in steaks, including the fat, and desiccated in a current of pure heated air, and then subjected to a pressure of from 6,000 to 10,000 pounds to the square inch in cast-iron moulds, by which process it is made into a block or cake about twenty-five per cent. heavier than water. It is then slipped into a tin pan of the same size, and surrounded with melted suet or fat of the animal, and hermetically sealed. Thus dried, compressed, and excluded from the air, it will keep indefinitely, and the nutriment of a barrel of mess beef is furnished in less than one sixth the bulk and weight, and of a much better quality, as, not being salted, or only sufficiently to suit the taste (salt not being used as an antiseptic), it is free from the evils produced by salt meats, such as scurvy, etc.

WINDOWS FOR NARROW STREETS. — The London *Builder* recommends a plan for lighting a dark room, in which the darkness is caused by its being situated on a narrow street or lane. If the glass of a window in such a room is placed several inches within the outer face of the wall, as is the general custom in building houses, it will admit very little light, that which it gets being only the reflection from the walls of the opposite houses. If, however, all the panes of glass are roughly ground on the outside, and flush with the outer wall, the light from the whole of the visible sky and from the remotest parts of the opposite wall will be introduced into the apartment, reflected from the innumerable facets which the rough grinding of the glass produces. The whole window will appear as if the sky were beyond it, and from every point of this luminous surface light will radiate into all parts of the room.

PRINTING ON TIN. — This is a new process just patented in France. The preparation of the inks, or colors, which are used, is not made known. After the tin plate is printed, it can be made up into any desired shape, as the printed surface is not injured by moderate hammering, nor in the process of soldering. A great variety of canisters, boxes, etc., are already made of this material, and it is likely to come into universal use. The same French house has patented a method of lining tin canisters with a silicious material, which protects the metal from the action of the acids in pickles, preserves, etc. This also promises to be a valuable invention.

WATER-PROOF GLUE. — Immerse common glue in cold water until it becomes perfectly soft, but still retains its form; then put it into common raw linseed oil, and apply a gentle heat, until it is completely dissolved by the oil. It is then used like ordinary glue. It dries very soon, and water has no effect on it.

A glue which will resist water to a considerable degree is made by dissolving common glue in skimmed milk. Fine levigated chalk added to the common solution of glue in water constitutes an addition which strengthens it, and renders it suitable for sign-boards and other things which must stand the weather.

A glue that will hold against fire and water may be prepared by mixing a handful of quicklime with four ounces of linseed oil. Thoroughly levigate the mixture, boil it to a good thickness, and then spread it on thin plates in the shade; it will become exceedingly hard, but may be dissolved over a fire, like ordinary glue, and is then fit for use.

Where glue is to be exposed to the weather, common glue, protected by a good coat of oil color, is superior to the above. If both are combined (that is, the water-proof glue and the paint) a much greater advantage may be obtained.

NATHAN HALL, of Durham, New Hampshire, in 1833, thanked God that he "lived in a hilly country where it was impossible to build railroads." To-day the cars run through his door-yard and within a few feet of his house.

RAILROADS SIXTY YEARS AGO.

THE following letter, in reply to a suggestion concerning railroads, was written by Chancellor Livingston, who had been associated with his brother-in-law, Robert Fulton, in the application of steam to navigation: —

ALBANY, *March* 1, 1811.

DEAR SIR: I did not till yesterday receive yours of the 25th of February; where it has loitered on the road, I am at a loss to say. I had before read of your very ingenious proposition as to the railway communications. I fear, however, on mature reflection, that they will be liable to serious objection, and ultimately more expensive than a canal. They must be double, so as to prevent the danger of two such heavy bodies meeting. The walls on which they are placed must be at least four feet below the surface and three feet above, and must be clamped with iron, and even then would hardly sustain so heavy a weight as you propose moving at the rate of four miles an hour on wheels. As to wood, it would not last a week. They must be covered with iron, and that, too, very thick and strong. The means of stopping these heavy carriages without a great shock, and of preventing them from running on each other — for there would be many running on the road at once — would be very difficult. In cases of accidental stops, or necessary stops to take wood and water, etc., many accidents would happen. The carriage of condensing water would be very troublesome. Upon the whole, I fear the expense would be much greater than that of canals, without being so convenient. R. R. LIVINGSTON.

A CHROMATIC PRINTING PRESS. — At the late fair of the American Institute, a press was exhibited which, with a single impression, prints in three different colors, and works as rapidly as any platen press can print in single color. Each of the three equal parts into which the surface of the inking-cylinder is divided, is supplied with adjustable color-strips of various sizes, to correspond in width with any line or part of line of type, and each part is supplied with a color from one of the distributing rollers. Lines are struck on the surface of the cylinder, which are numbered to correspond with lines and numbers on the chase, so that it is easy for the pressman to set his sectors (color-strips) to correspond with the lines of the type which it is desired to print in colors. Within a minute the press may be changed from two or three colors to one, by throwing two polished shells, or half cylinders, over the color arrangements, enabling the pressman to use three times the amount of distribution and inking surface that he now has in any one-color job press.

PAPER BOXES. — The making of paper boxes has within the past thirty years become a very heavy business. In 1840 there were but five manufactories in the country, — three in New York, one in Boston, and one in Philadelphia, — and their united production amounted to $20,000 a year; while now there are single manufactories whose production is estimated only by millions. The straight-edged shoe-knife has given way to machinery which cuts, scores, and clips out the corners, leaving the board ready to be pasted into form. In New York one shop employs three hundred hands, consuming on the average, per day, one ton of straw board, six reams of white lining paper, and one ream of glazed paper, besides five barrels of paste and seventy-five pounds of glue, turning out 10,000,000 collar boxes and 500,000 other boxes per annum; and still the establishments increase at the rate of seventy-five per year.

GLAZING FOR LINEN. — Add a teaspoonful of salt and one of finely scraped white soap to a pint of starch.

Agriculture.

CARRYING SEED-CORN SOUTH.

In an instructive article under the heading, "Corn and Climate," published on page 563, current volume Country Gentleman, Mr. Levi Bartlett notices a variety of corn, "long and successfully grown on an island in Lake Winnipiseogee, yielding from 100 to 135 bushels of shelled corn per acre." Some of it was sent from Vermont to New Jersey. He continues: "The original was not a very large growing kind; but having been long grown successively, in New Jersey, it has become very large, like the Southern corn. Last winter a Mr. Haines, of New Jersey, sent me per mail a splendid ear of this corn, measuring fourteen inches in length, and kernels to match. Now, it is certain that this ear was a lineal descendant of the John Brown corn. I have this day interviewed it (August 12), and find many stalks nine feet high, much of it not yet spindled out, and none in silk. . . . I grew the Brown corn several years, and then it was a medium-sized variety of corn. But by long years of cultivation in New Jersey it has attained the growth of New Jersey corn; and now it and the Illinois corn are of very little worth for cultivation in this section; the corn will not ripen, and the forage is too coarse and large for cattle fodder."

Writing mainly for Southern readers, I remark that Winnipiseogee Lake is 472 feet above tide-water, and surrounded by high lands that aid in cooling the local climate. On an island in this lake our semi-tropical cereal for long and successive years yielded "from 100 to 135 bushels of shelled corn per acre." The Cotton States can send no corn North that will be likely to improve plants thus fruitful. Indeed, it is desirable in all parts of the continent to bring the planting and maturity of this crop as near together as possible, to escape blighting drouth. If the climate will ripen a second 90-day variety of corn, let us plant two crops in succession in a year. The second will give us five times more fodder (stalk and ear included) than all the blades we now pull from an acre.

By planting seed very impressible to the influence of heat and light, in our sunny clime, we can organize about twice the quantity of food for man and beast per acre in twelve consecutive months, that can be grown in the climate of New England, the fertility of the soil being the same. Corn that once required five months to reach full maturity in the climate at the mouth of the Mississippi, now ripens its seed in two months and a half on the Red River in the British Province, in 50° North latitude. This shows how far the vital element in this plant changes its most important functions to meet a change of condition. It by no means proves that solar heat for two and a half months in latitude 50° North is equal to that of five months in the sugar-cane climate of Louisiana, as some meteorologists would have us believe. If maize had not already been carried far north and acclimated there, it would pay to do so to make it more fruitful in seed, and less in wood and weed, in more southern latitudes. Corn carried 200 miles north of Knoxville, into the climate of Lexington, Ky., and planted in a calcareous soil similar to that in this State, appears to be more fruitful than here, after acclimation. So far as I can learn, nothing is gained anywhere by a northern movement in the first or second crop. We might as well carry southern Irish potatoes and apples north for seeding, as corn. But where wheat is harvested in May and early in June there is plenty of time to make a crop of northern corn on the same land in season to seed to wheat again in autumn, in all cotton districts. In our longer summers and higher mean temperature for the year, we have a powerful agricultural force; but in our native plants there is less suceptibility to its influence. Hence, European cereals and grasses and northern maize have advantages for southern farmers not found in any purely southern plants. Let us avail ourselves of all the physiological resources of northern latitudes, and unite them with all the climatic advantages that abound in our own land. — D. Lee, *in Country Gentleman.*

TO REJUVENATE PEACH-TREES.

The following is the substance of a communication made by Dr. George B. Wood to the American Philosophical Society, of which he is President: —

Peach-trees, after producing a few crops, not only cease bearing, but perish in a short time; whereas their natural life is fifty or sixty years, or more. The cause of this defective power of growth is owing to a deficiency of potash in the soil; and if this alkali be supplied to the tree, so that it shall reach the small roots and be absorbed, the fruit-bearing power is restored, and the fruit itself, prematurely perishing, is revived.

Believing at first with most persons, that the cause of decay lay in worms at the root of the peach-tree, Dr. Wood put in operation a plan which he had seen his father perform more than fifty years before, viz., of digging around the base of the stem a hole four or five inches deep, scraping away all the worms that could be found burrowing at the junction of the stem and root, and filling the hole thus made with wood-ashes from the fire, which of course retained all their potash. This was done in the autumn of 1868; and with a result in the following spring at which he himself was astonished. The trees appeared to have been restored to all their early vigor and freshness; they put forth bright green leaves, blossoming copiously, and bore a crop of fruit such as they had never borne before, many of the branches breaking down under the load of peaches.

Dr. Wood, in reflecting on these results, noticed that several of the peach-trees had no worms, and came to the conclusion that we must look for an explanation to some other cause than the destruction of a few worms; and this cause he believed to be the ashes, the potash of which, being dissolved by the rain, had descended along the roots to the rootlets, and presented to them the very food for the want of which they were dying. Decaying apple-trees, bearing stinted and inedible fruit, have been revived by a similar process, and with like results.

SAWDUST AS LITTER AND MANURE.

Persons who have tried sawdust for the purpose of keeping animals in the stable or pen clean, dry, and comfortable need not be told of its value for this purpose. It absorbs a large amount of liquid in proportion to its bulk, and is thus a convenient article for accomplishing the desired objects.

But the question of the value of sawdust as manure is a different one from its value as litter. We have seen land greatly benefited, and have seen land made worse by it. The result depends on two points, — the kind of sawdust, and the kind of land to which it is applied Many years ago, we saw a good garden made on a piece of raw, stiff clay, lying on a hillside. The clay was in a few years converted into a good, friable loam, chiefly by ploughing in and spading in large quantities of sawdust. The sawdust was made from oak, bass-wood, white-wood, etc.

On the other hand, we have seen a sandy loam rendered less productive by the application of pine, spruce, and hemlock sawdust. The resinous matter in such sawdust does not readily decompose, and observation teaches that it is not good for vegetation. The decay of branches, bark, and roots of these species of trees does not improve the fertility of soil.

Sawdust from most deciduous trees, when mixed with urine, soon takes on heat, which in a short time completely rots it, and the carbonaceous matter, having a great affinity for the ammonia evolved from the urine, prevents its escape. Resinous sawdust does not so readily rot, and hence has less power in saving ammonia. If such material is added to soil already too loose in texture, the effect is to increase that defect, while the resinous matter has absolutely a poisonous influence on the soil in reference to the support of crops. Hence it is at least doubtful whether pine and hemlock sawdust is good for any land, even when it has been used for bedding animals.

But in this vicinity what sawdust is made is from wood that contains none of the objectionable substance. Oak sawdust, it is true, is sometimes rather sour; but the alkaline quality of urine, in connection with the heat produced when the articles are mixed together, soon dissipates or destroys the acid. On tenacious soils the application of manure in which such sawdust is mixed cannot fail to be beneficial, and on none except those of too light a character would the effect be unfavorable. Perhaps no more ready means can be employed for saving the liquid portion of animal excrements — which some experiments show to be equal in value to the solid — than by the employment of sawdust as litter, and as an absorbent, whenever the article can be conveniently obtained. — *Lansing (Mich.) Republican.*

DETERIORATION OF WHEAT.

An intelligent writer in the *Mark Lane Express*, London, says, touching this subject: —

"So thoroughly illogical an article as is published in the *Prairie Farmer*, headed 'Why Wheat Deteriorates,' has rarely been seen in the columns of an agricultural paper; and we shall not do our practical readers the injustice of assuming that they need any help from us to discover the numerous fallacies it contains. Unfortunately, the article is read by many who are raw to their business, and therefore incapable of detecting any errors that would be palpable enough to an expert. In his heading, 'Why Wheat Deteriorates,' the author of the article has begged the question. He has started on the *assumption* that wheat *does* deteriorate, and directly proceeds still farther to *assume* that it has done so when the yield has declined from forty or fifty bushels per acre to ten bushels. Thus the writer has *assumed* that a small yield is evidence of a deterioration of the constitution of the wheat plant. There we meet him with a challenge to prove that any such deterioration has ever been known to exist. Until the writer has found a few wheat plants that have nearly lost the distinctive characteristics of wheat, and that exhibit unmistakable signs of returning to the wild state, let him not talk of deterioration. Wheat produced at the rate of six bushels per acre is likely to be even healthier and better seed than that which formed part of a crop of fifty bushels per acre. A dense wheat crop is not necessarily healthier than a thin one, but is, on the contrary, more likely to take the rust. Neither is the produce of a crop grown on rich land so well adapted for seed as that grown on land in fair, healthy condition. The old farmers of England never take seed from rich land to poor, but *vice versa.* The amount of yield per acre is sure to be less when seed grown on rich land is sown, and as surely an opposite result is obtained from an opposite course of practice. The fault in America is not in the seed, but in the practice, common also in this country, of exhausting the land by repeated cropping without returning any of the fertilizing elements which the crops take away. The seed is right, but the farming wrong. In saying this, we

do not mean to allege that all soil is capable of producing a healthy wheat plant, because experience has proved that some soils require an occasional change of seed, and none demand it more imperatively than those black soils that are so highly esteemed by the farmers of this country. In effecting any such changes it is desirable to bear in mind the British maxim, — 'Get your seed from poorer land than your own.'"

COAL-GAS AND THE ROOTS OF PLANTS.

A suit was brought by the city of Aix-la-Chapelle against the municipal gas company for damage done to the public trees by the leakage of gas from the street mains, and in the course of the trial the question arose as to which of the constituents of the gas was the most mischievous. The subject was referred to Professor Freytag, of Bonn, as an expert, and he at once made a series of experiments to decide the question. A system of lead tubes, perforated with small holes, was laid underneath a plot of ground, in which wheat, rye, rape-seed, and barley were growing; hydrogen, light carbureted hydrogen, and heavy carbureted hydrogen were uninterruptedly conducted through the pipes, under different parts of the beds, for six days, without perceptible effect upon the plants.

The same result was obtained when the city gas of Bonn, after being thoroughly purified, was passed through the tubes; but whenever the gas contained tarry matters, especially carbolic acid, the destructive action soon became apparent. The condensed particles of tar could easily be discovered in the earth and about the roots, which they coated and destroyed.

Prof. Freytag therefore came to the conclusion that the normal constituents of coal gas exercise no bad effects upon vegetation so long as air and oxygen can get access to the roots — that is, the various constituents of the gas have no worse effects than the nitrogen of the air; but, on the other hand, the tarry vapors, and especially carbolic acid, in consequence of their condensation and accumulation about the roots, are highly destructive to trees.

As it is nearly impossible to free the gas from these foreign vapors, it is safe to assume that it is destructive to trees, and ought not be conducted in pipes near their roots.

THE POTATO IN FRANCE.

The introduction of the potato into France has been ascribed to Parmentier, who is said to have found the plant in a field near Mayence at the time of the siege of that city about the middle of the last century. Whether this story is true or not, it is certain that, on his return from Germany to France, Parmentier used every means to encourage the use of the potato as food. He is said to have resorted to a curious stratagem to make it popular. Having planted a field of potatoes, he stationed around it a line of armed sentinels. This extraordinary precaution, of course, excited much comment, and the precious treasure, thus securely guarded, became very desirable to the neighbors. The vigilance of the guards was judiciously relaxed to such an extent that the crop was gathered by the more venturesome among the covetous neighbors, and thus the excellence of the potato became established in the vicinity. Parmentier next undertook to place the potato upon the tables of the rich. He presented himself before his king, Louis XVI., with a bouquet containing a flower of the *Solanum tuberosum* (potato); asked to describe the pretty flower, he spoke of the value of the tuber, and he induced the king to have it cultivated upon the royal grounds. In Germany the potato was known as a garden plant as early as 1710; it was not cultivated on the large scale till much later, and it required the famine of 1771–1772 to overcome all prejudices against this esculent. Even at the beginning of the present century, according to M. Pepin, very few varieties of potato were cultivated, and these chiefly for cattle; it was not used by the better classes until 1818 or 1820.

In the *Grand Encyclopedia*, commenced in 1750, it is stated, under the title *Potato*, that the peasantry of certain districts made use of it as an article of food, but that it is a crude element, difficult of digestion.

RULES TO MAKE A FARMER POOR.

1. Not taking a good agricultural paper.
2. Keeping no account of home operations. Paying no attention to the maxim: "A stitch in time saves nine," in regard to the sowing of grain and planting of seed at the proper season.
3. Leaving the reapers, ploughs, cultivators, etc., uncovered from the rain and heat of the sun. More money is lost in this way than most people are willing to believe.
4. Permitting broken implements to be scattered over the farm until they are irreparable. One of the Seven Wise Men of Greece said only this to prove his sense: "The time to mend the plough is when the plough breaks."
5. Attending auction sales and purchasing all kinds of trumpery, because in the words of the vender, the articles are "very cheap."
6. Allowing fences to remain unrepaired until strange cattle are found grazing in your fields and bruising the fruit-trees.
7. Planting fruit-trees with the expectation of having fruit, without giving the trees half the attention required to make them produce.

MISCELLANIES.

Hemlock Wood Proof against Rats. — A correspondent of the *Philadelphia Medical and Surgical Reporter* says: —

"Being surrounded by these animals, I found it necessary to keep fruits, butter, cheese, and other articles in boxes made of hemlock (*Abies Canadensis*). In these boxes I could keep the most toothsome delicacies in the cellar with impunity, even though the box afforded free ventilation, which, in many cases, is highly necessary.

"To test the matter still further, I made a box of dry hemlock boards, perforating each end of the box with a 7-8 inch circular hole. Into this box I put a large healthy rat, caught in a hemispherical wire trap, nailed it up securely, put it in a dark, quiet place, and awaited the result.

"On inspection, at the end of twenty-four hours, I found he had scarcely more than touched the wood. I returned the box, leaving the rat to his cogitations, which horn of the dilemma to choose.

"At the end of forty-eight hours, I made him another visit. He had evidently come to the conclusion that remaining inactive was to strand upon Scylla, while the effort to buy his liberty could do no worse than wreck him upon Charybdis. He had enlarged the hole sufficiently to get his head out, in which condition I found and dispatched him on the third morning of his incarceration."

Adulteration of Manures in England. — The subject of manure adulteration has attracted the attention of the Royal Agricultural Society of England, whose chemist, Dr. Voelcker, is now authorized to publish every month all analyses of adulterated foods and manures which pass through his hands. He has accordingly shown up several very glaring instances of worthless guanos and superphosphates, in which gypsum, earth, chalk, and sand figure in place of the genuine guano and bone-ash. One sample of bone manure contained only one per cent. of phosphate of lime and one per cent. of nitrogen; it was made up chiefly of gypsum and some cheap organic refuse, impregnated with sulphuric acid. It cost four and a half pounds sterling per ton, and was worth less than a pound and a half. Other specimens were still worse. This exposure is the more necessary now that the English farmer, as some one has said, "depends for success mainly on brains and bones, — his own brains, and somebody else's bones."

British Farm Statistics. — According to statistics recently published, there are 1,141,996 farm-horses at work in Great Britain. The aggregate of farm stock is decreasing. The reduction within a year amounts to 70,000 cattle, 350,000 pigs, and 1,100,000 sheep. 20,000 more acres are devoted to wheat, 84,000 to barley, 22,000 to oats, 14,000 to rye, 45,000 to beans, and 100,000 to peas, while of clover there are 365,000 acres *less* than there were the preceding year.

Virgin Soil in the South. — The South has an immense area of lands untouched by the plough, and destined hereafter to be the source of wealth and power, such as that section has never yet known. The extent of Government lands in acres in the Cotton States is put down as follows: Alabama still has 6,790,776; Mississippi, 4,828,069; Louisiana, 6,583,841; Arkansas, 11,574,430; Florida, 17,425,438; whilst Texas has over seventy millions belonging to herself. The homestead and preëmption laws of the United States afford an easy means to the immigrant of becoming at once a thrifty farmer in any of the States where the public lands are still unsold.

Hints about Flowers. — House plants ought to be stimulated gently once or twice a week. Rain-water, so refreshing to summer flowers, always contains ammonia, which also abounds in all liquid manures. If you take an ounce of pulverized carbonate of ammonia, dissolved in one gallon of water, it will make spring-water even more stimulating to your plants than rain-water. If you water your plants once in two weeks with guano water (one table-spoonful to a pail of water) they will grow more thrifty. Chicken manure dissolved in water is excellent.

Always keep the soil in your flower-pots loose. A common hair-pin used daily will stir the earth sufficiently.

Russian Apples. — The Commission of Agriculture at Washington has just received from the Imperial Botanical Gardens of St. Petersburg a collection of Russian apples, embracing specimens of about 400 varieties. These have arrived in perfect condition, and are well provided with grafts, which will be at once distributed to nurserymen and others who desire to experiment with them. It is believed that they will prove a valuable acquisition to the pomologists of our Northern and Northwestern States.

Climbing Plants. — According to M. Lévy, some species of climbing plants show a preference for particular trees, refusing to twine about some kinds, and clinging eagerly to others, to reach which they may have trailed for some distance along the ground.

Grape-leaf Pickles. — The Moravians in Salem, N. C., are said to put up cucumber pickles as follows: Put up a layer of the sour, wild grapes with the leaves of the vines in the bottom of the vessel, then a layer of the cucumbers, and alternate thus until the vessel is full, or until you have put in as many cucumbers as you desire. Then put in water enough to cover them, and place boards and weights on top to keep them under the water. They do not require any further attention, although you may, if you desire, take them out and finish them with vinegar

Boston Journal of Chemistry.

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BOSTON, JANUARY 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

THE CATHEDRAL AT STRASBOURG.

THE siege of Strasbourg has drawn the eyes of the whole civilized world to "the old Alsatian city" and its magnificent Minster. The famous astronomical clock has also been an object of no small interest, and some of our Yankee newspapers have seemed to think that its fate was of more importance than that of the cathedral itself. But the clock is merely a gigantic toy, or at best a marvel of mechanical ingenuity. It is not the original mediæval horologe, as has been repeatedly stated in print, but, with the exception of a portion of the case, is wholly a work of the nineteenth century. It was begun by Schwilgue in 1838, and finished in 1842, and is far more wonderful in its way than its antique prototype. Even the moving images which amuse the looker-on when the hour is struck, especially at noonday, have been greatly improved by modern skill, and go through their various antics in a less jerky and stiff-jointed style than of yore. It would be tedious to tell all the manœuvres, whether chronological or comical, of this complicated time-keeper. It measures and marks periods from one second up to the slow cycle of the equinoctial precession, which takes over *twenty-five thousand years* for its completion. It has dials for all sorts of astronomical, civil, and ecclesiastical divisions of time; and it has processions of heathen deities, holy Apostles, and allegorical personages, — Youth, Manhood, Old Age, Death, and the like, — to say nothing of the cock that flaps his wings, ruffles up his neck, shakes his head, and wakes up the echoes of the church with his sonorous crow. But, after all, it is nothing more than a piece of cunning mechanism, and, being such, we need not wonder that it surpasses its predecessors of 1352 and 1547, — for the present is the third of these curious clocks. This is an age of machinery, as that was an age of art. It can build a better clock than was possible in the fourteenth century; but it cannot build a Gothic cathedral, — an achievement infinitely nobler. The clock is a machine; the cathedral is "a hymn to God sung in obedient stone."

This grand old Minster, like nearly all the European cathedrals, was never completed. According to the original plan, it was to have two spires of equal height; but only one was finished, and that not until more than four centuries after the edifice was begun. Indeed, the cathedral is an embodied history of Gothic architecture from its birth to its decline. The southern portal, in Byzantine style, dates back to the year 1002; the body of the church, to 1275; the façade and towers were begun in 1277, and the spire was finished in 1439.

If Longfellow's "Golden Legend" were as widely known as many of his poems, its references to Strasbourg cathedral would have gone the rounds of the papers ere this, but we have not seen the first hemistich of them in all that has been written on the subject. The opening scene of the poem is on (or around) the spire of the cathedral, where Lucifer is inciting the "powers of the air" to tear down

> "the ponderous
> Cross of iron, that to mock us
> Is uplifted high in air."

But the "Saints and Guardian Angels throng in legions to protect it," and the evil spirits are baffled. Neither can they

> "Seize the loud vociferous bells, and
> Clashing, clanging, to the pavement,
> Hurl them from their windy tower,"

for the bells have been baptized, as was the pious custom of that day, and can therefore defy the devil and all his imps. They cannot even break the windows, for the Archangel Michael flames from the painted panes. Then Lucifer says: —

> "Aim your lightnings
> At the oaken,
> Massive, iron-studded portals!"

But the Apostles and the Martyrs whose statues stand there as sentinels and warders repel the infernal invaders. Those same Apostles and Martyrs are still on guard to-day, but they would have been poor defenders against the thunderbolts of Prussian artillery, if the demon of war had tried to destroy the sacred structure. And yet were they not its defenders and saviours, after all? Was it not the German love and reverence for this ancient masterpiece of German art, with its myriad statues, its painted windows, its sculptured spire, its wealth of beauty and grandeur, its venerable and holy associations, that kept the cathedral almost scathless amid the storm of shot and shell that swept over the doomed city? Here is a finer theme for our poet than the mediæval superstitions wrought into this opening scene of the "Golden Legend!"

Farther on in the poem, Prince Henry and Elsie come to Strasbourg, and this is a part of their conversation in their first visit to the cathedral: —

> "*Elsie.* How very grand it is and wonderful!
> Never have I beheld a church so splendid!
> . . . . .
> Who built it?
> *Prince Henry.* A great master of his craft,
> Erwin von Steinbach; but not he alone,
> For many generations labored with him.
> Children that came to see these Saints in stone,
> As day by day out of the blocks they rose,
> Grew old and died, and still the work went on,
> And on, and on, and is not yet completed.
> The generation that succeeds our own
> Perhaps may finish it. The architect
> Built his great heart into these sculptured stones,
> And with him toiled his children, and their lives
> Were builded, with his own, into the walls,
> As offerings unto God. You see that statue
> Fixing its joyous, but deep-wrinkled eyes
> Upon the Pillar of the Angels yonder.
> That is the image of the master, carved
> By the fair hand of his own child, Sabina.
> *Elsie.* How beautiful is the column that he looks at!
> *Prince Henry.* That too she sculptured.
> At the base of it
> Stand the Evangelists; above their heads
> Four Angels blowing upon marble trumpets,
> And over them the blessed Christ, surrounded
> By his attendant ministers, upholding
> The instruments of his passion. . . .
> See, too, the Rose above the western portal,
> Resplendent with a thousand gorgeous colors,
> The perfect flower of Gothic loveliness!
> *Elsie.* And in the gallery the long line of statues,
> Christ with his twelve Apostles watching us!"

This is poetry, but it is a very photograph of the Minster as it now stands. We found it better than any guide-book description when we were there some two years ago. Erwin von Steinbach was the architect of the church from 1277 to his death in 1318, and his daughter and his son labored upon it for long years after; and to the three it owes the majestic façade, the sculptures of the south portal, and many other of its best features. "The Rose above the western portal" — a circular window more than fifty feet in diameter — is one of the most conspicuous ornaments of the façade; and seen from within, it is still "resplendent with a thousand gorgeous colors," as the poet has described it.

The spire is famous, not only for its exquisite workmanship, but as being the loftiest in the whole world; but just how high it *is* no two authorities agree in stating. Baedeker, who is usually trustworthy, makes it 524 English feet, but we think he is wrong. One of the best German works on architecture puts it at 442 feet (*German* feet, 34 of which are about equal to 35 English); and this is probably the truth, or near the truth.

ECHOES OF THE WAR.

SOMETHING approaching to regular postal communication with Paris is now established by a singular combination of ancient and modern methods. The outward service is by means of balloons; and the return mails are borne by carrier pigeons, which are brought from the besieged city by the balloons. But as the birds could not carry a heavy mail-bag, the aid of photography is called in to reduce printed and written matter to microscopic proportions. A large newspaper page is thus condensed into the space of an eighth of an inch. It is said that the Prussians are training hawks to intercept these feathered carriers; thus reviving the old art of falconry in opposition to that of sending messages by pigeons. And so, with balloons and photography on the one hand, and carrier pigeons and trained hawks on the other, we have the nineteenth century and the Middle Ages brought strangely together.

In our last, we gave some facts concerning food in Paris, gathered from the *Food Journal.* The December number of that magazine, just received, contains further reports on the same subject, "received by balloon post, Nov. 25th." Beef and mutton were then exceedingly scarce, and horse-meat was in great demand, as the next best thing to be had. The soup made from it is generally considered superior to that from beef,

and many prefer the meat itself to beef on account of its "game flavor." A well-known artist says: "I have taken to horse, not only by taste, but also as a hygienic measure; every day the beef is worse and worse; the cattle want exercise, and perhaps green fodder. As to horse, it is quite the contrary; we first ate the hacks, and now we have commenced on the fine animals. Good horse is undoubtedly better than middling beef." The price of the best equine "cuts" has gone up even to 5 francs (about a dollar) a pound. The flesh of the ass is also liked, and sells, "under the name of veal," for 4 francs a pound. Of other meat supplies the following extract will give an idea:—

"Cat is eaten and sold openly; and although I never had the pleasure of partaking of a *civet* of the kind — to my knowledge — I can assure you that cats are relished by a good many people, and are quoted at 6fr. each, while dog is quoted at 4fr. the half animal. I have, however, doubts about the dog. One journal declares that more than 24,000 cats have been sold and eaten. A student in medicine sent the following note to a friend: 'Come on Saturday to my rooms and eat a broiled cat, seasoned with pistachio nuts, olives, gherkins, and pimento, and washed down with Chablis. After dinner we will drink some Rhenish wine to the indivisibility of France.'"

The scarcity of more legitimate viands is shown by their prices, a few of which we will give in our currency. Ham is about $1.60 a pound; a goose brings $5; a pair of pigeons, $2.50; a turkey, $13; a rabbit, nearly $4; a dozen eggs, $1; a bunch of carrots, 50 cents; a pound of beans, $1. Choice preserved meats and delicacies of any kind command fabulous prices.

Not only is meat scarce, but the means of cooking it are becoming equally so:—

"Coal is always dear in Paris, and is now unattainable; and the charcoal is exhausted. There remains only wood; of this there is yet a good supply, and the price has only been slightly raised; it is now 60fr. the ton. Wood makes a very good fire, but not for roasting in the ordinary way; and we were reminded of this the other day, when we were to regale ourselves upon horse beef, by our cook saying, 'Madame, I have no coke left, so I have put the horse into the oven!'"

But, for all this, the Parisian must still have his joke. When dinner is ready, some one is sure to say, "To horse, ladies and gentlemen, — to horse!" Comical stories go the rounds; like that of the woman who is caught coming out of a house with something hid under her shawl; she is arrested, and a fine cat found upon her: "O! do not expose me," she cries, "it is for a poor sick friend!"

Scientific bodies are discussing matters of diet. Dr. Sée has given a lecture on the subject at the School of Medicine, and the main points of it have been printed and widely circulated. He says that the daily diet of an adult man may be made up of 100 grammes (a gramme is about $15\frac{1}{2}$ grains) of beef, 20 of salt fish, 750 of bread, 50 of bacon, and 50 of vegetables, — in all, 970 grammes, or a little less than two pounds of solid food, containing 88 grammes of albuminous matter; but as he loses daily 120 grammes of such matter, the deficiency of 32 grammes must be made up by auxiliary food or drink. Coffee and wine the Doctor specially commends, as diminishing the waste of the tissues; but he strongly opposes the use of spirits. "The abuse of these liquors," he says, "is the best accomplice of Prussia."

There are other things connected with the war of which we intended to speak; but the length of this article admonishes us to defer them to a future day.

THE STEAM-HEATING APPARATUS.

If we had anticipated exciting so much interest among our readers regarding the "model steam-heating apparatus" noticed in the last Journal, we should hardly have alluded to it. The amount of correspondence thus drawn forth from parties east, west, north, and south, is indeed burdensome, and it is quite impossible to reply by post. The apparatus was noticed as a novelty in mechanics, and as a matter of interest in connection with household economy. It was devised for our private use, and originated in a desire to meet a want which we had felt for many years. At the time the apparatus was constructed, we supplied it to about a dozen of our relatives and neighbors, and most of these, we think, are still in working condition. Some ten or twelve years ago, the patterns for the castings were burned in the great East Boston fire, which put end to further supplies. It is possible that we may be led to reproduce the various parts of the apparatus, and if so, a more detailed description of it, with cuts, will appear in the Journal.

THE METEOROLOGY OF NOVEMBER, 1870.

November has been as remarkable for its high temperature, and for the small amount of rain, as so many of the preceding months had been. According to Prof. Loomis's meteorological report, as given in the *College Courant*, the mean temperature for the month at New Haven was 43.3 degrees, or three degrees above the average temperature of this month. The highest temperature of this month was 62.7 degrees, on the 9th; the lowest was 26.1 degrees, on the 17th. The range of the thermometer for the month was 36.6 degrees, which is nine degrees less than the average range for this month at New Haven.

The mean temperature of the past eleven months has been more than two degrees above the average of the same months for the past ninety years; and the mean temperature of the past seven months has been three degrees above the average temperature of those months. So great a departure from the average temperature, continued for so long a period, has not occurred before for more than a century.

The amount of rain for November was 2.80 inches, which was nearly an inch less than the average fall for that month. The entire fall of rain for the last ten months has been nearly thirteen inches less than the average fall of that period.

The drought appears to have extended to the regular November shower of meteors. Prof. Newton reports that not more than 75 meteors were seen at New Haven on the mornings of the 13th and 14th, whereas 7,000 were seen two years ago. His conclusion is, that either the earth had not reached the margin of the great meteor stream by sunrise on the 14th, or else the stream itself, which for several years has been crossing the earth's orbit at a velocity of about 100,000 miles an hour, has all passed by, to return about the year 1900.

On the other hand, Prof. Rockwood, of Bowdoin College, says he saw enough meteors on the morning of the 14th to prove the return of the usual November shower, though the meteoric flights were at no time more frequent than one a minute.

☞ The subscriptions of some of our patrons expire with this number. We shall be happy to receive a remittance for another year, in token that they desire the paper continued.

THE DEATH OF GENERAL LEE.

Dr. R. L. Madison and H. T. Barton, attending physicians of General Lee, have contributed to the *Richmond and Louisville Medical Journal* a detailed account of his last sickness and the treatment pursued. They sum up the case as follows:—

"*Remarks.*—We had long been painfully impressed with the conviction that depressing moral causes were slowly but steadily undermining General Lee's health in a ratio far exceeding the inroads of mere physical disease. Indeed, how could it be otherwise? The terrible strain upon him during the momentous campaigns of 1863 and 1864, the agony of mind endured at Appomattox, the wail that went up from widows and orphans all over the desolated and ruined South, the bankrupt condition of his native State, the mute and eloquent woe appealing to him on all sides, were enough, and more than enough, to bow his mighty spirit, and to crush out, with fatal tread, the energies of his life! And more than this, with all this mighty sorrow weighing him down, he ever preserved a calm, serene, and even cheerful exterior. Few, even of his most intimate friends, knew the depths of his anguish, rendered all the keener, all the more poignant, by the very effort to repress it. He felt it his *duty* to conceal it, even while conscious that, like the Promethean vulture, it was tearing away his heart! No man less heroic than himself, no man less sustained by Christian faith and Christian principle, could have borne his burden for an hour. Yet, even with him, it was only a question of time. General Lee died of a broken heart, and its strings were snapped at Appomattox!

"In reference to the proximate cause of his death, we were of the opinion that it was due to passive congestion of the brain, not proceeding far enough to produce apoplexy or effusion. There was no positive evidence of acute softening, of cerebritis, or of embolism. There was no paralysis of motion or sensation, but marked debility from the first. His symptoms, in many respects, resembled concussion, without its attendant syncope. The treatment was based upon the above diagnosis."

EDITORIAL NOTES.

Velocity of Nerve Force. — Helmholtz has made some new measurements of the rate at which excitation is propagated along the motor nerves of man from the brain to the muscles. The ascertained velocity varies between 260 and 292 feet per second, and is also found to be greater in summer than in winter. This result led to a more exact observation of the influence of temperature, which is ascertained by the artificial cooling or warming of the arm. By this means the accelerating influence of a higher temperature has been clearly determined, so that the interval of time between an impulse of the voluntary power and the corresponding movement of the muscles is greater in winter than in summer.

Wooden Shoes. — The French and Germans out West continue to use wooden shoes, and a large establishment for their manufacture has recently been started in Iowa by a German. The cheaper kinds sell at from thirty-five to fifty cents a pair. These shoes are also much worn by dyers and other workmen whose employments expose the feet to the action of water and other substances injurious to leather.

The clattering of these wooden shoes on a pavement is a sound not readily to be forgotten. We remember well when it first startled our own ears. It was our first day on the Continent in the summer of 1868. We had come across from Dover to Ostend on a Saturday night, and taken an early train to the "quaint old Flemish city" of Bruges, where

we spent the Sabbath. Our hotel was close beside the venerable Church of St. James, and we had the windows of our room open to listen to the music of the mass. At length the service was over, and a thousand or more pairs of *sabots* came tramping out of the church. It was some moments before we could make out what the strange din might be, and then it seemed as comical as it had been frightful.

COFFEE LEAVES FOR MAKING TEA. — We remember the story of the Irishman, who, on being asked why he had stolen some coffee, replied, "An shure, to make *tay* of." If it had been the *leaves* of the coffee plant that Pat stole, this would have been no bull, after all. A Dr. Gardner of England has discovered that these leaves may be substituted for those of tea without any considerable loss of the peculiar properties belonging to the latter. In examining at a grocer's shop a great variety of teas, he noticed that one chest, labelled "Assam Tea," had a very peculiar appearance. On careful scrutiny he found it to be prepared coffee leaves. These were in small fragments, not rolled, being too harsh for that operation, and yielding a strong, pleasant infusion, acceptable to many on account of its comparative cheapness. The swindle was a more pardonable one than the ordinary sophistications of the Chinese herb. Indeed, if coffee leaves serve as a cheap *tea*, it would be a blessing to the poorer classes to have them generally introduced into the market instead of the "faced" and other adulterated forms of tea that are so common.

SPECIAL NOTICE TO OUR MEDICAL PATRONS. — By an arrangement with Messrs. Macmillan & Co., of London, we are enabled to offer *The Practitioner*, edited by Dr. Anstie, *and the* JOURNAL, at the very low price of *four dollars* per annum. This will be virtually furnishing this English medical monthly, the high character of which is too well known to need any endorsement from us, at the same price as is charged for the unauthorized American reprint issued in much inferior style. The regular price in this country for the English edition is five dollars. To those who subscribe through us it will be mailed from the publishers' branch house in New York, regularly and promptly on its arrival from London. We shall be surprised if very many of our friends do not take advantage of this liberal offer.

For other medical magazines sent in connection with the JOURNAL, see list in our advertising columns.

The price of the *Gynæcological Journal*, for 1871, is raised to *five dollars*.

LITERARY NOTES.

THE Harpers publish, just in time for the holidays, *The Adventures of a Young Naturalist* by Lucien Biart, and *My Apingi Kingdom, with Life in the Great Sahara*, etc., by Paul Du Chaillu, both of which we heartily commend to our young readers, or to their friends who are looking for Christmas gift-books for them.

Messrs. Scribner & Co. have issued three more volumes of their "Library of Wonders" — *Wonders of Bodily Strength and Skill*, by G. Depping; *Wonderful Balloon Ascents*, by F. Marion, and *The Bottom of the Sea*, by L. Sonrel — all excellent in their way. From the book on Balloons, we learn that these were first employed for military purposes in the wars of the French Republic in 1794, and some interesting facts connected with their use at that time are given by the author. The first Napoleon, however, did not favor them, and disbanded the companies of aeronauts that had been attached to the French army. It was not until our own recent war that they again played an important part in military operations. The war now going on in Europe is likely to furnish M. Marion with abundant material for an additional chapter to his entertaining book.

Messrs. A. S. Barnes & Co., of New York, publish, under the title of *The Metric System*, a sketch of the system and a Report upon it to the University Convocation of the State of New York, by Prof. Davies; together with John Quincy Adams's elaborate Report of 1821, and Sir John Herschel's Lecture on the subject in 1863. The publishers make it a volume of their "Teachers' Library," but it has an interest for the general reader as well.

Dr. Naphey's *Physical Life of Woman*, published by Geo. Maclean, Philadelphia, has reached its fiftieth thousand. It has been endorsed by the *Philadelphia Medical and Surgical Reporter*, the *Boston Medical and Surgical Journal*, the New York *Medical Gazette*, and other leading professional journals, as well as by Prof. W. A. Hammond, Pres. Hopkins of Williams College, and others. It is a less exceptionable work than most of its class; but we have our doubts whether the best book of the kind does not do more harm than good.

Land and Water, the English weekly commended in our last, is edited by Frank Buckland, well known as a naturalist and as an author.

By an arrangement with the publishers, we are enabled to furnish *The English Mechanic and World of Science*, together with the JOURNAL, at the very low price of $3.50 per annum; the former to be mailed weekly *post free*. We believe that the *Mechanic* alone has not heretofore been offered in this country for less than five dollars a year.

We can also furnish the *Building News*, published weekly in London, and the JOURNAL (the former post free), for $4.50, which is only *one half* the price ordinarily charged for the former on this side of the Atlantic.

The Academy, the admirable monthly review started by Murray a year ago, has passed into the hands of Messrs. Williams & Norgate, of London. It is still published at sixpence a number. Its scientific department, though but one sixth of the paper, is of itself worth more than that.

Nature, which has steadily improved from the start, has just commenced its third volume. It will be remembered that we furnish it with the JOURNAL for *five dollars*, and any one who makes the investment will find that he gets more than his money's worth before the year is out.

☞ WE learn from Messrs. Lebosquet Bros., of Haverhill, that they have placed in operation about one hundred of the new dust-and-gas-tight furnaces which we devised, and that every one is giving the highest satisfaction. The only reward we expect for our labors is in the feeling that we have contributed in no small degree to the comfort and health of so many of our patrons and friends in their happy homes. We predict that in ten years no other form of air furnace will be used by intelligent housekeepers in the country.

OUR MEDICAL EXCHANGES.

THE *New York Medical Journal* for December has the following Original Communications: I. E. S. Dunster, M. D. — The Relations of the Medical Profession to Modern Education. II. L. D. Mason, M. D. — The "Rubber Air-Cushion" in the Treatment of Complicated Fractures, and other Severe Injuries of the Lower Extremities, with Illustrative Cases. III. Frederick D. Lente, M. D. — Dangerous Effects of a Hypodermic Injection; Extraordinary Slowness of Respiration; Recovery. IV. E. Holden, M. D. — Relation of Hæmoptysis to Phthisis. V. J. H. Hobart Burge, M. D. — A Case of Partial Placenta Prævia. Novel Mode of controlling Hemorrhage. VI. P. De Marmon, M. D. — Report of Three Cases of Poisoning by Whiskey in Children, with Remarks on Alcoholism.

The *American Practitioner* has original articles on Non-malarial Origin of Fever, by S. Littell, M. D.; Carbonic Acid and Fever, by H. Beauchamp, M. D.; An Attempt to Designate and Identify the Cause of Several Diseases, by Duff Child, M. D.; A Musket-ball in the Frontal Sinus — Removal after Six Years, by Preston Peter, M. D.; Removal of a Pessary from the Bladder with Remarks, by Levin J. Woolen, M. D.; On the Treatment of Typhoid Fever, by J. Hale, M. D.; A Case of Chronic Spermatorrhea, by J. R. Barnett, M. D.

In the *Chicago Medical Journal*, the leading articles are as follows: I. Injury of the Head — Abscess, with Absence of Symptoms, etc., by C. T. Parkes, M. D.; II. A Case of Traumatic Tetanus, treated with Hyd. Chloral, by A. H. Kinnear, M. D.; III. Read to the Muskingum Co. Med. Society, by A. Ball, M. D.; IV. Clinical Experiences in Private Practice, etc. by Z. C. McElroy, M. D.; V. A Day amongst the Surgeons of Philadelphia, by John E. Owens, M. D.; VI. Prof. Beale and his Doctrines, by I. N. Danforth, M. D.; VII. Case of Irregular Innervation, by Walter Hay, M. D.; VIII. Cases from the Surgical Clinic of Prof. Moses Gunn, of Rush Medical College, reported by H. F. Chesbrough, M. D.

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — home science, arts, agriculture, medicine, etc. — will be answered under this head, but *only when the subject is one of general interest to our readers.*

ANSWERS to questions sent us will often be found elsewhere in the paper. Quite a number of our correspondents are referred to the article on the *Aurora* on page 73; others to "Useful Recipes," on page 75, and to items under "Arts" on page 76.

J. E., of HIGH GROVE, Ky., writes as follows: "You gave a rule in the JOURNAL for estimating the number of bushels in a bin or box. Another convenient one is as follows: Multiply the number of cubic feet in the box by the decimal .8, and the product will be bushels and tenths of bushels, very nearly. The decimal carrried out to five places is .80031."

QUERIST, from NEW YORK, wants to hear "what becomes of the water whirled down in the Maelstrom on the coast of Norway." It ought to be generally known, by this time, that this fearful whirlpool, as described in old books (and new ones not up with the times), is a myth. At certain stages of the tide there is something like a whirlpool, and in bad weather the place is a dangerous one, even for large vessels; but if these are wrecked, it is by being dashed against the rocks, or by foundering, — not by being drawn down into a vortex. See Lord Dufferin's "Letters from High Latitudes," Bayard Taylor's "Norway, etc.," and other recent books of travel. In 1859, an official report on the subject was made by Mr. Hagerup, Minister of the Norwegian Marine, who says that more violent currents of the kind are to be found at other points on the coast of Norway, but the worst of them is not so bad as the Maelstrom of the old stories.

A. V., BALTIMORE. See recipe for "Camphor Ice" on page 84.

W. R. Y., MILLERSBURG, Ohio. The following is a recipe for violet and other colored inks: Digest half an ounce of the proper aniline color in five ounces of alcohol, in a glass or enamelled iron vessel for three hours. Then add a full quart of ice or distilled water, and heat gently for several hours, until the odor of spirits has disappeared; then mix in two drachms of gum-arabic dissolved in half a pint of water, and allow the whole to settle. From the first experiment the exact proportions of color must be seen.

But, as we have said before, these inks are liable to fade, and cannot be commended. We heartily endorse the following from an exchange: —

"We deprecate, as wasteful of time, temper, and eye-sight, the fashion now prevalent of using violet and other tinted writing-inks. The chemist who will give to the world an ink *perfectly black in the act of writing*, and remaining so for all time, and of proper, but not a too watery fluidity, will confer a great benefit, and may make a fortune beside."

W. E. R. inquires why the sun and moon appear larger on the horizon than high in the heavens. The explanation generally accepted by scientific men is the fact that we judge of the distance of unknown objects (and consequently of their size) by comparing it with the distance of known objects. When the moon is on the horizon, we see that she is beyond all the objects on the earth in that direction, and therefore she seems farther off than when overhead, where there are no intervening objects to help us to judge of the distance.

J. R. H., ATHENS, Ala. We gave an account of the Metric system, with simple rules for reducing the denominations to English equivalents, on page 99 of our last volume (March, 1870).

A READER, commenting on our statement that the inventor of the lucifer match is not known, says that the person was a Mr. Walker, chemist, living at Stockton-on-Tees, England, and that he brought his invention before the public about forty years ago.

W. H. J., BOSTON, inquires for a simple way of coloring bee's-wax *red*, without injuring its properties.

J. G. P. asks why a wet rope contracts in length. Because the water, absorbed by capillary attraction into the fine tubes of the fibre, increases their diameter, and so diminishes their length.

JANE E. GILLIS, of RICHMOND, sent us $1.00 some time ago; but as she forgot to give the State, and as there are *twenty* post-offices of that name in the United States, we do not know where to send her paper.

A. R. TUCKER, of WOLCOTT, sends $1.00; but he fails to add his State, and there are five post-offices of that name.

Medicine.

HYDRATE OF CHLORAL.

Dr. J. P. Chesney, of New Market, Mo., communicates to the *N. Y. Medical Gazette* an account of his experience with hydrate of chloral, from which it appears that he has put in jeopardy the lives of several patients by using what is evidently a vile, impure compound. In describing what he has been using, he remarks as follows: —

"It looks like a translucent salt in a half deliquescent state — like a mass of clean snow saturated with clear water until it reaches the 'mushy' condition: and when taken up on the point of a clean knife-blade, leaves a greasy-looking moisture; it is perfectly soluble in a small quantity of water. The bottle containing it was two thirds full, and about half the size of an ordinary quinine jar, closed with a well-fitting glass stopper; label, in large blue capitals, 'HYDRATE OF CHLORAL.' No name of place nor of the manufacturer given. My druggist lives twenty miles distant, and I have had no chance to make inquiry as to its origin. Price $1 per oz. I have no doubt that the extensive demand for this article will cause our markets to be, for a time, flooded with worthless imitations, and the journals should warn the medical public of such a possibility, if not the probability."

Now, it is very strange that any physician should *risk* so much as to use a new and powerful agent which comes into his hands without assurance from any one that it is the article he wants. Upon the vial the name of maker was not given, and undoubtedly it was an impure, dangerous compound, bought by some druggist at a low price, and sent out to be dispensed to the sick and the suffering. Tens of thousands of ounces of *impure* hydrate of chloral are made and sold in this country every week, and no wonder physicians have such fearful experience with it. We have tested specimens of two lots of several thousand ounces each, which were loaded with impurities; and yet we have reason to believe that every ounce was placed in the market, and is probably now being dispensed by physicians. If physicians fully realized how they are deceived and cheated in this way, they would be more cautious, and thus save their own reputations and the lives of their patients.

THE PHYSICAL UNITIES OF THE HUMAN BODY:

DYNAMICAL, PHYSIOLOGICAL, PATHOLOGICAL, AND THERAPEUTICAL.

BY Z. C. M'ELROY, M. D., ZANESVILLE, OHIO.

If the human body were presented to a competent physicist for study, acquainted with the accumulated facts of its anatomy, physiology, pathology, dynamics, and therapeutics, unembarrassed by any previous theories, speculations, or conjectures concerning it, he would not consume much time in unveiling most of its hitherto impenetrable mysteries.

As the initial step, he would determine, as he could readily do, that it was composed of certain definite elementary bodies, common to earth, or inorganic nature, and in definite proportions; and controlled in all its processes of growth, repair, and decay, by the earth's forces, except in, as yet, one unexplained feature, to be noticed hereafter.

But little observation would satisfy him of the intimate relationship existing between it and all organic life on the globe, be it biped or quadruped, fish or fowl, worm or insect, in both material and force. Nor would he be long in determining that all animal life was but a higher type of the vegetable, seeing that directly, as in the herbivora, indirectly, as in the carnivora, or those subsisting on parts of both, the omnivora, they were all alternately dependent on the vegetable kingdom for food, from which to construct their tissues; and that there is, in certain vegetable products, material common to them all; so that at last the only real difference between them lies in their *forms*; and that in the scale of animal existences from the lowest, or most simple, to the highest, or most complex, each added function has behind it a special form of structure.

Nor would he fail to notice the almost continuous stream of material, solid, fluid, and gaseous, organic and inorganic, going from without into the interior of the body, as well as the equally continuous return current of matter, having undergone chemical changes in it, through the skin, from the lungs, and at stated intervals the contents of reservoirs of sewerage, — the bladder and lower bowel, — from the interior of each and all animal existences; the quantity being the chemical equivalents of the dynamic, or mechanical, chemical, thermal, sensory, emotional, intellectual, and psychological results, evolved in a given time.

Neither would he dwell long on the determination of the problem whether organic instrumentalities performed their functions at the expense of their substance, as the candle, or only furnished conditions for chemical changes in other matter, as the lamp. And his conclusion could hardly fail to be that they performed their functions at the expense of their substance.

No candle is designed or expected to be chemically changed at once, evolving all its light, heat, and other chemical products, as in the chemical changes occurring between the materials of gunpowder in the act of explosion; but for all the light and heat evolved, so much of its substance has been chemically changed into carbonic acid and aqueous vapor.

Entering upon the duty of grouping the separate viscera and tissues, no greater difficulties would be presented than those he had already overcome. It would be plain to him that provision must exist for the transformation of the food eaten into the forms and substance of the viscera and textures; and that from the means to these ends little or no sewerage would be necessary, after leaving the main alimentary tract; and consequently all so-called viscera, without conduits to the exterior, must of necessity act only in the interest of repair; and further that as each organic instrumentality performed its function at the expense of its substance, a general system of sewerage must exist to convey to the exterior waste or effete educts and material, much of which cannot be worked over again in the system, though some, as the alkalies, undoubtedly are, and perhaps others, as carbon and hydrogen. This is found in the system of so-called absorbents, while much effete gaseous matter finds exit at the lungs.

These things determined, as they all have been, and that beyond all cavil or doubt, the induction would necessarily follow that the leading processes of any animal body would be repair and waste, — histogenesis and hystolysis, — *i. e.*, constructive and destructive metamorphosis; and that so long as these processes proceeded normally, and molecular forms of structure normally reproduced, the result would be health, or ease of body; and that when disarranged, or molecular forms of structure lost, the opposite condition, or dis-ease, or want of ease, must necessarily result.

And from these premises the further induction would unavoidably result, that the physical and physiological unities of the human body are, —

1st, Material, *i. e.*, certain elements in definite proportions; 2d, Form, *i. e.*, that these elements must be worked into definite molecular forms of structure; 3d, Motion, *i, e.*, chemical changes, whose unit is motion, must occur in the molecular forms of structure, as fundamental conditions for the performance of normal functions.

Function is, then, demonstrated to be the expression, or so to speak, the language of the molecular forms of structure, and depends on the molecular forms of structure, and motion in the molecular forms of structure itself.

And these are the ideal unities into which merge all the accumulated facts of anatomy, physiology, pathology, therapeutics, and dynamics; and these ideal unities give rise to mental conceptions, which correctly represent the facts of organic life to the mind of each and every student of the human body, anatomically, physiologically, pathologically, therapeutically, and dynamically, which the separate facts themselves as certainly fail to do, disconnected from any ideal unities into which they can all be merged.

It is, then, apparent that there are not now, and never have been, and never are likely to be, any separate and specifically distinct pathological states or conditions in a human body; and, therefore, the long catalogue of what are now taught and believed to be separate and distinct so-called diseases must be materially abridged, if, indeed, the wet sponge is not necessary to erase them entirely. For, as they stand now, they certainly give rise to mental conceptions or ideals which do not represent the facts of life to any mind. A necessary condition for specifically different pathological states is human bodies specifically different in material, forms, and forces, which as certainly have no existence.

A physiological human body is made up of certain definite materials, with definite molecular forms of structure, and a definite velocity of motion, or chemical changes, in the molecular forms of structures. A human body in a pathological state can only consist of abnormal velocity of molecular changes, or changed or changing forms, one, or two, or all three. And into one or some combination of these ideal unities merge every known past, present, or possible future pathological condition. And farther, the causes of all the so-called separate diseases, organic or inorganic, gaseous, fluid, or solid, or naked modes of force, can do nothing more, or nothing less, or nothing different, than to retard, accelerate, or arrest motion, or chemical changes, or change molecular forms of structure in a human body, dead or alive, sick or well.

These facts and inductions make it further apparent that all present classifications of therapeutic, remedial, or hygienic agencies or measures whatever, and the ideals to which they give rise, must also be materially modified, if not wholly abandoned, and others substituted, based on the ideal unities of organic life, to the end that the conceptions to which they shall give rise may correctly represent the facts to the mind. For all that any therapeutical, remedial, or hygienic agency or measure ever has done, or ever can do while the laws now governing the universe are in force, is, —

1st, To promote or retard motion or chemical changes in the molecular forms of the viscera or textures.

2d, To change the molecular forms of structure. These are the naked facts and inductions of modern science, or rather warranted by modern science, in reference to organic life; and they would be speedily recognized and accepted, but for the hypothetical existence of a peculiar force termed vital, manifested nowhere else in the universe, except in living beings. What is called vitality, spirit, or life, is a resultant, and not a cause, of the chemical transformations of the matter composing a human body. Nothing is or can be known of soul, spirit, or life, except through

the forms and motion, or chemical changes, in the molecular forms of structure of the human body. The existence of spirit is self-evident; but no shadow of proof is in existence going to demonstrate that it in any wise controls the physical organization of the human body. This is, through almost innumerable facts, clearly traceable to the ordinary physical forces, in all that concerns its growth, repair, and decay. The sole fact, not as yet accounted for by science, is its molecular forms of structure, as well as physical contour. But that these — physical contour and molecular forms of organic structures — are due to peculiar modes of the physical forces, not as yet identified and separate from them, is well nigh certain; for the constant forms assumed by inorganic matter in passing from fluid to solid states are probably due to a common or uniform form force, operating alike in organic and inorganic natures, just as the chemical transformations of matter are due to a uniform formless or working force, whether in the animal, vegetable, or mineral realms of nature.

It is due to medical science that this advanced ground be speedily occupied. Biology as a science has now no existence in fact; while pathology, therapeutics, and dynamics are simply empiricisms.

Among the cultivated outside of the profession, these truths are, to a greater or less extent, recognized, and hence, with them, the profession, as a body, has but an equivocal status; while the disagreements of the practitioners of its several departments are a standing reproach. A recognition of these, or, if not these, any ideals into which all the accumulated facts of life can be merged, will at once establish scientific order — a standard by which to judge empirical observations and experiences; then disagreements among practitioners of any of the several departments of the healing art will disappear, because they will be impossible.

On a physical basis, physiology, pathology, therapeutics, and organic dynamics may speedily attain a certainty little short of mechanical engineering in our own times. The culture of the age demands it, and sooner or later will possess it. Why does the profession defer it to the future?

MEDICAL MEMORANDA.

Glycerine. — Dr. Unziger recommends to the profession the use of glycerine instead of syrups when prescribing medicines in a liquid form. His reasons are: that it possesses great solvent powers, and mixes well with most substances; that it acts as a great preservative to the medicine by preventing fermentation and decomposition; that in the practice of children especially, it counteracts fermentation in the stomach, acts as a nutritive, and thereby greatly diminishes irritation in the alimentary canal. It has no superior as a vehicle for giving acrid substances, such as tincture of guaiac, turpentine, ammonia, chloroform, acids, etc. In prescribing glycerine for internal use, only the very best ought to be used, as an inferior, impure article would only produce adverse results.

Maxims of Success. — The celebrated Scotch surgeon, Dr. James Syme, used to give his students the following rules to insure success in practice: —

1. Never look surprised at *anything.*
2. Before stating your opinion of a case on your second visit, ascertain whether your previous directions have been complied with.
3. Never ask the same question twice.

Hygienic Treatment of Disease. — The following is an extract from the admirable Address in Medicine, by Dr. Francis Gibson, at the last meeting of the British Medical Association: —

"Side by side with the use of medicine, and not second to it, is the so-called hygienic treatment of disease, — the study and regulation of the vital forces. The influence that the physician exercises over the mind, and through the mind over the body; the soothing or the stimulation of the nervous power; the calming of exaltation or the stirring up of apathy; the quieting of the over-busy brain or the spurring of the flagging will; the repose of over-used powers or the awakening of suspended vital functions; the subduing of the over-sensitive skin, or the stimulating of it where wan, muddy, and lifeless; the limiting of supplies to the over-fed frame or the repair of the wasted body by the proper kinds of food and stimulants; the bringing into play, and so again into existence, muscle that had become wasted and paralyzed by disease, — these are among the aims the physician seeks to accomplish, and these are among the means which he seeks to employ irrespectively, but by no means necessarily, without the use of medicine; these are among the agencies which you hold in your power in the treatment of disease, and that you, each of you, exercise daily in coping with the various forms of malady, of ailment, and of constitution."

Leeches. — Few persons have any conceptions of the magnitude of the leech trade. France is said to consume annually 100,000,000 of leeches, England and Germany the same, and other countries in proportion. From official statistics of France, Germany, Russia, Italy, and Turkey, it has been gathered that the prime cost of leeches sold in Europe exceeds $10,000,000 per annum. Some parts of Australia abound with leeches, those which frequent the Murray River being preferred by the medical faculty to any other known specimen. They bite freely, and leave no inflammatory wound or mark behind. They thus equal, if they do not surpass, the famed freckled leeches of Northern Europe.

Pharmaceutical Homicide. — "Little mistakes" in dispensing medicines are becoming more rather than less frequent. The *New York Medical Gazette* says: "Two more deaths from ignorance or carelessness of druggists' clerks were reported last week. At Batavia, in this State, a young man was given eighty grains of tartrate of antimony in mistake for a dose of salts (so the Albany *Evening Journal* has it, although such an error seems almost inconceivable), death ensuing in a few hours; and in Bridgeport, Connecticut, a girl aged twelve was killed by the substitution of morphine for quinine in compounding a prescription. When shall we have laws prohibiting the dispensing of drugs by any save graduates of a College of Pharmacy?" — And when, we may add, shall we have "Colleges of Pharmacy" that are worthy of the name, so that their graduates may properly be intrusted by law with this responsible business of dispensing medicines?

Singular Cause of Death. — The *Lancet* states that a woman named Cooper, housekeeper to Mr. W. Boyce, at Newmarket, was sitting near a table on which were some poisoned papers for the purpose of killing flies. A fly was seen to go to one of these papers, and then to alight on the woman's nose, which was slightly scratched. The wound became speedily inflamed, in a short time her whole system became affected, and in about twenty-four hours she died.

Carbolic Acid and Street Watering. — Dr. Whitmore, in his Report of the Health of the Parish of St. Marylebone, London, for August, says: "During the summer most of our crowded streets have been watered on alternate days with a weak solution of carbolic acid, as has been the custom for the last four years, and there is no doubt that this excellent antiseptic and disinfectant has been very beneficial in a sanitary point of view. The inhabitants of those streets have often expressed satisfaction at the freshness and removal of disagreeable smells which this acid produces, and they regard it as an addition to their comfort."

QUACK MEDICINES.

Quack medicines, like Macbeth, bear a charmed life. Serious argument, ridicule, the inexorable logic of repeated failures and exposures, have no effect on their consumption, so long as the proprietors supply the "go-power" by untiring advertising. For this reason, we think most of them will survive the following smart attack made on them by the *San Francisco News Letter.* Our contemporary writes: "We have a suggestion to make to the medicine men, which we will preface by the statement that for a considerable part of the nineteenth century we have been taking their prescriptions with an unquestioning and lamb-like compliance that entitles us to a respectful hearing in return. The principal affliction under which our healthless community writhes like a colicky worm is 'ye Nostrum.' Why should it longer writhe? Granted that the community is an ass, which gets itself poisoned by cropping a noxious weed in preference to a healing herb. Asses, on account of their relationship to ourselves, must be tenderly looked after and firmly restrained. There are an infinite variety of ways to restrain them, all more or less ineffectual. Probably the one that is least so is the crunching of their heads with the back of an axe, or some process that shall give a similar result. And this is the method we would employ in dealing with their fellow brutes who stuff their systems with patent medicines and feed the same to their females and young. We would mash their heads. But inasmuch as, under our mawkish civilization, this is quite impossible to accomplish in any kind of peace, there is no choice but to be content with a method less satisfactory to the feelings, but equally efficacious, so far as concerns final results. Our leading physicians of the McNulty-Maxwell stripe should combine in an anti-nostrum society. They might employ an experienced chemist whose duty it should be to carefully analyze every patent medicine in the market, and publish its composition to the world; with some judicious remarks — adapted to the meanest capacity extant — as to the probable or observed effect of taking it into the stomach. There is little doubt, such is the influence of the mind upon the body, that a great multitude of the unlucky wights who have been dosing themselves with these villainous drugs would, upon learning what they have got inside them, keel over and die. This would be a positive blessing. It would materially decrease the vote at primary elections, and would render anti-coolie conventions impossible. It would probably not interfere more than temporarily with the profits of apothecaries, for people would take more medicine of the proper kind. By the same token, it would increase the fees of the regular practitioners. Upon this cogent argument we rest our case."

SCARLET FEVER.

According to the *British Medical Journal*, during the 21 years from 1848 to 1868 inclusive, there were registered in England and Wales 415,982 deaths from scarlet fever and its allied disease, diphtheria. To bring this number down to the present time, exact data are not yet forthcoming; but it may be estimated that at least 40,000 deaths occurred throughout England last year. In the six months ending June last, 13,000 deaths were returned as resulting from scarlet fever and diphtheria, — a number which we suspect, however, to be under rather than over the mark. Here, then, we have an aggregate in round numbers of 470,000 persons who have fallen victims to one type of zymotic disease in the last 22½ years. But what of those whom the diseases attacked, but did not kill outright? On the most moderate assumption, it is probable that at least 5,000,000 of persons in England have, during the last 22½ years, suffered more

or less severely from attacks of scarlet fever and diphtheria. That a considerable number of these persons ultimately perished by other maladies, either induced by the original attack or supervening on a broken constitution, must undoubtedly be taken for granted.

Speaking of the propagation of the fever, the *Medical Gazette* says: "It is spread by personal carelessness, by neglect, and by recklessness of individuals as to the public safety. Scarlet fever is propagated from person to person by culpable ignorance and criminal neglect. Cleanliness and general sanitary regulations are of use in mitigating the severity of the disease, but are no bar to its propagation. Scarlet fever is one of the most intensely and continuously contagious diseases. From the outset of the disease till the completion of the subsequent process of peeling the skin, the patient, his clothing and discharges, and the light scales which are diffused in the atmosphere from his poisonous surface-skin, are pregnant with poison. Not only should he be carefully isolated; not only should his clothing and all that comes in contact with him be carefully and thoroughly disinfected; not only should his body be anointed, as Dr. Budd has recommended, with oil to limit the aërial diffusion of the epidermal scales, but the utmost care should be exercised by the persons attending him not to become carriers of this virulent and subtile poison. To send to the laundress garments fatal as those of Dejanira, to expose in a public carriage or a crowded waiting-room the fertile sources of a deadly and volatile poison, are terrible offences against the public safety. They are constantly and carelessly committed, and it is thus that scarlatina is spread."

AN EXCESSIVE DOSE OF CHLORAL.

Dr. James Rodman, of Hopkinsville, Ky., relates the following case in the *American Practitioner*: —

Forty-five grains of hydrate of chloral was prescribed for an insane gentleman, of spare frame and delicate organization. This dose had on several former occasions been administered to him with the effect of producing from seven to nine hours of unbroken sleep. On this occasion, the first dose of forty-five grains proving insufficient, the nurse, without consulting Dr. R., allowed the patient to take two hundred and twenty-five grains more, making in all two hundred and seventy grains in less than two hours. Deep sleep followed, which was not regarded with concern by the attendants until seven or eight hours had elapsed. Dr. R. then found him sleeping heavily but quietly, his skin rather warmer than natural, pulse less frequent than in health, but full and strong; his pupils were sluggish and contracted, conjunctiva injected, respiration normal in character and fifteen in a minute, and he could with difficulty be aroused to any sense of his surroundings. Sleep continued eighteen hours, during which time the patient was aroused only occasionally by considerable effort, and swallowed a little water.

The treatment consisted of cold affusions to the head, not frequently repeated, and he was walked at short intervals between two assistants, and vapor of ammonia applied to his nostrils. This expectant treatment was adopted, as the condition of the patient was by no means alarming, and the lapse of time after the exhibition of the drug rendered an antidote unavailing, even if he had known of any that had been properly demonstrated to possess antidotal properties. When the patient awakened, he presented the appearance of a man recovering from profound alcoholic intoxication. There was no headache nor nausea. He had a keen appetite, healthy pulse, warm extremities, but a constant sense of chilliness, that passed away in a few hours.

This case is very remarkable for the absence of those alarming symptoms which we should naturally expect to result from such an enormous dose of this substance.

THE TREATMENT OF THE INSANE WITHOUT MECHANICAL RESTRAINTS.

Dr. Henry Maudsley, writing on this most interesting subject in the London *Practitioner*, says: "The principle of the non-restraint system, in the true acceptation of the term, is, while avoiding a meddlesome interference, to make all the surroundings of the poor lunatic as tranquil, as orderly, as gentle, as may be consistent with his proper care, — to counteract the commotion in him by an absence of commotion in what is around him. The lunatic cannot, any more than the sane person, resist the steady influence of his surroundings; he assimilates them unconsciously, and they modify his character for good or for evil. How little a system of mechanical restraint fulfils the conditions of the just principle of treatment is so plain that a wayfaring man, though a fool, can hardly fail to see it. An excited, active patient, urged by an uncontrollable instinct of movement, desiring and needing above all things freedom of limbs, is secured hand and foot by mechanical appliances — with what result? That he is provoked into furious mania, expends his energy in shouting and raving, and becomes dirty in his habits, — dirtiness in some shape is, in fact, unavoidable under such circumstances. . . . There can be no greater fallacy than that of supposing what is called a moderate use of mechanical restraint to be consistent with a general plan of treatment in other respects humane and beneficial. It must be dispensed with altogether, or deterioration will ensue in the patient, and all kinds of neglect and tyranny will be engendered by degrees, until restraints become the usual substitutes for forbearance and watchful attention. . . . It is necessary that the abolition of restraint should be absolute to be efficient; the principle of the non-restraint system will admit of no compromise. . . . . I do not hesitate to express a strong personal conviction that the use of mechanical restraint in any asylum, public or private, is an indication of a badly managed institution, and that its use in the treatment of private cases is unnecessary and prejudicial. Where it is entirely dispensed with there will be less excitement, fewer scenes of violence, less need of secluding patients, and earlier and more numerous recoveries than where it is in use. For it is not only an evil itself, but it is the fruitful parent of a multitude of ills, not the least of which is the certain deterioration of all who have any part in its employment, whether suffering or doing."

THE THERMOMETER IN MEDICINE.

The *British Medical Journal* expresses the hope that "it will not be long before every intelligent mother of a family is familiar with the use of the thermometer for the discovery of disease. In many respects, it is far more reliable than the tongue or the pulse. As a means of ascertaining when it is desirable to consult a doctor, and when advice may be deferred with safety, it would be invaluable. By its aid the difference between insignificant skin-rashes, which will disappear in a day or two, and those which imply a constitutional fever, may usually be satisfactorily determined. Under many circumstances, the early discovery that a child was sickening for scarlatina or measles might be of great importance. We hope that before long a few brief rules adapted for home employment will be prepared, and that, aided by them, the mothers and nurses of our land will at once commence the acquisition of a kind of experience which will become every year of increased importance. In addition to its practical value in reference to the health of their households, we must also add that all who becom familiar with the facts of human thermometry mu learn some very interesting lessons in physiology."

VALUABLE FORMULÆ.

Cologne Water. — The following gives an arti cle of superior quality, if the oils are pure and th alcohol good: —

Pure Alcohol	6 gallons.
Oil of Neroli	4 ounces.
" " Rosemary . . .	2 "
" " Orange . . .	5 "
" " Citron . . .	5 "
" " Bergamot . . .	2 "

Mix with agitation; then allow it to stand for few days perfectly quiet before bottling.

The following affords a good article, but no equal to the preceding: —

Pure Alcohol	6 gallons
Oil of Neroli	2½ ounces
" " Rosemary . . .	2 "
" " Orange peel . . .	4 "
" " Lemon . . .	4 "
" " Bergamot . . .	4 "

Treat in the same way as the first.

Camphor Ice. — Expressed oil of almonds an rose-water, each 1 pound. White wax and sper maceti, each 1 ounce. Camphor, 2 oz. Oil of rosemary, 1 dr. Melt together. Glycerine may b substituted in part for the oil and rose-water.

Tincture Kino. — In our last we referred to a inquiry for a method of preventing the gelatinizin of Tinct. Kino. A friend in Brooklyn, N. Y., send us the following formula: —

Kino	℥iss.
Logwood, in coarse powder .	℥ss.
Alcohol, dilute	q. s.

Moisten the logwood with dilute alcohol, an pack in a glass percolator; dissolve the kino b trituration in successive quantities of dilute alcohol pour this solution and dilute alcohol over the log wood until one pint of tincture has passed.

Our correspondent says that tincture prepared a year ago by this formula is now just as liquid as when first made, while that made according to th Pharmacopœia became in a short time so thick that it could not be poured from the bottle.

Burns and Scalds. — Dr. Ferguson gives th following recipe which he has tested in the severes cases of burning and scalding from railroad an steamboat accidents with invariable success: Gly cerine, five ounces; white of egg, four ounces tincture of arnica, three ounces. Mix the glycerin and white of egg thoroughly in a mortar, and grad ually add the arnica. Apply freely on linen rags night and morning, washing previously with warn castile soap-suds.

The celebrated English surgeon, Mr. Skey, recom mends the application of a solution of nitrate of sil ver in a proportionate strength, varying from five t twelve or more grains to the ounce, according to th extent and severity of the burn and the age of th patient. The whole surface of the burn should b brushed over with the solution, cotton-wool applied and a moderate opiate administered in a glass of brandy and water, proportioned to the age and hab its of the patient, with the object of counteracting the sense of chilliness that will otherwise necessarily follow in all these cases.

Many will recollect the anecdote told so often by Dr. Chapman, in regard to himself, when called to visit a little boy who had swallowed a silver twenty-five-cent piece. "Madam," said the renowned joker, in all solemnity, "was the piece good?" "Indeed it was, sir," replied the surprised but excited lady, "I got it myself from the mint." "Then, my dear madam," said Dr. Chapman, "if the money was good, give yourself no further uneasiness, for *it will certainly pass.*"

Boston Journal of Chemistry.

VOLUME V. BOSTON, FEBRUARY, 1871. NUMBER 8.

Familiar Science.

THE CLOTHING WE WEAR.

WE seldom pass through the thoroughfares of a great city without thinking how much the woolen, cotton, silk, and linen fabrics which the crowd of men, women, and children carry about with them upon their persons have to do with their health, comfort, and success in life. Clothing is used not only for warmth, but to secure coolness and to adorn the person. It also serves an important end in keeping the body clean; for with our ideas of cleanliness, if the whole surface were exposed, it would need as frequent washing as do the face and hands, which we leave bare. In our rigorous northern climate, clothing is worn chiefly for the sake of its warmth; and this is indeed the most important point which demands consideration. The human body is a singular machine, and no function of its complex organization is more wonderful than that connected with the production of animal heat. We are warmed by the process of combustion as truly as are our workshops and dwellings; but the furnace within us is a far more perfect apparatus than anything ever constructed through human ingenuity. The regulation of this internal combustion is so beautiful and exact, that the heat of the body in its normal condition never rises above or falls below 98° F. Place a thermometer under the arm so that it will be fully influenced by the animal heat, and it will rise to 98° and remain thus, no matter whether it be summer or winter. Upon our common thermometer this temperature is marked "blood heat," and it remains a fixed point in the scale. We may take up our residence within the arctic circle, or directly under the equator, and there will be no change in the internal temperature of the body. To keep up combustion, and maintain warmth in our dwellings, we use coal or wood as fuel; the body requires more refined combustible materials, such as beef, mutton, poultry, bread, butter, and vegetables, articles which we class as foods, and which are daily placed under the influence of the digestive processes in the stomach. But the stomach is not the furnace where these substances are burned to warm the body. The fireplace or furnace of the body is in the capillary system, or in the minute, invisible vessels which ramify through every part of the organization. The food we consume is not burned directly, but the tissues which are formed from the food are undergoing the process of oxidation or burning every moment of our lives, and from this burning the body is warmed. Every part of us where blood-vessels are to be formed, every part where nervous influence is perceptible, every organ, every tissue,—muscle, and brain, and nerve, and membrane,—waste away like a burning taper, consume to air and ashes, and pass from the system rejected and useless; and if we did not repair the waste by supplying food, the body would "burn up" as truly as if consumed by a blazing pile. Starvation is a burning process; and those who perish from want of food may be said to die from slow combustion. But we must not be enticed away from the topic which it was our purpose to consider.

Clothing is composed of a variety of materials, and these are used with reference to their influence upon the body. Cotton and linen are cooler than wool or silk, and consequently in this climate we prefer the latter in winter and the former in summer. The former are bad conductors of heat, but the animal products, the wool and the silk, are much worse. Clothing serves the same purpose for the body as coverings of wool or hair felting do for steam or hot air pipes, namely, to keep in the heat, or prevent loss by radiation. The worse conductor any substance may be, the warmer it will prove as clothing. Linen jackets and muslin dresses take the place of cloth overcoats and thick shawls in summer, because they are better heat conductors than the heavy woolen garments. In winter we desire to retain as much animal heat as possible, and so we don the very imperfect conducting substances of wool and silk.

The color of clothing is by no means a matter of indifference. White and light-colored clothes reflect the heat, while black and dark-colored ones absorb it. White is the comfortable and fashionable color for clothing in summer. It reflects heat well, and prevents the sun's rays from passing through and heating the body. If white is the best color for summer, it does not follow that black is the best for winter. It must be remembered that black radiates heat with great rapidity. Give a coat of white paint to a black steam radiator, which is capable of rendering a room comfortably warm at all times, and the temperature will fall at once, though the heat-producing agency remain the same as before. A black garment robs the body of a larger amount of heat than white, and consequently the latter color is the best for winter garments. It is the best color for both summer and winter. Although this statement may seem like blowing hot and cold, it is nevertheless true. Let those who are troubled with cold feet, and who wear dark socks, change to white, and see if the difficulty is not in part or wholly removed. Utility in color is confined to the different shades merging from dark into light; but we find in connection with dress all the beautiful tints of the rainbow, and these are used for the ornamentation of the person. The rich and varied colors which are so extensively worn are by no means to be condemned; adornment of the person to a reasonable extent is commendable. We all love the beautiful in nature, and what adds so much to the attractiveness of woman as the ribbons and scarfs, stained with magenta, mauve, or solferino, which adorn her person? Deep in the instincts of our nature is laid the admiration of color; and we love beautiful flowers and birds and — beautifully dressed ladies.

The abuses in dress must not pass unnoticed. The tight waists, the low necks to dresses, and the high-heeled shoes are most flagrant abuses, and ought not to be longer tolerated. We shall not quarrel with the little jaunty hats of the ladies; for they are indeed pretty, and no harm results from them, as of all parts of the body the head needs the least clothing. But, to pass to the other extremity, we have to say that the detestable high heels to ladies' boots and shoes, running as they do down almost to a point, are spoiling the gait and ruining the ankle-joints of children and young misses. We are careful to order our shoemakers to remove such heels from shoes before permitting them to be brought into our dwelling. Heels of moderate height and good breadth are of great service in elevating the feet, so as to avoid direct contact with moist earth, and they also give support and afford firmness to the step. Why should Fashion push good devices to absurd extremes? We must aid in dethroning the tyrant when her decrees lead to the physical or moral injury of the race. The present fashion of leaving the neck and the upper part of the chest bare, is fraught with evil consequences. It would be less objectionable in countries uniformly warm; but that our daughters, here in this frigid and changeable climate, should constantly expose to chilling winds a vital part of the body, is one of the evils of fashion which should be discountenanced by every mother, and father, and brother.

No part of the dress of men is really more absurd than the hard "stove-pipe" hat so generally worn; and yet all attempts to subvert it have proved abortive. For thirty years we have worn this kind of head covering, and we like it better than any other; we have tried hard to like the low soft hats, but we cannot; and this is the experience of thousands. Absurd as the high, hard hat is, it does keep the head more comfortable, it does maintain a more equable temperature, it does *feel* better, than any other form of head covering; and so let us continue to knock them against beams in attics and the branches of trees. If they serve a good purpose in brushing cobwebs from the roofs of old garrets and stables, they also protect us from bad bumps, and keep our heads comfortable.

There is much to be said upon the subject of dress, but we have not room for further remarks at present.

ALLYL.

To many of our readers allyl is probably not a very familiar word; but, like many terms found in the vocabulary of the chemist, it is connected with sundry matters of every-day interest. It is the name of one of a large class of vegetable oils which consist of only two elements, hydrogen and carbon. Many of these volatile oils are exquisite perfumes,—as, for instance, those to which the rose and the lemon owe their fra-

grance; but allyl and its compounds exhale an odor of another sort, and by no means so generally acceptable to sensitive nostrils. The onion and the garlic derive their smell and their flavor from the *sulphide of allyl*, a combination of sulphur and this hydrocarbon allyl. But in these plants we do not have the compound in its full pungency. To obtain an ounce of the odorous oil, we must distill the sweetness of thirty or forty pounds of garlic or fifty pounds of onions. *Assafœtida*, which in its commercial form is the dried juice or sap of an Asiatic plant, contains a similar compound of sulphur and allyl. The characteristic flavors of horse-radish and mustard are likewise due to allyl united with sulphur and a substance of much chemical interest, known as cyanogen.

These plants containing allyl are very widely distributed over the earth, and from the earliest times have been more or less popular as articles of food. When the Israelites were wandering in the wilderness, we are told (Numbers xi. 5) that they murmured, saying, "We remember the cucumbers, and the melons, and *the leeks, and the onions, and the garlic.*" These alliaceous vegetables were even objects of worship among the ancient Egyptians, which suggested the satirical exclamation of the Roman poet: —

"O happy country! where the gardens bear
A crop of gods through all the lengthening year."

The assafœtida is rather too strongly flavored to be tolerable to European palates, but in Asia it is a favorite condiment for food. The Frenchman makes the garlic an ingredient of countless dishes, but generally in moderation, and delicately mingled with other flavors; with the Spaniard the garlic and the onion are every-day relishes and more freely used; while, if we cross over into Africa, we find these vegetables the seasoning of the universal food throughout the whole region from the Pillars of Hercules to the mouth of the Nile. The Teutonic races, with their Anglo-Saxon offshoots, make up in their fondness for mustard for their less ardent devotion to the onion; but the latter is by no means an insignificant item in their food. England has to import hundreds of tons of onions from Spain and Portugal, to eke out the supply from home production; and in this country we consume a good part of our large onion crop, though we have a surplus for exportation.

Man has not unwisely "followed his nose" in selecting these strong-smelling plants as articles of food. Human instinct, in this case as in so many others, has proved a trustworthy guide; for the onion is one of the most nutritious of vegetables. It contains a large quantity of gluten (from twenty-five to thirty per cent. of the dried bulb) and of uncrystallizable sugar. In Spain and Portugal, the working man who makes his dinner of a piece of bread and a raw onion, eaten as a Yankee would eat an apple, does not make so poor a repast as we might at first consider it. Like plain bread and cheese, it is a cheap and simple meal, but one which is nourishing and strengthening. With such a diet a man may work hard year after year, and yet "hold his own" quite as well as some of his brethren in other lands who can command more varied and more costly fare.

NAPHTHALINE may be used instead of camphor as a protection against moths and other insects.

OZONE.

WHEN an electrical machine is worked, a peculiar pungent odor is produced, which has sometimes been called "the electrical smell." It has been found, however, that the same odor can be developed by other means, as by allowing phosphorus to remain for some time in moist air or oxygen, and by the slow combustion of ether and certain other volatile liquids. This odorous principle has been the subject of much investigation during the last thirty years, especially by Prof. Schönbein, of Basle, to whom it owes its name of *ozone*, from a Greek word (ὄζω), meaning *to smell.* After so much research, it might be supposed that we should know all about it, but ozone is still one of the mysteries of modern chemistry. Prof. Balfour Stewart, writing on the subject only a few months ago, says that it "is supposed to be a peculiar modification of oxygen, into which ordinary oxygen is converted by the passage of the electric current;" but it is now pretty generally conceded that ozone *must* be an allotropic form of oxygen, unless oxygen, instead of being an *element*, is a *compound*, of which ozone is one of the constituents.

There are several of the elements, — sulphur, phosphorus, and carbon being familiar examples — which are capable of existing in states so unlike that they would naturally be taken for radically different substances. The *diamond, plumbago* (or *black lead*, as it is popularly called), and *charcoal* are three such states of carbon, very different in their appearance and properties, and yet easily proved to be chemically one and the same element. These states are called *allotropic*, from two Greek words meaning *of a different character*, and the capability of existing in such states is known as *allotropism.* In the case of sulphur and phosphorus the element can be readily changed from one of these states to another, and back again; and it can be proved beyond all question that we have the very same portion of matter, with nothing added to it or taken away from it, from the beginning to the end of the experiment. *How* this can be we are absolutely ignorant: we give a name to the phenomenon, but as yet we have no knowledge whatever of its nature.

That ozone is either oxygen or a constituent of oxygen would appear to be proved by the fact that it can be produced by sending electric sparks through pure, dry oxygen sealed up in a glass tube. If this be done, the bulk of the gas is diminished somewhat, and the presence of ozone can be detected by the smell, as well as by chemical tests.

Assuming ozone to be oxygen, it is a remarkably energetic form of that element. It oxidizes metals on which ordinary oxygen does not act at all; indeed, it attacks all the metals except gold, platinum, and the rare metals chemically related to platinum. It corrodes cork, india-rubber, and most other organic substances; and hence it is a powerful bleaching and disinfecting agent. When breathed, even in a very dilute state, it is exceedingly irritating to the lungs, its effects being much like those produced by chlorine. Its density is greater than that of oxygen, — just one half greater, according to some authorities.

Ozone instantly decomposes the iodides of the metals, and this fact has suggested a ready test for its presence. A slip of paper dipped in a solution of iodide of potassium and starch-paste is turned blue if exposed to its action. The ozone unites with the potassium, liberating the iodine, which forms a blue compound with the starch. Since paper thus prepared is often turned blue by exposure to the atmosphere, it is supposed that ozone is present in the air in variable quantity. But as the same effect may be produced by other oxidizing agents sometimes found in the atmosphere, this test is not conclusive, unless confirmed by others. On the whole, the weight of evidence is in favor of the theory that ozone *is* a constituent of the atmosphere, and that the variation in its amount may have an influence upon health. It may often act as a disinfectant by oxidizing and destroying the organic "disease germs," if such there be, floating in the air. It is claimed that infectious diseases have sometimes abated with the coming of an ozoniferous wind. On the other hand, the irritating influence of the gas may, as some physicans believe, give rise to diseases of the respiratory organs. There is considerable evidence that colds, influenza, sore throats, and kindred complaints have been especially prevalent at times when the amount of ozone in the air was greater than usual.

It is not improbable that ozone may yet play an important part in the arts. If it can be cheaply obtained in considerable quantities, it may come to be used extensively as a bleaching agent. If it does not take the place of chlorine, it may be made available where chlorine cannot be employed. An apparatus for producing ozone by means of an induction coil has been devised, which promises to furnish the gas abundantly at small expense; and a patent has been taken out in England for the application of ozone to the bleaching of syrup in the manufacture of sugar. We shall not be surprised if the industrial uses of ozone should be as rapidly extended as those of certain other chemical agents have been in our day. Iodine, bromine, paraffine, glycerine, and carbolic acid are but a few out of many illustrations we might give of substances that a few years ago were little more than curiosities of the laboratory, while now their commercial importance is immense. Ozone may soon be added to the same list.

In this familiar account of ozone we have said nothing of *antozone*, which many chemists believe to be another allotropic form of oxygen, produced simultaneously with ozone and often confounded with it, but distinguishable from it by certain chemical tests. Its properties have been less thoroughly investigated than those of ozone. We know little enough about that, but we know even less about antozone. It is, nevertheless, a very interesting substance, and we shall speak of it hereafter.

THE STEREOSCOPE.

MR. A. C. NICHOLS, of Leavenworth, Kansas, sends us the following novel and interesting suggestions with regard to this instrument: —

One idea the stereoscope suggests is, that our involuntary seeing — that is, our seeing least changed by directed attention — is a vital act; in other words, the convergence of the lines of vision from our two eyes just necessary to prevent seeing double is such an act. But it is an act of life so constant and unremitting, in our wakeful moments, as to be far less apprehended by us than the motion of the lungs, or the beating of the heart; an act similar to that which, in our wakeful period, holds open our eyes.

I think there are moments when this life tension

is somewhat let down, and that this diminution of tension may be easily detected by a careful observer. In the half-asleep period, just between slumber and waking, if there be sufficient languor, objects will be seen double, and just the distance apart at which the stereoscope presents them.

We are told, moreover, that certain abnormal conditions of the brain give rise to double vision; and we all know that this is said to be one of the effects of intoxication.

Again, medical works state that the extract of Gelsemium is one of the most powerful relaxing agents known; and it is recommended to administer it in small doses, repeating them at short intervals till the patient complains of double vision.

Now I believe that in all these cases the vital or semi-vital act, by which the axes of our two eyes are sufficiently converged for seeing objects solid or single, is interfered with by relaxation or languor, normally or otherwise brought about.

It may be said that while the head, with its two eyes, is constantly, by mechanical formation, the original of the double-tubed stereoscopic camera, the final stereoscopic result — brought about in the mechanical world by a separate instrument — is in animate vision only realized in connection with certain degrees of wakeful attention.

Another idea with me is, that this delightful little instrument, the stereoscope, may, in the hands of astronomical calculators, be made to give us the true shape of our moon. Some astronomers hold that she is not exactly spherical, but egg-shaped, with the pointed end toward us. Might not the stereoscope settle this question?

It is well known, among photographers, that if the picture of a light-stand, whose top is round, be taken for the stereoscope, it will appear in the stereoscope in positive relief, and the top *round*, when the camera tubes were used two and a half or three inches apart; but if the camera views be apart as many or double the number of *feet*, the result in the stereoscope will be an *oval*-topped stand, sharply standing with its longest diameter pointing toward the observer, as though the circular top had been pushed out of round by a lateral pressure. In this case, the relief is simply exaggerated. The human face, treated in the same way, appears in the stereoscope sharpened or distorted from the excess of relief.

The fine point to calculate in photographing the moon for the stereoscope would be to find just how much of her libration is needed for a true production or representation of her shape; and also whether this could be secured when she is at exactly the same point in her passage from new to full; and at the same elevation in the heavens, between zenith and horizon.

Again, besides the misrepresentation of form caused by taking the two pictures for the stereoscope from widely separated points of view, there is a belittlement of the object represented. For instance, if a considerable portion of a city be taken from quite an elevation, with widely separated view points, the stereoscope will make the buildings look like martin-houses thickly set along narrow footpaths.

If, in taking a stereograph of the moon, it be possible to obtain too great a relief by using her whole libration as difference between the two camera views, thereby gaining the advantage of a "giant vision, with eyes thousands of miles apart," as Sir John Herschel aptly says I apprehend that, instead of being conscious of being magnified ourselves, we should only find the moon diminished to a foot-ball.

HAIR-BRUSHES are best cleaned by washing them in saleratus or soda-water, which removes all the oily coating. The alkali of course unites with the oil to form *soap*, which aids in the cleansing.

NOTES ON FAMILIAR SCIENCE.

TO FREEZE WATER. — At this time of year most of our readers can suggest a ready way of performing this experiment; but in hot weather or in a warm room they might not find it so easy a feat. They are aware, however, that evaporation is a cooling process, just as freezing is a warming process; in other words, that a liquid in passing to the gaseous state *absorbs* a good deal of heat, while in passing to the solid state it *gives up* heat. Taking advantage of this simple law, water may be readily frozen by the evaporation of ether. Put the water in a small test-tube; and place the test-tube, surrounded with cotton moistened with ether, in a wine-glass or tumbler. Put the nozzle of a bellows into the cotton, and blow vigorously. The current of air passing over the cotton acts on a very large surface of ether, which is thus evaporated fast enough to freeze the water in the tube.

A TRAP FOR SUNBEAMS. — In the JOURNAL for November, we explained the difference between luminous and obscure heat, and how the heat of the sunbeams is caught and confined by hot-houses, and also by the watery vapor in our atmosphere. Saussure illustrated the same thing by an interesting experiment. He made a wooden box, blackened within, having one of its sides formed of three panes of glass, separated by thin layers of air. He then put a vessel of water in the box, and exposed the glass side to the rays of the sun; and in this way he succeeded in making the water boil. The luminous heat easily passed in through the glass and the air, and was absorbed by the blackened surface; but when radiated back as obscure heat, it could not escape from the box, and after a time it had accumulated sufficiently to boil the water.

Ericsson has long been experimenting upon means for utilizing the solar heat, and has succeeded in making an engine whose motive power is sunlight. The full details of his invention are not yet made public, but it is not unreasonable to hope that it will prove of great practical importance. The amount of *force* in the solar rays that are virtually wasted on the surface of the earth is almost beyond calculation; and if even a small fraction of it can be made available for mechanical purposes, the gain to industrial interests will be immense.

WATER IN PLANTS AND ANIMALS. — Hamlet complained of "this too, too solid flesh" of ours, but it is not so very far from being fluid, after all. Organic bodies in general are made up of a very little solid matter to a great deal of liquid. To quote from Rolfe and Gillet's *Handbook of Chemistry*, "Water constitutes the greater part of all plants and animals. The human body is four fifths water. In many of the lower animals the proportion is much greater. From a sun-fish weighing 30 pounds, only 240 grains of solid matter were obtained; so that water makes up about .999 of the weight of such animals. The vegetable substances which we use for food contain almost as large a percentage of water. In potatoes, the fraction is .75; in apples, .80; in turnips, .90; in watermelons, .94; and in cucumbers, .97."

HOUSEHOLD RECIPES.

REMEDIES FOR POISON BY IVY. — 1. Olive oil is said to be a sure cure for the effects of the Poison Ivy or Poison Oak (*Rhus toxicodendron*). In severe cases it is to be taken internally as well as applied externally. Dose, two table-spoonfuls three times a day, keeping the affected parts well oiled all the time. Anointing the exposed parts with the oil will prevent poisoning.

2. Take a handful of quick-lime, dissolve in water, let it stand a half-hour, then paint the poisoned parts with it. Three or four applications never fail to cure the most aggravated cases.

TO MAKE OLD KID GLOVES NEW. — Make a thick mucilage by boiling a handful of flaxseed; add a little dissolved soap; then when the mixture cools, with a piece of white flannel wipe the gloves, previously fitting to the hand; use only enough of the cleaner to take off the dirt without wetting through the glove.

HOW TO SAVE YOUR SHOE SOLES. — Melt together tallow and common resin, in the proportion of two parts of the former to one of the latter, and apply the preparation, hot, to the soles of the boots or shoes — as much of it as the leather will absorb. One farmer declares that this little recipe alone has been worth more than the cost of five years' subscription to the newspapers publishing it.

A REMARKABLE SPRING.

A CORRESPONDENT sends us the following account of a remarkable spring in Texas: —

"About sixty miles north of Galena, near the town of Liberty, there is a spring, the water of which is quite acid, simulating lemonade, and those who taste it like it so much that they drink it almost immoderately. When you feel hot, it is quite delicious; and under any circumstances, whether you are hot or cold, the drinking of it produces perspiration, with no unpleasant effects afterward. The spring has no apparent outlet or inlet. It is probably sixty feet across it, and it is covered with a white froth or foam, which upon close examination appears like cream of tartar on a wine-cask. It kills insects, worms, and other small animals that come near and use it. No fish or other evidence of life is seen within its waters."

BIG TREES IN MISSOURI. — It is popularly supposed that California has the biggest trees in the world; but Prof. Swallow, of the Missouri Geological Survey, claims the distinction for his own State. He gives the following actual measurement of trees in southwest Missouri: —

"The largest is a sycamore in Mississippi County 65 feet high, which, 2 feet above the ground, measures 43 feet in circumference. Another sycamore in Howard County is 38 feet in circumference. A cypress in Cape Girardeau County, at a distance of one foot from the ground, measures 29 feet in circumference. A cotton-wood in Mississippi County measures 30 feet around at a distance of 6 feet above the ground. A pecan in the same county measures 18 feet in circumference. A black walnut in Bentou County is 26 feet in circumference. A tulip tree (poplar) in Cape Giradeau County is 30 feet in circumference. There is a tupelo in Stoddard County 30 feet in circumference. There is a hackberry in Howard County 11 feet in circumference. A Spanish oak in New Madrid County is 26 feet in circumference. A honey locust in Howard County is 13 feet round. There is a willow in Pemiscot County that has grown to the size of 24 feet in circumference, and 100 feet in height. Mississippi County boasts of a sassafras that must be king of that tribe; it measures 9 feet in circumference. In Pemiscot County there is a dogwood 6 feet in circumference. In Mississippi County pawpaws grow to a circumference of 3 feet, and grape-vines and trumpet creepers to a circumference of 18 to 20 inches."

RELIGION AND SCIENCE. — The devout man trembles without cause at the progress of science; science has power and permanence only as it is true; and, so far as true, science can only be a reading of part of the thoughts of God. The man without religious faith boasts without cause over the reduction of all things to scientific law. Scientific laws constitute only the *grammar* of the Divine speech. For the meaning of the creative word, we look much higher. — *Rev. Thos. Hill, D. D.*

The Arts.

MEMORANDA IN THE ARTS.

Adulteration of Aniline Colors. — The *Manufacturers' Review* states that aniline dyes are now frequently adulterated, chiefly with sugar and starch, and gives the following methods for detecting the fraud: —

"To test for sugar, dissolve a quantity of the aniline dye in water, add a little yeast, and place the solution where the temperature is between 68° and 77° F. If sugar is present, fermentation will set in in a few hours, the progress of which will be indicated by the abundant evolution of bubbles of carbonic acid gas.

"In testing for starch, we must remember that aniline colors are soluble in alcohol, while starch is not. In this case, therefore, we take a quantity of the aniline color, pour alcohol on it till it is saturated with color, and then pour it off from the undissolved residue. The treatment with alcohol is repeated till the residue is no longer colored. We may then examine the residue under the microscope, or by boiling it with hot water, to satisfy ourselves that it is really starch."

If the insoluble residue does not appear to be starch or sugar, further chemical examination will be necessary. It is said that soda salts are often used to adulterate aniline dyes, and that their amount sometimes rises as high as 20 per cent.

Vegetable Down. — From the same excellent authority we learn, that in Europe the decreasing supply of horse-hair from America and the increased demand for the article have led to many efforts to find a good substitute for it. Most of these have proved failures; but a Mr. Kratzenstein, of Amsterdam, has prepared a "purified vegetable down" which appears to be even better than the horse-hair itself. "This down is the envelope of the cotyledon of an Indian fruit, for the cleansing and working of which Mr. Kratzenstein had a special machine constructed. The advantages claimed for this material, which is offered on its own merits, are — great durability; greater lightness, as a mattress requires, according to its size, from six to eight pounds less of it than it would of horse-hair; it is easily worked and reworked, requiring no preliminary preparation; greater cleanliness. Being a purely vegetable article, it cannot become the home of moths or other vermin. It costs about 38 cents (gold) per pound."

Russian Cotton Factories. — Russia has 667 cotton factories, employing 180,000 operatives. Before the war in this country, cotton manufacture had scarcely commenced in Russia. During that period, however, the Russians began to manufacture Bokhara, Persian, Indian, and other cotton; and it is said that their factories are now the most magnificent in the world, exceeding in style and completeness even the English establishments. The products amount to $50,000,000 annually.

Petroleum as Fuel. — There is a fair prospect at last that crude petroleum can be used advantageously as fuel for steam boilers. The great difficulty hitherto has been the clogging up of the tubes used for feeding the flames by a deposit of solid carbonaceous matter. This obstacle has at last been removed, and there is a factory in Philadelphia which is running night and day with no other fuel. The fires have now been running six months continually. There is no smoke from this new fuel, no gas, and no trouble in feeding the furnaces; the engineer is also the fireman, as he has only to turn a stop-cock to increase or diminish his fire. Having no ashes to clean out, and being able to keep his engine room in good order at all times, the smell of the burning oil is scarcely perceptible. This material for generating steam is likely to prove a great saving in large factories, as petroleum costs only about half as much as coal when used as fuel, with a very large saving in labor. It generates steam much more rapidly than coal, and with ordinary care is just as safe to use. If it can be used on ocean and river steamers, much of the room required for coal can be devoted to stowing cargo, thereby materially increasing the profits of the voyage.

Lively Work on the Wires. — There was quite a rivalry among the telegraph companies between Washington and New York in transmitting the President's Message this year. The document contained about 9,000 words, and was transmitted over 10 wires by the Western Union Company, dropping copies at Baltimore and Philadelphia, in 37½ minutes, or at the average rate of 25 words per minute on each wire.

The entire message was transmitted by the Bankers' and Brokers' and the Franklin Companies in seventy minutes, employing two wires each. This was at the rate of 33 words per minute.

The Franklin Company used two wires until the message was completed, and a third wire for 15 minutes, the average time being 70 minutes and the average speed 28 words per minute.

The Bankers' and Brokers' Company used two wires, the average time being 70 minutes, and the average speed 35 words per minute. One of these wires averaged 39 words per minute.

Household Steam-engines. — Some months ago, we referred to the fact that steam-engines of about one "Biddy" power had been made for domestic use in France, and that they gave good satisfaction wherever they had been tested. More recently we have met with the following description of one of these engines in an English paper: —

"The apparatus consists of a small vertical boiler, heated by several Bunsen burners, the supply of gas to these burners being governed by a simple automatic arrangement dependent for its action upon the pressure of the steam. Thus, as this pressure rises, the supply of gas is diminished, the adjustment being such that practically the steam is maintained constantly at any pressure to which the apparatus is set. The engine, which is of very simple construction, is carried by the boiler, and the latter is of such capacity as to contain sufficient water for a day's supply. In using the apparatus, all that is necessary is to charge the boiler in the morning and light the gas, and the engine will run the whole day without further attention."

A New Field for Chloral Hydrate. — It appears that the fame of this remarkable compound is not to be confined to medical circles. It has already found its way into the laboratory of the photographer, and we will not venture to predict in what other art processes it may hereafter be used. The *Photographische Archiv* mentions, that to freshly prepared and slightly colored collodion (iodo-bromized) one per cent. of chloral hydrate was added. With a neutral silver bath it gave a good white film. The developer consisted of sulphate of iron and acetic acid. The plates were considerably more sensitive than those prepared without the chloral hydrate. The plates worked very clean.

COTTON-SEED OIL IN ENGLAND.

The Liverpool Circular of Alexander S. Macrae, under date of Nov. 19th, says: —

"The cotton-seed oil of the Southern States has a great future before it, second only in importance to the gigantic petroleum trade of the Northern States. Its sweetness, utility, and price are now commending it everywhere; and though in England we are manufacturing 20,000 tons annually (chiefly from Egyptian seed), the quality is not to be compared to the American, as the following values will testify. The price of English to-day is £34, at which it is slow; the value of American £36 to £4[illegible] per ton, at which it is in strong demand.

"The range of quotations for American oil begins from the worst of it (which eclipses any of ours) to the best of it, — that is, from ordinary yellow to the fine bleached. The bleaching of this oil is of the veriest importance, and, whether effected by the sun or chemically, will have a marked advantage from Southern climes. Our consumption for it is practically inexhaustible — we use it for soap, for salads, for lubricating, and for burning, and the whole continent of Europe consumes it largely. It is sold by the ton of 2,240 lbs., and if £3 to £5 per ton be taken off the above quotations, producers may see at a glance the 'net profit' on consigments to Liverpool from the Southern and Western States of America."

Collodion for Photographic Purposes. — The following formula for collodion is said to have been given to a novice by a noted photographer in New York: —

"Ether, ... 6 ounces.
Some brains.
Alcohol, ... 6 "
Some more brains.
Cotton, ... 72 grains.
Some iodide.
A little more brains.
Some bromides and a large quantity of brains.
After the above is all dissolved and settled, add enough brains to make good negatives."

"Faced" Tea. — The detection and examination of the facing is simple, as its presence may be at once ascertained, by either examining the tea with a magnifying lens, or by simply washing it off by agitation with cold water. The determination of its nature after removal is accomplished by the usual processes of qualitative analysis, into which it is not our province in these popular articles to enter. We may, however, indicate the manner of detecting Prussian blue, because this "facing" is at once the most dangerous, and yet very easy to discover. Let the green tea be violently shaken up in a little bottle with some cold water, and the resulting fluid quickly poured into a wine-glass to settle. The blue powder thus detached from the tea will subside, and the water having been carefully poured off, it will remain at the bottom of the glass. If a few drops of strong solution of washing soda be now added to the powder, it will change from blue to dirty brown, thus indicating the presence of Prussian blue. — *Food Journal.*

Another Submarine Tunnel. — An engineer in the employ of the Turkish government has planned a railway tunnel made in sections, to be submerged thirty-four feet below the surface of the water, and moored to the bottom by chain cables. He proposes to sink it across the Bosphorus, and thus connect Europe and Asia by railway.

The *Ironmonger*, a prominent organ of English industrial interests, says: "A company has been projected at Birmingham for the purpose of manufacturing screws by means of new and improved machinery which has been recently introduced from the United States, and which is believed to produce a better article, at a lower price, than any machinery in use in Great Britain."

The French and Dutch were the first to use blast furnaces; they were about 10 ft. high, charged with ore and coal at the top in alternate layers. The blast was introduced at the bottom. The exact time of their invention is not known; subsequently blast furnaces were built 25 ft. high on the Rhine. At these furnaces cannon were cast in one piece and stoves made, in the fifteenth century.

Agriculture.

MINERAL FERTILIZERS.

A CLERGYMAN in New Hampshire has written ıs a letter calling attention to the "Stevens Mineral Fertilizer," which is produced in the town of Lisbon. We have heard of the "*Grafton* Mineral Fertilizer," but were in ignorance of the fact that Lisbon had commenced to grind her barren silicious rocks also, and offer them as fertilizers. It appears that Lisbon is now fairly pitted against Grafton, and in the contest it will be interesting to learn whether the *silex* of the former or the *dolomite* of the latter shall come out ahead. The parties have of course rushed to the chemists, to procure "analysis" and indorsement of their rocks; and they claim to have secured both, and are now ready to "fill orders." We give the analysis of these fertilizers, for which we make no charge.

GRAFTON MINERAL FERTILIZER.

Silica	30.30
Protoxide of iron	6.27
Lime	20.60
Magnesia	11.17
Carbonic acid	32.11
	100.45.

LISBON, OR STEVENS MINERAL FERTILIZER.

Silica	90.60
Lime	3.27
Oxide of iron	3.06
Alumina	.31
Magnesia	.38
Carbonic acid	1.35
Water	1.06
Alkalies	a trace.

Good solid plant food truly! It would be as unreasonable for a baby to turn away from a set of cast iron, as for the grasses and cereal plants to reject such delectable nutriment as is here afforded.

Our correspondent's zeal is all enlisted in favor of the silica of the Lisbon mountains. He writes as follows: "Perhaps you will be glad to know that God has prepared just such an agricultural desideratum as a *pure fertilizer*. It has been found on the Gardner Mountain during the past season," etc. In this connection we would remark that it is pleasant to know that the Supreme Being has not been partial in his favors, for there are a great many *banks* of just such *pure* fertilizers scattered all over New England. We have not been forgotten; for directly in the centre of our farm we have a deposit of this "fertilizer," from which we have taken 500 horse-loads, to cover a peat bog. It is most excellent for low, swampy lands, bringing in the rich upland grasses, when a little ashes and bone dust are mixed with it. Our deposit is a little richer in silica (sand) than the Stevens or Lisbon fertilizer. Upon analysis we find ours to give 93 per cent.; the Stevens only 90. Our price for the fertilizer taken at the farm is 25 cents a horse-load. We have not learned what the price of the Stevens article is, but have no doubt that it is *much higher*.

Our correspondent continues: "The effects of this fertilizer upon the products of the garden and field are almost *incredible*. On trees it has wrought marvelous changes, which are seen in the change of *complexion*," etc. If trees in New Hampshire have *complexions* which need improving, why not try the "Balm of a Thousand Flowers," or "Phalon's Cosmetic," and compare the effects with the Stevens fertilizer? He closes as follows: "May I ask you to visit Lisbon, and see the remarkable effects of the fertilizer yourself?" Thank you; the season of the year is rather unfavorable for visiting farms and examining crops, and besides, it is quite unnecessary, as our mind is fully made up as regards the *merits* of the fertilizer.

But enough. Ridicule is the readiest weapon with which to combat such nonsense as this, but there is a serious side to the business. It is evident that there are parties who are intent upon inducing farmers to purchase a powder, alleged to possess fertilizing properties of a high order, which is made up of 90 *per cent. of sand* and 10 per cent. of other almost valueless substances. A long article appears in the *N. H. Telegraph*, in which a specious and artful attempt is made to convince farmers that this silicious powder has a real money value, and that it is something worthy of being bought, at a price probably of 15 or 20 dollars a ton. Prof. Seely's name is used, also Dr. Jackson's and those of some other chemists, in a way seemingly to recommend the powder, but they do not in fact do this. They *dare* not do it. As a protection against such schemes, farmers everywhere should remember that the geology of New Hampshire and of the other New England States affords not the least ground for hope that any rocks (save gypsum) or deposits exist which can possibly have any considerable commercial value as plant fertilizers. Rocks and deposits, to have value worthy of attention, must hold either the phosphatic nodules or potash in some available form. The carbonates of lime and magnesia, or the magnesian and common limestone, have some value; but they are not fertilizers to be bagged or boxed up, and sent off to be sold in the market, as are the concentrated compounds holding phosphoric acid and the alkalies; neither is *silica*, which is usually the largest constituent in the soils found upon every farm. We think well of the New Hampshire rocks for building bridges and abutments; but for soil fertilization we prefer to employ something better suited to the wants of plants.

THE SUPERPHOSPHATES.

AT the meeting of the State Board of Agriculture at Framingham, in December, a lively and interesting discussion arose upon the subject of commercial fertilizers. What is known in this section as "Bradley's Superphosphate" came in for a full share of comment and criticism, and there was a free expression of views regarding the compound. Hon. Simon Brown remarked that he had learned that what was called "sugar-house waste" was largely consumed by the manufacturer, and also vast quantities of "fish pomace" were carted to his factory. The inference drawn from these facts was, that the compound contained other and cheaper materials than should be found in a true superphosphate of lime. Mr. Brown further observed that the "waste" from the sugar-house was alleged to be of trifling value, and therefore unsuited to become an ingredient in an expensive fertilizer. Mr. Brown's remarks were liable to be misunderstood, although he was quite right in his meaning; and we should have ventured upon some explanations, but exhaustion from a talk of quite two hours' continuance compelled us to leave the hall. President Clark, of the Agricultural College, however, continued the discussion, and stated, as we were informed, that the article known as "sugar-house waste" was carbonized bone, and a fertilizing substance of much value; also that fish pomace was an excellent plant stimulant, and one largely employed. We regret that we did not hear his remarks; but we have no doubt they were perfectly in accordance with facts and the deductions of science. Still, whilst the two speakers were perfectly correct in their statements, there were some important points overlooked in the discussion, which, when understood, serve to clear up what possibly might appear to some as a conflict of statement and opinion. Sugar-house waste is composed of materials derived from sugar refining, other than the bone coal used for decolorizing syrups. This rejected coal is submitted to the action of heat, and the charring process is renewed, when from use the pores become filled with impurities, and it is then fitted again to serve as a decolorizer. The amount of bone coal ultimately rendered worthless by repeated charring is considerable; and undoubtedly this, with the organic filth removed from dark sugars, constitutes "sugar-house waste;" and this is what Mr. Brown was told by the refiners was of but "little value," and all of it went to the "superphosphate" maker. We know that good dry fish pomace is a manurial agent worth about $20 the ton. The price in the market in large quantities is sometimes as low as $15 the ton. Now, the superphosphate maker alluded to may employ both of these articles in compounding his mixture, as intimated by Mr. Brown, and the ingredients, as stated by President Clark, are not worthless; but the important point is, *what is the mixture worth? what is its actual value?* That is what farmers wish to know. Has it a fertilizing value of $60 the ton, or only of 20, 30, or 40 dollars? Farmers do not care what fertilizing substances a manufacturer employs, or where he procures them, or how cheap he may be able to buy them. They are willing to pay a fair profit to the maker for any concentrated assimilable plant food that he may be able to compound; but they *do want to know* the exact character of the substances they are solicited to buy, and also their exact commercial and farm value. If a manufacturer can buy sugar-house waste at one quarter of a cent a pound which is actually worth two cents, he is driving a sharp trade, and is entitled to the benefit of his shrewdness. A fertilizer worth 50 or 60 dollars a ton cannot be made from fish pomace and sugar-house waste, and this was the idea intended to be conveyed by Mr. Brown. We have yet to find in the market a "superphosphate," or any other manufactured fertilizer, that we would purchase for farm employment at any cost approaching that sum.

ADDRESS UPON MANURES.

WE have received many letters requesting copies of our address upon "Manures Special and General," delivered before the Massachusetts State Board of Agriculture at Framingham, in December. In reply to our correspondents, we would say that the address will appear in the State Agricultural Report, to be published in March. We shall probably have a hundred copies or so printed separate from the Report, which we shall be happy to send to our friends when they are ready. If the demand increases, it is possible

we may issue an edition of one thousand, copies of which will be sent, postpaid, on receipt of *twenty cents* for each copy. We will send a copy *free* to any one who will send us a new subscriber to the JOURNAL, with one dollar.

The *Boston Cultivator*, one of the oldest and best of our agricultural journals, remarks upon the address as follows: —

"Dr. Nichols's lecture at the meeting of the Board should be heard before every enterprising farmers' club in New England. It was the most profitable address we have ever heard at the meetings of the Board."

Hon. Marshall P. Wilder, the distinguished horticulturist, was pleased to remark that "the address was the most practical and useful one which had been delivered before the Board since his connection with it, a period of sixteen years;" and President Clark of the Massachusetts Agricultural College, Hon. Simon Brown, and many other distinguished gentlemen, bestowed upon it the warmest commendation in the debate which followed its delivery. We are pleased to have presented anything which meets with the approval of the true friends of agricultural progress and are fully rewarded for our labor.

BEET CULTURE FOR THE SOUTH.

OUR much esteemed contemporary, the *Rural Carolinian*, strongly advises the farmers of the South to introduce the culture of the sugar beet. Two crops a year can be raised, and instead of impoverishing the land, like sorghum, imphee, and other sugar plants, it will greatly increase its fertility, as well as its capacity for stock raising. The soil and climate in many parts of the region are precisely adapted to this line of cultivation. Capital is required for establishing sugar factories with the proper machinery; but it is believed that this would readily be attracted by an enterprise promising such rich returns. The writer gives the following facts in regard to the recent progress of beet culture in France: —

"The prize of Argenteuil of twenty-four hundred dollars ($2,400) for the most useful invention during the last five years in France, has been awarded to Mr. Champonnois, the inventor of the distillation of alcohol from the beet root. Some idea of the importance of his discovery may be obtained by comparing the following figures: Before the alcohol was distilled from the beet root, 4,867 acres of land, carrying this crop, were under cultivation, the proportion of wheat grown to the acre on this land being fifty-three bushels; the number of cattle supported being 25,386 head; the number of cattle fattened being 6,955 head; and the number of workers employed being 16,618. Since Mr. Champonnois' discovery, the number of acres of land devoted to the cultivation of beet root, divided into five hundred farms, has increased to 53,512 acres; the yield of wheat per acre, to seventy-four bushels; head of cattle supported, to 51,449; head of cattle fattened, to 46,656; number of workers employed, to 40,453. 735,000 tons of beet root, yielding 6,468,000 gallons of alcohol, at the average rate of two francs and twenty-five centimes per gallon, produce a gross annual income of $2,911,000."

"The northern part of France was, at no very remote period, the least remunerative portion of the empire. The average production of wheat was about twelve bushels to the acre; the product now averages about forty-five bushels, and that region supports large herds of cattle, unsurpassed in size and quality, with corresponding amelioration in the condition of the population. This revolution has been effected through science, by the culture of the beet; and the manufacture of sugar from that 'providence,' to use the words of her distinguished statesman, Monsieur Thiers, 'the beet, has at three separate periods saved the empire.'"

HOW TO MAKE FARM LIFE ATTRACTIVE.

1. BY less hard work. Farmers often undertake more than they can do well, and consequently work too early and too late.

2. By more system. The farmers should have a time to begin and stop labor. They should put more mind and machinery into their work. They should theorize as well as practice, and let both go together. Farming is healthy, moral, and respectable; and, in the long run, may be made profitable. The farmer should keep good stock, and out of debt.

3. By taking care of health. Farmers have a healthy variety of exercise, but too often neglect cleanliness, eat irregularly and hurriedly, sleep in ill-ventilated apartments, and expose themselves needlessly to cold.

4. By adorning the home. Books, papers, pictures, music, and reading should all be brought to bear upon the in-door family entertainments; and neatness and comfort, order, shrubbery, flowers and fruits should harmonize all without. There would be fewer desertions of old homesteads if pains were taken to make them agreeable. Ease, order, health, and beauty are compatible with farm life, and were ordained to go with it.

FARMERS' MEETING IN NEW HAMPSHIRE. — The State Agricultural Society of New Hampshire will hold a convention at Manchester, commencing Tuesday, January 24, and continuing three days. We have accepted an invitation to deliver an address on the second day, or Wednesday the 25th inst., and shall endeavor to discuss some topic of practical importance to husbandmen. Some of the best farmers and horticulturists of the State and of New England will be present and take part in the proceedings. The meeting will undoubtedly be full of interest, and we hope our farmer patrons will be present.

VARIETY OF FOOD FOR THE HOG. — In an experiment detailed in *Deitz's Farm Journal*, where hogs were fed on cooked potatoes and oats, the excrement showed by the iodine test that a large portion of starch was passing off undigested. The addition of a small amount of peas to the feed caused all the starch to be appropriated to the animal economy. Experience has demonstrated that a variety of food is essential to the perfect development of animals. When hogs are fed for any length of time on the same food, they become "glutted," and the addition of even a single article of food to their accustomed diet causes a marked improvement. If they are fed on corn, they should have pumpkins or potatoes; access to grass should be allowed them when they do not have a variety of food.

TO PROPAGATE JAPANESE LILIES. — The *Vermont Farmer*, a promising agricultural journal, just started at Newport in that State, gives the following hints concerning the propagation of Japanese lilies, which are as hardy as they are beautiful, and ought to be more generally cultivated: —

"If one has a bulb or two to start with, the stock may be readily increased. If left to themselves, the bulbs become large clumps by natural subdivision, but this is a slow way of multiplying them. If a lily be taken up in autumn, after the leaves have withered, there will be found upon the stem, just above the old bulb, a mass of small bulbs intermingled with roots. A dozen, and even more, are frequently found. The little bulbs may be removed and planted out separately, or the stem to which they are attached may be cut off just above the old bulb, and set out with the cluster of bulbs and roots attached. They should be covered the first winter with a few inches of litter. The next season they will make strong bulbs."

A LARGE PEAR. — A friend has shown us a California pear of almost incredible size. It measures around, 13½ inches, and lengthwise, 17½ inches. It is now somewhat shriveled, but it was said to weigh *three pounds* when taken from the tree. The variety we judge to be the Vicar of Winkfield although not quite certain. These pomological monstrosities are not uncommon on the Pacific coast, but to us they seem wonderful. We should be careful in venturing under trees loaded with such fruit, as the effect of the blow resulting from the fall of a specimen might prove decidedly unpleasant.

PINE-TREES THEIR OWN INCENDIARIES. — A French writer thinks that the very frequent fires which occur in pine forests in summer, far from any habitation, are not due, as has been commonly believed, to careless or mischievous people, but to the action of the sun's rays concentrated by the globules of resin which exude from the trees. These act as burning lenses, and start the conflagration, which of course, spreads rapidly among such inflammable material.

RAG PULP IN BUTTER. — After melting a sample of butter purchased at Brixton, a large clot separated, and although the sample was left all night in a cool place, it did not again solidify. This led to an immediate microscopic examination, and proved beyond a doubt that rags in a state of pulp had been employed in large quantity. The rags themselves conjure up ideas sufficiently nauseous; but, in addition, *the dyes had not even been discharged*, as the filaments presented a great variety of magenta, blue, brown, and other colors. — *Food Journal.*

STEAMING FOOD FOR CATTLE. — The *Practical Farmer*, in an article on this subject, makes the very sensible suggestion that galvanized iron pipe should not be used in the apparatus, as the zinc coating is liable to scale off and poison the food with which it becomes mixed. It would appear that in some cases cattle have actually been poisoned in that way. These dangerous pipes should under no circumstances be used in conveying water for either man or beast, or in any process connected with the preparation of their food or drink.

BIG VINES AT THE SOUTH. — The "Walter Raleigh vine," on Roanoke Island, nearly three hundred years old, covers one acre of ground; the wine from this vine last year sold for $3,000; another vine in Tyrrel County, N. C., in 1869, produced 2 530 gallons of wine; several other large vines in the South produce each from 1,000 to 2,000 gallons of wine per annum.

COTTON-SEED FOR SMYNRA. — A new branch of commerce has just been opened between this country and the southern part of Europe and Asia. An invoice of forty-five tons cotton-seed was recently shipped from New York to Smyrna for the purpose of planting, the object being to start the raising of cotton in these sections from American seed.

☞ WE would call the attention of our farmer friends to the agricultural journals offered in our clubbing list.

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, FEBRUARY 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

ZINC POISONING.

GALVANIZED IRON WATER-PIPES.

No source of danger to the public health, that we have detected, and pointed out in the Journal, has awakened greater interest, or provoked more opposition and controversy, than our statements regarding the dangerous nature of galvanized iron water-pipes. Before we called attention to this alarming source of danger, no physician, chemist, or journal of any kind in this country, so far as we can learn, had ever alluded to the matter, or manifested any suspicion of peril. This apparent neglect or indifference arose probably in part from the circumstance that the galvanized pipe had come into use for water conduction so rapidly and quietly that it was not generally known, among those competent to judge of its character, that it was being extensively employed; and also a popular idea has prevailed, and unfortunately still prevails to some extent, that the salts of zinc are not specially poisonous to the human system. Where or how this idea originated, it is difficult to understand. The exact character of the zinc compounds, it is true, has not been carefully and properly investigated; and therefore we find in books but little regarding their nature as toxicological agents. From experiments and observations made during the past six months, and from a knowledge of some of the sad instances of poisoning which have occurred in this vicinity, we have no hesitation in declaring that zinc is at least as virulent and fatal a poison as lead. We think it quite possible or probable that it may be proved to be even *more dangerous* than lead. In small quantities it produces nausea, in larger it produces vomiting with violent retching and great cerebral distress. The chloride is the most active in its effects, and numerous instances of poisoning from its use have been recorded. Those engaged extensively in Burnetizing timber (a process by which wood is impregnated with chloride of zinc in solution) suffer from zinc poisoning; and the symptoms are strikingly like those of lead poisoning. Instances are recorded of poisoning from the use of chloride of zinc as a disinfectant. More of these have occurred in England than in this country, as the liquid is largely employed there. The chlorides are not often found in water passing through galvanized iron pipes. The protoxide and carbonate of zinc prevail in these waters. Fifteen grains of the protoxide, given daily to a dog, soon made the animal ill, *and killed it in less than a week.* Painters who use, and manufacturers who make oxide of zinc suffer from its poisonous effects. It produces a colic resembling that caused by lead, and which is known as *zinc colic.* We have ascertained that some painters are so sensitive to zinc poison that they will not use it. Those who are not affected by lead suffer terribly from zinc; and when attempts have been made to deceive workmen, by alleging that lead was used instead of zinc, the falsehood has been detected by the peculiar effects experienced. By far the most common compounds of zinc found in water which has passed through galvanized iron pipes are the protoxide, and the carbonate of the protoxide. These usually make their appearance in a few hours after water is first drawn from the pipes, and they continue to form so long as any zinc remains upon the interior. The manufacturers have recently contrived to make the coating of zinc quite heavy, which of course greatly enhances the danger, as it affords a longer time for the coating to be removed, and the poisoning effects are protracted. We have in several instances had brought to us, for chemical examination, a whitish powder alleged to have been taken from joints in the galvanized pipes, which we found upon analysis to be carbonate of zinc mixed with a little sesquioxide of iron. In one instance, *nearly half an ounce* of this salt was scraped from the interior of a galvanized pipe of sixty feet in extent. This powder, in minute quantities, produces exceedingly disagreeable effects upon the stomach and bowels, indeed upon the whole system. We took *half a grain* in the evening an hour before retiring, and passed a very uncomfortable night. The disturbance is not alone confined to the digestive and assimilating organs, but all the secretions become affected, and a persistent metallic taste remains for a day or two. We are led to think that this mixed carbonate of zinc, formed under peculiar circumstances in water and in the presence of organic matter, is different from *calamine*, or the impure carbonate of zinc of commerce, and a more potent poison. There is manifestly much to be learned in relation to the salts of zinc, and their effects upon the system; and we are certain future investigations will afford much light upon the subject. The recent sad case of zinc poisoning by water drawn from galvanized iron pipes, occurring in Melrose, is a warning which cannot fail of being heeded. It is not necessary for us to dwell upon it, as Dr. Smith, in another column, under the medical head, has presented a full account of the distressing case. Mr. Sargent, of the house of Sargent Bros., is one of the best known and most extensive dealers in dry goods in this city, and one of the most respected and influential citizens of Melrose.

Instances of poisoning, of greater or less severity, are not rare in this vicinity. One physician has informed us that six cases have come under his care within a few months. With these indubitable facts before us, there is reason to be thankful that we have been led to point out this new source of danger to the health of individuals and families.

Since the above was in type, our attention has been called to the report of Dr. Winsor, of Winchester, Mass., upon galvanized iron pipes, made to the East Middlesex Medical Society, and published in the *Boston Medical and Surgical Journal* of December 5th. The question that Dr. Winsor, as chairman of a committee, was appointed to report upon was this: "Does galvanized iron pipe impart any poisonous quality to water conducted through it?" We have not space for the comments upon this singular medical production which we would like to make. It may be stated in brief that the committee, after consulting Appleton's "Cyclopædia," and the *manufacturers of galvanized iron pipes*, find themselves ready to report "that there is no proof that water derives any poisonous or harmful quality from passing through galvanized iron pipes." This conclusion is reached after admitting that water freely dissolves the zinc coating, and that quantities as large as six grains of the carbonate to the gallon are often found. They state that where the joints of the pipe are screwed together, they are packed with red or white lead, and coolly remark, "*So one has a chance of drinking a little lead in their water when they begin to use galvanized pipe.*" It appears, then, that in addition to large quantities of carbonate of zinc, the water which passes through these pipes holds *lead* also, and this disgusting, poisonous, metal-impregnated water is not harmful to the men, women, and children of the households where it is used!

The writer or writers of this report assume that the carbonate of zinc is the only salt of the metal ever present in water, and that the carbonate is not poisonous. They do not appear to have any knowledge of the important chemical fact that the formation of the carbonate is dependent upon the prior production of the oxide. The oxide or protoxide of zinc is the compound first formed when water comes in contact with the metal, and this highly poisonous substance often remains unchanged when the water is used freely by families. If the committee had made a few simple chemical experiments, their report would have been essentially modified. When water is poured into a galvanized iron pipe, or when a little granulated zinc is thrown into a glass of water, decomposition of the water almost immediately commences. The oxygen of the water unites with the zinc, forming the oxide, and the hydrogen is set free. Little bubbles of this gas are seen to form upon the surface of the metal at once. Zinc is the metal commonly used to procure hydrogen for experimental purposes. If when water is added to zinc the surface did not become covered with the oxide, it would not be necessary to add sulphuric acid to produce active decomposition. The only use of the sulphuric acid is to keep the surface of the zinc clear of the oxide, which it does by converting it into a sulphate. Water acts with great energy upon zinc when a clean surface is presented to it. The oxide is, then, *first formed* in the pipes, and held in the water, unless there is carbonic acid enough present to change it into a carbonate. This is by no

means always or usually the case. The oxide that falls off from the surface of the zinc-covered pipe, and is precipitated to the bottom, remains long enough in the pipe to be converted into the carbonate. But much is held in suspension, and passes as unchanged oxide into households to be employed in food and drinks. The idea that the carbonate is the only compound of zinc found in the water passing through galvanized iron pipes is an error, and also it is an error to suppose that the carbonate is not poisonous. The two assumptions found in this report are unwarrantable and dangerous; and it is difficult to understand how a body of cultivated, intelligent medical gentlemen could allow the publication in their name of a report upon an important subject so ill considered as this. It supplies a capital advertising hand-bill to makers and venders of the galvanized pipe, and doubtless it will soon be published in their interests, and thus it will aid in extending a sanitary evil of no small magnitude. It should be observed here that zinc, like lead, does not affect all persons alike. It is probable that there are many who can allow considerable quantities of the salts of the metal to enter the system, and remain in apparent health. We know that lead, copper, mercury, and the other poisonous metals act in this singular way upon the human organism. It often happens that in a family using water contaminated with zinc or lead, no one apparently suffers, or perhaps one or two may sink under the poison. In Mr. Sargent's family, consisting of seven, only the children suffered severely. All, however, were affected in a sensible degree. It is usually those constitutionally weak, or of low vitality, who are prostrated, or there may be some idiosyncrasy of organization which causes metals to act with great energy as poisons. This matter is imperfectly understood at present; but so long as we *do know* that many are liable to be brought under a deadly influence when even minute quantities of zinc or lead are introduced into the system, it is our duty to guard with watchful care every avenue through which these metals may find access to the food and drinks used in families. We shall refer to this report again.

THE PEAT DELUSION.

In our daily visits to the city, we pass on the line of railway a dilapidated building, from the chimney of which, a few years ago, smoke and puffs of steam issued most vigorously, and it was evident that considerable activity prevailed within. This was a "peat manufactory;" and in front of it a vast wet bog composed of the substance stretches away in the distance. But alas, all is silent in that vicinity now, and the frogs and tadpoles of the meadow are no longer disturbed in their day slumbers, and the mosquitoes are able no longer to insert their sharp tubes into the bare arms of the peat-diggers. It is a little hazardous to mention the subject of "peat" in that neighborhood; indeed, it is a disagreeable topic to converse upon in any part of the county of Essex, and, we may say, in any part of the State. We have, however, recently seen some indication of an attempt to revive the peat excitement; and as it is now about six years since the last spasm, it may be time to try it again. New dupes turn up, ready to bite at any bait which is artfully presented, as often as twice in each decade; and it is by no means impossible that a repetition of the peat fever may occur in some sections.

There always have been, and we presume there always will be, plenty of people ready to engage in projects and speculations regarding which they know nothing, and in which they are sure of being pretty effectively fleeced. In regard to peat the idea held out is that the wet bog as found in our New England meadows can be dug out, and, by the aid of somebody's patent machine, speedily and cheaply compressed into compact, dry fuel. This is a delusion, a complete delusion. No machinery ever has been constructed, and in our view it is extremely doubtful if any can be constructed, which will transform the tenacious water-impregnated peat of our low grounds into cheap fuel. We have examined some specimens alleged to have been made by various machines, which were of tolerably compact and dry structure, and which of course burned freely and pleasantly; but we have no doubt the article cost the manufacturer at least fifty dollars a ton. We have made a sufficient number of experiments upon the peat from our own bogs to learn that it is a difficult and expensive article to manipulate, — a very unpromising material to attempt to improve by the aid of machinery or other appliances. Dry compressed peat affords upon combustion less than one half the heat afforded by anthracite coal of equal weight; and it has the disadvantages of giving off an exceedingly unpleasant odor, and leaving a huge mass of light and troublesome ash. It cannot be dug out, dried, and compressed for any sum that will bring it into competition with coal; and therefore it is perfectly preposterous to give the matter any further attention. There has been lost by victims of the peat delusion, in New England alone, nearly or quite *a million of dollars*, and this has gone into the pockets of the owners of "patent peat machines," and speculators interested in keeping up the excitement. We advise our readers to have nothing to do with any schemes for manufacturing peat, however flattering the prospects may be made to appear.

SPECTROSCOPIC RESEARCH.

Among those who are devoting themselves to scientific research in this country, there is no one who is attracting more attention at home and abroad than Prof. C. A. Young, Professor of Natural Philosophy and Astronomy in Dartmouth College. We have for several years watched the career of this gentleman with much interest; and we are certain that there are few men living who pursue science with more indefatigable, intelligent zeal than Prof. Young. He is an honor to the venerable and excellent institution with which he is connected, and to our common country. The department of science to which he is devoting special attention is connected with spectroscopic research, and recently he has devised a form of spectroscope which embraces some new principles of the highest importance to science. In the construction of this instrument he had the aid of those distinguished American opticians, Messrs. Alvan Clark & Sons, of Cambridge. The instrument has the dispersive powers of thirteen prisms, and, even with a low magnifying power of only five on the observing telescope, shows perfectly the lines of aqueous vapor which make their appearance between the sodium lines when the sun is near the horizon. Everything shown on the maps of Kirchhoff and Angström is readily seen, and many lines beside. During the months of September and October, Prof. Young carefully examined many sun spots with the new spectroscope, using it in connection with the small 6-inch telescope of the Dartmouth observatory; and also the wonderful solar protuberances, concerning which, at the present time, so much interest is felt, have been repeatedly examined. These consist of vast clouds of luminous matter which are projected with inconceivable force beyond the sun's disk, away into space. Some of these columns of flame, 30,000 miles in height, have been examined throughout their whole extent, and the new instrument reveals the most delicate details with great beauty and clearness. The workmanship is so exquisite that this is accomplished although the light, in passing through, is reflected or refracted by 43 different glass surfaces. The flame clouds move with immense velocity; one of those examined was flying at the rate of 120,000 miles per second, and the space it passed over was more than 90,000 miles. One of the most interesting of Prof. Young's discoveries is that of a brilliant cloud of flame *upon the sun's disk*. These bright clouds have seldom been observed when projected beyond its edge; but it is now certain that they form, or break off from the great mass of flame, and float away until from some cause they are extinguished. The cloud seen and carefully examined was more than 130,000 miles long, and it was in the field of the instrument for nearly one hour. How inconceivably grand and startling are these discoveries! How sublime, how vast, are the operations of nature! The field for research is immense, and we are pleased to know that our countrymen are doing their part in the work of exploration.

A DANGEROUS FRAUD.

The following letter from Francis Lee, Esq., of Clinton, Iowa, and the reply, are published in the *Clinton Daily Herald* of December 15th: —

Clinton, Ia., *Nov.* 22d, 1870.

Messrs. Jas. R. Nichols & Co.: —

Gents., — A burning fluid designated as Danforth's Non-explosive Petroleum Fluid is being sold and introduced into dwellings and business houses by S. R. Snyder & Co., and is represented as being perfectly safe. I send you by express one of their circulars, and a sample of the fluid. Will you please examine it, and give me your opinion. Is it as represented, and perfectly safe?

Francis Lee.

Boston, *Dec. 9th*, 1870.

Mr. Francis Lee: —

Dear Sir, — The bottle holding the fluid sent to us for analysis reached our Laboratory in safety, and a portion of the contents has been subjected to chemical examination. We find it to be Coal Oil Naphtha, having a specific gravity of 7.12 and igniting at a temperature as low as 44 degrees F. This is a very dangerous fluid to use in lamps for the purpose of household illumination, and every family into which it enters is subjected to fearful danger. Any party offering for sale such a fluid for illuminating purposes in Massachusetts would be liable to fine and imprisonment, and under United States laws the offending party can be punished. Very truly yours,

James R. Nichols & Co.

The following item is taken from the *Boston Traveller* of December 28th: —

"*Killed by Non-explosive Oil.* — A girl named Mary Gibson was fatally burned at Poughkeepsie, N. Y., last evening, by the explosion of a lamp containing *Danforth's Non-explosive Oil.* She has a mother living in Providence, R. I."

Another murder from the use of naphtha, alleged to be *non-explosive* by an impudent charlatan. We have exposed this dangerous liquid a dozen times, but still there are people willing to listen to any empirical statements. If the good people of the Western and Middle States do not "crush out" this dreadful business, they deserve to be "blown up."

QUACK CHEMISTS.

UNDER this head, Prof. F. W. Clark, in the November number of *Old and New*, after alluding to some of the difficulties of chemical analysis, especially in the case of mixtures of organic compounds, goes on as follows to expose the falsehood and worthlessness of many of the "certificates" given by these chemical quacks: —

"In many cases, these certificates are given without even an attempt at analysis having been made. For example, a friend of the writer was one day in the office of a noted quack chemist in one of the New England States, when a stranger entered with a new nostrum to be analyzed. The chemist, scarcely glancing at the substance, asked its proprietor what it contained, and received a list of ingredients in reply. Then, depending solely upon the word of the stranger (quacks are proverbially truthful), a *certificate of analysis* was made out, paid for, and the fellow went on his way rejoicing. The guilty chemist in this case has attained to some celebrity, and by the outer world is regarded as a high authority. This sort of thing happens every day; and many of the certificates printed upon the labels of proprietary medicines are of this character, and not worth the paper upon which they were first written.

"These certificates, however, vary in form, the absolute lie being probably rare. A favorite style among those quack chemists who fondly imagine themselves possessed of consciences runs somewhat as follows: This is to certify that I have *examined* Mr. Smith's, Brown's, Jones's, or Robinson's (as the case may be) elixir, panacea, spirit, oil, or balm of a thousand humbugs (as the case may be), and find in it nothing of a deleterious character. The whole is wound up with a glowing panegyric (the degree of enthusiasm being measured by the amount of the fee received) upon the wonderful properties and virtues of the nostrum in question. Now, the analytical part of this is literally true in most cases. The substance is examined, — the chemist looks at it, smells of it, and, if he is very courageous, tastes of it; and nothing injurious, in fact nothing whatever, is found. But the certificate is intended to convey the idea of analysis, and therefore is to all intents and purposes a lie. In fact, it is worse than a lie; for to the crime of deception is added the disgrace of cowardice and hypocrisy. The truth is used as a mask for the falsehood.

"Many certificates, however, are given, which merely state that the nostrum examined is free from lead, mercury, silver, iron, or other metallic ingredients. These substances being easily detected, there is nothing necessarily false in such a certificate; and the value of the latter then depends wholly upon the character of the chemist giving it. It is to be hoped that they are usually true. But, notwithstanding these exceptional cases, the great majority of quacks' chemical certificates are absolutely worthless.

"It is hard to overestimate the harm done by this scientific swindling. Many of the most widely advertised 'remedies' are pernicious, not to say poisonous; and oftentimes serious illness, sometimes death, results from their use. . . .

"At present, thoroughly educated, reliable chemists are loath to undertake 'job-work' of any kind, preferring rather to obtain permanent situations as professors, superintendents of chemical works, or managers of assay-offices. They dare not give false certificates, or such as would be available to the venders of patent medicines; nor will they even run the risk of being confounded professionally with their disreputable (half) brethren.

"But it is not only in the analysis of unanalyzable nostrums that chemical quackery is evident; the same lack of conscience is manifest in other kinds of work. The mining company whose mines are deficient in metal wish a better certificate than truth will allow, and straightway the quack chemist finds for them as much of the precious material as they desire in their ores. The most worthless minerals are found to be rich in everything, and a hundred per cent. of gold from pure quartz is quoted on the prospectus of the mine. . . .

"But perhaps the most glaring examples of scientific criminality may be found in the recommendation given by some chemists for dangerous and explosive naphthas and petroleums. Here is a case in point. A dealer carried a sample of a patent oil or burning-fluid to a well-known Massachusetts chemist, desiring a good recommendation, whereby he might secure better sales. The fluid was so inflammable that its vapor would ignite from a lamp placed ten feet from the bottle; and yet the chemist recommended it as an excellent article, much less explosive than other similar products which he had examined. Possibly the latter part of the assertion may have been true; but the bare recommendation of so dangerous an article was criminal."

EDITORIAL NOTES.

CHEMICAL NOMENCLATURE. — We have seen the following item in several of our medical exchanges: —

"*A Chemical Expert not Expert.* — A chemist who was examined as an expert in a recent trial in a San Francisco court, spoke of 'Chlorate of Potassium' and 'Carbonate of Sodium,' and described the former as composed of chloric acid and potassium — at least he is so reported in the papers."

It is the critic who is not an expert in the rival forms of chemical nomenclature to be found in recent books. In Miller's great work on Chemistry you will find all the names of ternary salts after the above pattern; and, on the face of it, "sulphate of *potassium*" is as appropriate as "sulphate of *iron*." The question at the present time, however, appears to be between such forms as "*potassic* sulphate" and "*potassium* sulphate;" of which *we* prefer the former.

INFLUENCE OF DIET ON THE COMPOSITION OF BONE. — Some very interesting experiments have been made by M. Papillon, and communicated to the French Academy. He fed pigeons and rats with food containing small quantities of phosphate of strontia, phosphate of magnesia, and phosphate of alumina. These substances were given daily in small doses for several months without any visible effect on the health of the animals. On analyzing the bones of the pigeons that had been fed with the strontia, there were found in a hundred parts of the ash of the bones: —

Lime	46.75
Strontia	8.45
Phosphoric acid	41.80
Phosphate of magnesia	1.80
Residue	1.10
	99.90

The ash of the bones of the rats that were fed with the alumina gave: —

Lime	41.10
Alumina	6.95
Phosphoric acid, &c.	51.95
	100.00

while in the bones of those fed with the magnesia were found: —

Lime	46.15
Magnesia	3.56
Phosphoric acid, &c.	50.29
	100.00

It is very remarkable that strontia, magnesia, and alumina can be made to enter into the composition of bone by means of an appropriate diet. A fact of this kind is calculated to raise our hopes of the possibility of modifying the animal body by means of medicines. Possibly ossification of the arteries might be stopped by an appropriate diet.

CATS' MEAT IN LONDON. — It is stated, on good authority, that from 900 to 1,000 horses, averaging two hundred weight of meat each, are boiled down every week, and sold as food for the cats and dogs of the British metropolis. These 200,000 pounds of meat are sold at an average price of about five cents a pound; so that the trade amounts to $10,000 a week, or more than *half a million of dollars* a year. At least a thousand persons are occupied as carriers or sellers of this provision for the feline and canine population of the great city.

ON GRINDING COFFEE. — A London paper says that the Germans have lately found that it is not economical to use coffee ground so coarse as is common; if ground fine, one half the quantity will make equally good coffee; and if pounded in a mortar till reduced to an impalpable powder like flour, as practiced in Turkey and other Eastern countries, still less, only two fifths, is needed. Further experiments went to show that the result was the same whether the beverage be prepared by simply pouring boiling water over the coffee and letting it stand a short time to draw, like tea, or if the infusion be allowed to boil up once or twice, or the coffee simply filtrated. But it was abundantly proved that by the last-named mode of proceeding, though the strength of the coffee remained the same, the aroma was preserved to a much greater extent than by either of the other methods.

On the other hand, the *Food Journal*, which is unexceptionable authority on all culinary matters, says that if coffee be ground very fine, there is a decided loss of aroma in the infusion. It commends the coffee prepared by the French Coffee Company for the coarseness of the grinding.

If the coffee is kept for any length of time after being ground, we are inclined to think that this latter view is correct; but if it is ground at home just before being used, we should rather side with the Germans.

ATOMS.

THERE has been a case of hydrophobia in England caused by the bite of a donkey, but it is thought that the animal must have been previously bitten by a mad dog. — Leaves of fresh wintergreen scattered where red ants congregate will disperse them as effectually as camphor. — A railway, twelve hundred miles long, is to be built in Siberia; the greater part of it extending through desert regions covered with ice and snow for ten months of the year. — In the French army more than thirty per cent. of the conscripts can neither read nor write; in the Prussian army, only four per cent. — A cheese factory, of two-thousand-cow capacity, is building in Minnesota. — Much of the "jujube paste" sold in the shops is made of glue and molasses, or the same composition as is used for printers' rollers. — In England there are sixty-five persons to each acre of potatoes; in France, thirteen; In Ireland, five and

a half. — The State Medical Society of Ohio has asked the Legislature to make it a penal offense for any one except a regular physician to perform vaccination. — A fine work on European Spiders has just been issued at Upsala. Singularly enough, it is printed in English. — Three tons of coal represent the labor power of a man for his life-time. — The Prussian Government has already given orders for 200,000 wooden legs. — The frequent explosions of nitro-glycerine nowadays suggest the necessity of more stringent laws concerning the manufacture, storage, and transportation of the dangerous compound. — Colorado built about three hundred miles of railroad in the last nine months of 1870, which is no mean achievement for a territory whose population numbers only 75,000. — Soluble glass is coming into use in Europe for "waxing" floors, and is found to answer the purpose admirably. — The *Manufacturer's Review*, of New York, claims to be "the only paper in the English language, devoted to the technical aspects of textile manufacture and dyeing;" but even without the stimulus of competition in its special field, it is as excellent as it is cheap. — It is said that "the heathen Chinee," in his native land, has life insurance companies three thousand years old, and marine insurance companies dating back to antediluvian times. — We see "Montauban's Patent Prepared Tragacanth" advertised in the *Food Journal* as "an adjunct to the breakfast and luncheon table, valuable to both the robust and the weak in health." — From the Paris correspondent of the same journal for January, we learn that "some gastronomical philosophers of the Acclimatization Society have been banqueting on all the extraordinary viands which they could collect, and *salmi* of rat and broiled dog's liver are declared by them to be exquisite, while the young rats which furnished the garnish to a roast cat were admitted to be uneatable, and a dog's hind-leg was pronounced as tough and stringy as it is proverbially crooked." — Of seventy samples of petroleum oils tested by the Board of Health in New Orleans, *thirty-seven* were dangerous, nine of the number burning at a temperature *below* 32° F. — The New York *Medical Gazette* warmly commends *Zell's Popular Encyclopœdia*, which, by the by, will be completed in fifty-five numbers, the last five of which are furnished gratuitously to subscribers. Baron Haussman is said to have spent about 425 millions of dollars in Paris during his rule; but it must be admitted that the improvements made in the city are worth a good part of the money, if not the whole of it. — A paragraph is "going the rounds" to the effect that "the largest room in the world," is in a Rhode Island cotton-mill, the said room being 750 feet long by 76 wide; while, we may add, the main hall of the Crystal Palace at Sydenham is only about 1,600 feet long and 380 wide. — Another migratory item states that the Croton aqueduct is the largest in the world; but the aqueduct which brings the water of the Yonne to Paris is some ninety miles long (an American scientific journal says 140 miles, apparently confounding kilometres with miles), or more than double the length of that which supplies the wise men of Gotham. — A medical exchange says that the student who translated *tempus fugit* into "few get time" was clever in his Latin compared with most doctors and druggists. — The question whether aniline colors are poisonous appears to have been settled thus: they are never poisonous when pure, but they are so rarely pure that the safest rule is to consider them as *always* poisonous. — The price of the *Technologist* has been advanced to *three dollars* a year, but it is cheap enough at that, especially when taken in connection with the BOSTON JOURNAL OF CHEMISTRY. — The *American Chemist* promises to be a success financially, as it unquestionably is every other way. — Be sure to read our clubbing list and premium list, which you will find in our advertising columns.

LITERARY NOTES.

MESSRS. HURD AND HOUGHTON have published *Suburban Sketches*, by W. D. Howells; a series of papers in the author's best vein. It is one of the pleasantest books of the season, and we wish we had room to speak of it more at length.

The same publishers have issued a new uniform edition of Cozzens's Works. In the volume which chronicles *The Sayings of Dr. Bushwhacker*, among other good things are some capital papers in the "familiar science" way, like the "Journey around a Tapioca Pudding," "The Radiant Dinner Castor," "A Peep into a Salad Bowl," etc.

Want of space forbids us to enlarge upon these genial volumes, or to make more than a passing reference to Appleton's cheap reprint of Huxley's *Lay Sermons and Addresses;* the bound volume of *Good Health* for 1870, which we heartily commend to all who have not read it in its monthly instalments; and Rolfe's edition of *The Merchant of Venice*, which *Harper's Magazine* thinks "will prove not only useful as a school-book, but a favorite as well in the parlor." Other books and pamphlets on our table must lie over to another month without even this "mere mention."

THE NEW CATTLE DISEASE. — The farmers and cattle breeders of New England are greatly alarmed at the appearance of the new disease in their herds, affecting the mouth and hoofs of the animals, a disease exceedingly disgusting and inconvenient, but not very fatal. In this country we have been singularly successful in "stamping out" cattle plagues, and we do not feel particularly alarmed in view of the appearance of the new one. We shall soon conquer it, as the usual energetic measures are being taken for its suppression. We employ in our barns *carbolate of lime* as a preventive or disinfectant. It is very effective and not costly. A handful or two thrown around the cattle stalls every morning and night will serve to destroy contagion, and it will in no way injure animals. J. R. Nichols & Co., Chemists, 150 Congress St., can supply the carbolate of lime in any quantity. The solution of carbolic acid is excellent to apply to the hoofs of affected animals.

☞ SINCE the last number of the JOURNAL was issued, large accessions to our subscription list have been made, many of the new patrons residing in distant lands. We have new subscribers from Para, in Brazil, and from Rio Janeiro, and not long since a fine list was sent us from Melbourne, Australia. From a single town in Tennessee we have received *eighty new subscribers*, and all parts of the South are giving us a most generous support. Thanks, friends, your kindness is fully appreciated.

OUR SCIENTIFIC AND MEDICAL EXCHANGES.

THE *American Journal of Science and Arts* (Silliman and Dana's), for January (the first number of the monthly issue), contains articles on the Quaternary or Post-tertiary of the New Haven Region, by Prof. Dana; on the Solar Corona, by Prof. Norton; on the Duration of Flashes of Lightning, by O. N. Rood; on the Electro-tonic State, by A. M. Mayer; on Some Phenomena of Binocular Vision, by J. Le Conte; on the Earthquake of October 20, by Prof. Twining, etc., etc.; with the usual valuable summaries of scientific intelligence, etc.

The *New York Medical Journal* has the following Original Communications: I. Fordyce Barker, M. D. — Blood-letting as a Therapeutic Resource in Obstetric Medicine; II. Albert H. Buck, M. D., and Francis Delafield, M. D. — Abstract of Virchow's Lectures on Morbid Tumors; III. J. H. Hobart Burge, M. D. — A Sexless Child; IV. John H. Packard, M. D. — Notes on Hæmorrhoids; V. J. C. Nott, M. D. — Carbolic Acid as a Remedy for Carbuncle; with Proceedings of Societies, Reports on the Progress of Medicine, etc.

The leading articles in the *Chicago Medical Journal* are, I. Cavernous Tumor of the Orbit, complicated with a large Sanguineous Cyst: Successful Removal without Injury to the Globe or Optic Nerve, by E. L. Holmes, M. D.; II. Chronic Pemphigus, by Walter Hay, M. D.; III. Cook Co. Hospital Clinic, by C. T. Fenn, M. D.; IV. Hydrate Chloral, by S. W. Gould, M. D.; V. Trismus Nascentium, by Theo. W. Stull, M. D.; VI. Case of Imperforate Anus, etc., by Moses Barret M. D.; VII. Cases in Private Practice, by Jno. E. Owen M. D. There is the usual interesting variety of Selections, Re views, Medical Items, News, and Gossip, etc.

Most of the medical journals for January have not come t hand before we go to press (Jan. 16).

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — hom science, arts, agriculture, medicine, etc. — will be answered unde this head, but *only when the subject is one of general interest to ou readers.*

VICTIM, of TITUSVILLE, PA., and all others must remembe that we do not answer any inquiry in this department of th JOURNAL unless we have the true and full name of the corre spondent.

H. A., BEAVER, PA. Perhaps soluble silicate of potassa, o marine glue, will serve to attach glass labels to bottles, so tha they will remain unaffected by water or acids.

W. J. H., MESOPOTAMIA, OHIO. It is quite in accordanc with the practice of our best physicians to combine opium wit belladonna, and we see no incompatability in the association.

C. J., TROY, N. Y. Hair dyes containing nitrate of silve should be kept in a dark place to prevent change. Light pro motes chemical decomposition, and the solution is spoiled.

C. B. P., CHAUMONT, N. Y. Fish specimens can be pre served in alcohol or in a weak aqueous solution of carbolic acid Glycerine is also a good preservative agent, if the specimens ar not to be kept for a long time.

B. C. S., CENTRE, ALA. To kill animals with strychnine the pure alkaloid in crystals should be used. A few grains (thre or four) will almost immediately destroy life in a fox or a dog.

I. T. S., SALEM, MASS. But little good could result fro any statute laws against medical quackery. We must rely upo the intelligence of the people for the doing away of the evil. I the people can be educated and made acquainted with the gen eral principles of the natural and physical sciences, they will dis card quacks and quackery, and the business will soon end.

F. B., BOSTON, MASS. Soaps containing carbolic acid may b used for cleaning the teeth, without injury. Many, indeed mos of the soaps alleged to contain carbolic acid hold no trace of th agent. They are simply cheap soaps of no special merit.

J. C. C., NORTH VERNON, IND. Gasolene is a very danger ous fluid to use for household illumination. Pour all you hav into the sewer, and never allow, as you value the lives of you family, a single ounce again to enter your dwelling.

E. N. S., CLINTON, IOWA. Naphtha, or what is the sam thing, "Danforth's" *safe oil*, does not explode; it is the air mixed *vapor* which comes from it that causes the terrible deto nations. When the reckless fellow ignites his naphtha to prov that it will not explode, he is deceiving you. No illuminatin fluid is explosive in itself, but there arises a vapor from all the light naphthas, which, when mixed with air and confined in a lamp, will explode with great violence. The vapor even will no explode without the air. Any fluid which will ignite in a warn room when touched with a lighted match, no matter what nam it may bear, no matter what statement may be made regardin its safety, is as dangerous to have in your house as gunpowder *Use nothing but good legal Kerosene Oil, which is cheap enough and you are safe.* It gives off no vapor at ordinary tempera tures, and will not take fire unless heated above 110° F.

G. D. B., BOSTON, MASS. It is probably better to remov plants from sick-rooms, especially if there are many of them To disinfect sick-rooms, the pure carbolate of lime is efficient and cleanly. A teaspoonful or two, allowed to remain open in a saucer, will accomplish the work.

B. P. S., WASHINGTON, D. C. Hydrate of chloral is incom patible with mercury, and the salts of the metal. It should not be administered in association with calomel, or with the alka lies and alkaline earths.

R. G. C., JACKSONVILLE, FLA. Possibly dissolved bones may not be adapted to the dry sandy soil of Florida. The season has much to do with the effects of fertilizers. With a moister season doubtless your success will be greater.

S. M., CONCORD, N. H. Corn is not all constituted alike chemically, each variety having its own peculiar powers of assimilation. Two varieties may *grow on the same cob*, and be entirely dissimilar. Usually the common yellow corn has double the amount of phosphates that is found in the sweet varieties. The *oil* in corn varies from six to eleven per cent. It is analogous to animal fat, and almost by simple transference it takes its place in the adipose substance of animals.

H. O. M., MARSHFIELD, MASS. Your meadow holds undoubtedly what is known as the "vitriol peat." It is sour, unproductive, almost corrosive in its character. It is permeated with the sulphate of the protoxide of iron, and the best way to destroy the deleterious quality is to use carbonate of lime. When carbonate of lime is brought in contact with this salt of iron, mutual decomposition takes place, forming sulphate of lime (gypsum) and carbonate of protoxide of iron; soon the latter substance absorbs oxygen from the air, and the inert protoxide of iron remains. A cask of quick-lime, which soon changes to hydrate, and from that to carbonate, will be sufficient for a cord of the peat.

B. VAN ZANDT of KIT CARSON, COLORADO, wishes a recipe for curing buffalo hides with the hair on. Can any one of our readers give it ?

Medicine.

;ES OF POISONING FROM GALVANIZED IRON WATER-PIPE.

BY J. HEBER SMITH, M. D., MELROSE, MASS.

OLLOWING close upon your earnest protest ;nst the use of galvanized iron pipes for water duction, come some sad cases of zinc poisoning, ch should be recorded for the benefit of the med- profession and families who employ this danger- pipe for the conveyance of water for household I beg leave to submit the following cases occur- in my practice.

bout a year ago Mr. W. P. Sargent, Chairman ie Board of Spot Pond Water Commissioners in town (Melrose), connected his well and a force p in the kitchen with upwards of seventy feet of and a half inch galvanized iron pipe; and to itate the working of the pump, a large reservoir tructed of galvanized iron was placed near to it. hout entering into the details of the minor ail- ts of the family during the past twelve months, ously resulting from zinc poisoning, but which e not sufficiently alarming to be brought to the ce of the physician, it may be stated that in ember last the two daughters were seized a peculiar and persistent inflammation of the at, with extensive ulceration of the pharynx and ils. The ulcers were round, sharply defined, red, everted edges, and gradually coalesced. y were filled with a yellowish white matter. ile convalescing, the youngest, aged five and a years, began to present indications of some un- l derangement of the nervous system. On wak- in the morning, for about ten days, there was re inability to move the head and limbs, with ex- ne sensibility of the whole surface to contact. er about an hour this paralytic state improved ugh to permit walking, but with a staggering, un- ain gait, and a marked tendency to fall to the side. The eyes were turned outward; pupils rnately dilated and contracted, but usually di- d; falling of the upper lids and œdema of the r; objects apparently elongated, and, at times, ble; expression vacant and apathetic or irrita- ; constriction and spasm of the œsophagus dur- deglutition; accumulation of mucus in the nx and posterior nares, with obstruction of both rils and nasal speech. For twenty-four hours ere croupy condition, with symptoms of paraly- of the cervical nerves; considerable gastric dis- ance, eructations, loss of appetite, vomiting of , offensive diarrhœa, alternating with constipa- , and diminished secretion of urine, approaching ne time entire suppression. The pulse, wiry and gular, averaged one hundred and twelve per min- Febrile flushes, with sudden crying out to be ned, and thirst; sleep agitated and unrefreshing, h occasional nightly perspiration. In the evening bility to support the head; great emaciation, ca- etic look, complexion bluish white. On the 15th December, from the general correspondence of symptoms with the records of zinc poisoning, diagnosis and treatment became clear. On same day, the only son, aged thirteen, a very icate child, was indisposed from what had been ught a cold. On examination he presented an aciated, feeble appearance, the face wrinkled and ish; the pulse only forty beats a minute, and in- mitting. There were no other signs of local inflam- tion than a slight tenderness to pressure over the mach, and a dry, spasmodic cough. On Friday, 16th, he was no better, but dressed and lying on sofa. Complained of occasional fleeting pain in hypogastrium on rising, continual nausea, and ire loss of appetite, with disgust at the sight of d; vomited mucus several times the following ht. Sunday morning, vomiting of bile, and indications of intense nausea. Although there were marks of gastric suffering about the mouth, he complained of no pain from pressure over the stomach and abdomen. There was absence of pain or complaint to the hour of his death. Only milk was retained, of which a little was taken at intervals. He vomited again in the evening, and once the following morning, but passed a quiet night in sleep. Monday evening, vomited a brown fluid once, pulse sixty, face flushed, but no delirium nor stupor. Tuesday morning, at six o'clock, he died very suddenly, soon after passing about a gill of disorganized blood at stool. There was slight thirst before death, and faintness. A *post mortem* examination, made by Dr. G. M. Pease, of Boston, and others, confirmed the opinion that the action of the zinc on the nervous centres, inducing paralysis of the heart, was the immediate cause of death. The stomach presented internally marks of a highly inflamed condition, being extensively injected and showing traces of sanguineous exhalation. Dr. Charles T. Jackson, State Assayer, reports, December 23d, that "the water from Mr. Sargent's pump is charged with a very large quantity of the oxide of zinc and a little iron," and that "the zinc renders the water dangerous to health." At the time of his analysis the doctor was not only ignorant of the sickness in Mr. Sargent's family, but also of the source and medium of conduction of the water. At date of writing, January 1st, the little girl, though partially paralyzed in her lower extremities, is fast regaining health and strength. Among other cases of less interest, brief mention may be made of one. Mr. W. B. Burgess, while drinking water conducted by a pipe of this kind, only thirty feet long, had constant dull frontal headache, with occasional attacks of vertigo, preceded by sharp pressure at the root of the nose, and a sensation of drawing together of the eyes, followed immediately by nausea, faintness, and trembling of the hands and weakness of the legs. Examination of the pipe, ordered to be removed from the well, showed a thick incrustation, throughout its whole inside, of a white substance on uncorroded iron, with no traces of its metallic zinc covering. This white powder, analyzed by Dr. J. R. Nichols, chemist, of Boston, was found to consist of carbonate of zinc with a little oxide of iron. This pipe was put in position about six years ago, and more or less water which passed through it has been used in the family.

These cases, with many others occurring in this vicinity, show that zinc is a slow but fatal poison, when introduced into the system through the medium of water, and will serve to put families on their guard against the use of water flowing through galvanized iron pipes.

CHLORODYNE.

In the October number of your valuable Journal of Chemistry, I find an article on the formula of Chlorodyne. During the prevalence of cholera in New Orleans from 1865 to 1867, I used the following formula in its treatment with the greatest success, and never heard of Chlorodyne till 1869.

℞ Chloroform	ʒi.
Morph. Sulph.	grs. xv.
Tr. Camph. fort.	ʒiv.
Tr. Capsici.	ʒij.
Spts. Ammon. arom.	ʒij.
Syrup. Zingib.	ʒij.

From 20 to 60 drops every half-hour or hour, in the first stages of cholera, soon checked and relieved all distressing symptoms (in a large majority of cases) such as nausea, or vomiting, or purging, or crampings. This dose was repeated immediately if rejected, and every half-hour or hour afterwards till the patient was relieved. In addition to this remedy, I invariably used hot fomentations to the extremities by enveloping the patient in blankets wrung out of hot water, and the heat kept up by pouring upon him, thus swaddled, streams of hot water from a tea-kettle. This formula was always immediately tranquillizing in its effect, subduing and relieving the great restlessness and jactitation usually accompanying this disease in its earlier stages. This is a very important object to attain in every case of cholera, as quiet and the recumbent position are *absolutely* necessary to save the patient in a vast majority of cases. In the more advanced or collapsed condition I equally relied upon this formula. To conquer the great thirst, I allowed ice only to be taken into the stomach. After the disease was abated, I of course then directed my remedies to restoring the secretions, etc., of the patient.

This formula was communicated to me by a French physician in New Orleans, who attended a meeting of the medical savants of France in Paris, convoked by order of the French Emperor to investigate this disease in the hospitals of Paris during the great epidemic of 1863–1865. An English physician from London communicated this formula, as the result of this commission's investigation, to his apothecary in London, who immediately compounded it and sent it forth to the world under the captivating name of Chlorodyne. I think upon trial you will find this a most excellent remedy in the treatment of all cases of looseness or gripings of the bowels, or pains from indigestion, or almost any irritability whatever of the system. In cases of insomnia it is fully equal in all respects to the great hypnotic, Hydrate of Chloral, when it is given in teaspoonful doses at bed-time, mixed in two ounces of water. Owen M. Long, M. D.

U. S. Consulate, Panama, *Nov. 4th*, 1870.

DISPENSING MEDICINES.

In the December number of the *Druggists' Circular* is a communication calling the attention of physicians and druggists to the discrepancy between the strength of syrup tinctures and infusions made from Wood and Bache's Dispensatory, and those made from fluid extracts by Tilden's formulas.

Now, it is not generally known by physicians that a large number of their prescriptions for these preparations are made up from fluid extracts, or extemporaneously made from private formulas; but such is the fact.

I will relate one instance of my own experience, which will more fully illustrate how we are imposed upon by those who ought to be above it.

Less than two years ago I took a prescription for Infusion Rhei Comp. to one of the oldest established stores in your city, and asked one of the proprietors how long it would take him to prepare it. He replied two or three minutes; but when I demurred, saying it was too short a time to have a good infusion, he replied, "Your physician may have told you it would take two or three hours; but Dr. So-and-so used to prescribe it, and we always keep it prepared, and the *older* an *infusion*, the *better*."

At the next store I went to, the clerk very kindly offered to make it up in two or three minutes from fluid extracts. It had been put up the day previous at another first-class store in a few minutes, by triturating some powder with hot water in a mortar, the clerk directing the person to "shake well and swallow dregs." And yet you are often told to take your prescriptions to these stores when perhaps you may have to pass some half-dozen where you would be properly served, from the very fact that physicians do not frequent them enough to become familiar with their method of preparing and dispensing, and some they shun altogether. What is the remedy? Go in and familiarize yourselves with those who make and dispense the medicine; and if they are wrong, suggest the right, and then if they heed not, discard them. B. F. Clough, M. D.

Worcester, *Dec.* 10, 1870.

ERYSIPELAS.

In your November number I noticed, among other very able articles, one of value in regard to a specific in Erysipelas, by Dr. T. Temple, of Amherst, Mass. Please permit me to say, that iron has been used in Erysipelas, both internally and externally, for some time past, but it does not necessarily follow that Iodine should be entirely discarded. For many years I have been in the habit of treating Erysipelas, both idiopathic and traumatic, in private and military practice, in the following manner: I surround the margin of the parts inflamed with an inch or less wide stripe of the *etheric* Tr. of Iodine, in order to produce a line of demarcation; this will dry almost immediately; then I cover this band so formed with a coating of collodion, to which, during late years, I have been adding a drop of glycerine. Over the whole I use a thin compress of linen, soaked in a solution of sulphate of iron (about one drachm to the ounce of water), to be renewed as often as it evaporates. I have not yet seen any reason to alter the treatment, being perfectly satisfied with the *modus operandi.*

E. Seyffarth, M. D.

Lawrence, Mass.

PERSULPHATE OF IRON AS A HEMOSTATIC.

October 30th, I was called to a young man with Epistaxis, who had been suffering for three days with hemorrhage, and had been attended by two other physicians without any good result. I plugged the posterior nares; hemorrhage ceased for two or three hours, but began again with symptoms seeming critical.

I took a gum catheter, cut it in two, putting some persulphate of iron into it, and thus blowing it up into the anterior nares, previously removing the plug. I found the hemorrhage ceased in a few minutes, with no return since. I then placed him on a full diet, with a preparation of iron, and now he is at work in good health.

In all cases of minor surgery the persulphate of iron is the great *sine qua non.*

J. W. Foster, M. D.

Camden, Mo.

HYPODERMIC INJECTION OF ATROPINE IN HYSTERIA.

December 6th, 1870. Visited a lady aged thirty-five who for five years has been periodically (usually twice yearly) affected with protracted and exhausting hysteria attended with severe eclampsia.

Usual treatment has generally proved only palliative. Disease generally lasting from ten days to two weeks. Always complaining of peculiar sensitiveness and much pain in the cerebellum and upper portion of the spinal cord.

On the above date, December 6th, injected 1-30 gr. of Atropine into the nape of the neck. In one hour the urgent symptoms ceased, patient slept, on awaking was natural, and has remained thus to the present writing, December 27th, 1870.

B. E. Osborn, M. D.

Throopsville, N. Y.

MEDICAL MEMORANDA.

The Pulverization of Camphor. — The *American Journal of Pharmacy* contains a note on the pulverization of camphor. Camphor is easily enough reduced to powder by rubbing with a few drops of alcohol; but after a short time the powder will aggregate to crystals, which have to be rubbed down again. If, however, the camphor is reduced to fine powder as above, and then intimately mixed with carbonate of magnesia in the proportion of 10 or 20 grains to the ounce, a powder is obtained which never cakes or forms crystals. H. F. Fish suggested, several years ago, a process in which a drachm of carbonate of magnesia was used to disintegrate 16 ounces of camphor, by dissolving the latter in alcohol and pouring the solution into a gallon of water in which the magnesia was suspended, and letting the whole settle, and collect in a filter.

A New Material for Suppositories. — The solubility of glue in glycerine has been utilized by Mr. Carre in the formation of a new material for suppositories. It may be used for the administration of any medicine except tannin. The material is prepared as follows: —

Take of	Best Glue	4 oz.
	Glycerine	8 "
	Golden Syrup	2 "
	Water	8 "

Soak the glue in the water at a temperature approaching 212° F. until quite soft. Mix the syrup and glycerine, add them to the glue solution, and boil until the mixture has lost about two ounces in weight; remove scum, and pour into an oiled mould or tray. The elastic substance thus produced will keep a long time, but gradually becomes more difficultly soluble. In preparing a suppository, the composition is dissolved in a little warm water, the drug is mixed with it, and the mixture is then run into a mould.

New Remedies for Old Ailments. — Acetate of lead is recommended as a cure for the *toothache.* Put one or two grains into the cavity for a moment, and then spit it out. The relief is instantaneous, and the remedy does not fail in more than eight per cent. of the cases.

La Santé gives the following as a method of removing *corns*: Macerate the tender leaves of ivy in strong vinegar for eight or ten days, then apply them to the corns. This dressing should be applied twice a day, and in a few days the corns will be removed.

For *rheumatism,* a large piece of flannel well sprinkled with sulphur and wrapped about the part affected will often prove a remedy as effective as it is simple.

Mumps. — Dr. Young asserts that muriate of ammonia will cure any case of mumps in forty-eight hours. Give in doses of from fifty to twenty grains every two or three hours. It is equally good in orchitis.

CHILBLAINS AND CHAPPED HANDS.

The returning cold, damp weather brings in its train the seasonable series of complaints, such as chilblains, chapped hands and lips, etc. These appear to be most prevalent just now, amongst those exposed to the inclemency of changeable weather, who possess a fair complexion, delicate skin, and other constitutional predispositions. To those especially liable to these tiresome and painful affections, we recommend as a preventive wearing kid skin gloves lined with wool, which not only keep out the cold, but absorb any moisture that may be upon the hands; and to rub over the hands before washing a small quantity of glycerine, which should be allowed to dry or become absorbed to a partial extent. When chilblains manifest themselves, the best remedy not only for preventing their ulcerating, but overcoming the tingling, itching pain and stimulating the circulation of the part to healthy action, is the liniment of belladonna (two drachms), the liniment of aconite (one drachm), carbolic acid (ten drops), collodion flexile (one ounce), painted with a camel's-hair pencil over their surface. When the chilblains vesicate, ulcerate, or slough, it is better to omit the aconite, and apply the other components of the liniment without it. The collodion flexile forms a coating or protecting film, which excludes the air, whilst the sedative liniments allay the irritation generally of no trivial nature. For chapped hands, we advise the free use of glycerine and good olive oil in the proportion of two parts of the former to four of the latter; after this has been well rubbed into the hands and allowed to remain for a l[e] time, and the hands subsequently washed with [...] tile soap and tepid water, we recommend the be[lla]donna and collodion flexile to be painted, and [the] protective film allowed to remain permanen[tly]. These complaints not unfrequently invade pers[ons] of languid circulation and relaxed habit, who sho[uld] be put on a generous regimen and treated with [fe]ruginous tonics. Obstinate cases are occasiona[lly] met with which no local application will reme[dy] until some disordered state of the system is remov[ed], or the general condition of the patient's health i[m]proved. Chapped lips are also benefited by t[he] stimulating form of application we advocate, but t[he] aconite must not be allowed to get on the lips, o[r] disagreeable tingling results. — *London Chemist a[nd] Druggist.*

Count Moltke, aged 70. — The most potent man in the world just now is General Moltke, a[nd] the days of his years are threescore years and te[n]. We will leave military critics to do justice to t[he] military genius of Moltke, and to say where he is [to] be placed in comparison with Grant, and Wellin[g]ton, and Napoleon, and Marlborough, and the old heroes of the world. What we design now is mu[ch] more simple, but equally interesting. The "si[lent] strong man," about whom one hears so little, wh[o] can be "interviewed" only by Bismarck and by th[e] royal family of Prussia, and without whom all Bi[s]marck's grand designs might have been unavailing, the man who is renewing the art of war, and con[]centrating with such terrible efficiency the whol[e] force and manhood and discipline of Germany, i[s] seventy years old. The King of Prussia, himse[lf] seventy-three, has made him a count in honor of hi[s] seventieth birthday; but to us it is far more inter[]esting to know that he has reached that age, tha[n] to hear that he has become Count Moltke. Gran[t] is not yet fifty years old. Marlborough was al[l] done with war by the time he was about sixty. Na[]poleon died at the age of fifty-two. Wellington's military career was over before the age at which Moltke began to distinguish himself. Indeed, before the war with Austria, Moltke has kept his power and his genius very much to himself.

Here, then, is a point for physiologists, that a man of seventy may alter the complexion of the world, and the relation of nations, and the history of civilization; that he may at this age have physical power for going through arduous bodily exertion, and mental power for solving the most tremendous military problems. Meantime let the example of Moltke cheer old men, and make many young men more modest. — *Lancet.*

French Wine Baths. — A story is told of an American travelling in Paris, who, on recommendation of his physician, took a wine bath. He inquired of the colored man in attendance, whom he had known in America, how they could give a wine bath for 75 cents, and was answered, "Why, massa, that wine has been used one week, and you is the thirty-eighth person who has bathed in it." "Well, I suppose they throw it away when they are done with it." "O, no, massa, they send it downstairs for the poor people, who bathe for 25 cents." "And then what do they do with it?" "Bottle it up and send it to America, where they sell it for French wine."

An American dentist has written a paper to prove that nearly all the "ills that flesh is heir to" come of eating common salt. He says: "While I would not wish to be understood as believing that common salt is the sole cause, I *do* believe that it is *one* of the giant evils that are tending so remarkedly to undermine the health of man, and, with the health, the mind."

Boston Journal of Chemistry.

VOLUME V. BOSTON, MARCH, 1871. NUMBER 9.

Familiar Science.

INFECTIOUS GERMS.

THE spread of the new cattle disease, *epizoötic aphtha*, in this country, under circumstances so remarkable, has awakened in the minds of farmers and others a desire to learn something of the nature of the contagious principle, and the mysterious manner in which it is communicated from one animal to another.

An agent of infection so subtle that a dog or cat walking through a barn where diseased animals are kept, and then running four or five miles in the open air and entering another barn, infects a herd of healthy animals without contact, must be regarded as extraordinary in its nature. After all, it is no more extraordinary or wonderful than the infectious germs of small-pox, scarlet fever, or measles, which are readily conveyed very long distances in the clothing, and in the air, and which remain uninfluenced by meteorological agencies, heat and cold, wet and dry. The susceptibility of different individuals to the influence of contagious germs is no less wonderful than the nature of the germs themselves. It may be said that no two persons are affected alike by them, and it is probable that the same difference prevails among animals. Indeed, we have instances of some herds attacked by the new disease, in which five, ten, and even twenty per cent. of the animals remain in perfect health. They are confined in the same stalls with those diseased, and breathe the poisoned air night and day, and yet not a function is disturbed or a vital movement interfered with. Among human beings, we know that a physician, nurse, or any person leaving a room in which there is a patient sick with scarlet fever or measles, may, in passing a child upon the opposite side of the way, communicate to it the disease; while during the same walk, another may be taken in the arms and suffer no detriment. There is a small class of persons who can never be brought under the influence of kine-pox virus, and such are usually greatly distressed in consequence of this idiosyncrasy of organization. There is but little occasion for anxiety, however, for such will usually escape the more severe disease of small-pox, if exposed to infection. In our view, those who are most readily and severely influenced by vaccine virus are the persons who will be most likely to contract varioloid, when brought in contact with the germs of small-pox; so that the feeling of safety cherished by such is not well founded. There are individuals and families in every community who are continually suffering from every form of malaria, poison, and contagion known to medical men, and certainly they are deserving of sympathy. Personal cleanliness and the strict observance of all hygienic laws are of no avail with thousands in warding off these disturbing agencies; they are the victims of an organization susceptible to the malign influences of poisons and contagions which lurk constantly in the atmosphere, and even in food and drinks.

We know but little regarding the exact nature of the germs which are capable of implanting disease in the system. That they have substance and form, no one can doubt. As distinct atoms or particles of matter, they are inconceivably small, and capable of being buoyed up or supported in air, and carried from place to place through its agency. In a barn containing animals suffering from pleuro-pneumonia, or from the epizoötic aphtha, we must suppose the atmosphere to be loaded with the infinitesimal particles. If our eyes could be opened so that we could see the particles as we see snow-flakes in the winter, what a fearful spectacle would be presented! The disgusting, poisonous atoms would be seen flying in all directions and resting upon everything; upon the clothing of those in charge of the animals, upon the hay, upon the manure, floors, scaffolds, and upon the backs of any dogs, cats, or birds which might be present. A perfect shower of infectious spores would be seen to prevail, and probably we should no longer wonder how the poison is carried so rapidly from one point to another. It is probable that when one or more of these germs are taken into the system through the organs of respiration, a kind of fermentation is set up in the blood, analogous, perhaps, to that which occurs in vegetable substances during the vinous or acetic change.

In studying disease, or any of the changes which occur in the animal organization, we must constantly bear in mind that the body is simply a piece of chemical apparatus, and that all the movements or changes that occur are simply chemical reactions of one form or another. The disease germs themselves are chemical substances; and the difference in chemical composition gives rise to the different forms of blood poison which manifest themselves as scarlet fever, measles, typhus, etc., in human kind, and pleuro-pneumonia, hoof and mouth disease, etc., in animals.

There is reason to suppose that scarlet fever, measles, and typhus ferments resemble albumen in complexity, and like albumen they may be altered in composition and action by heat, alcohol, and other agents. Small-pox ferment is of a different kind, and is remarkable for the small quantity of substance which produces such extraordinary changes. An atom so small that a microscope of the highest power is incapable of defining it, enters the system through the lungs, and passes on into the blood, and from thence into every texture, nerve, and secretion. In a few days the chemical actions of oxidation and nutrition throughout the whole body are completely altered, and the little particle of matter has reproduced itself infinitely. Pustules appear over the whole skin surface, each one loaded with an infinite number of germs identical in nature with the original particle which set in motion the train of disorganizing forces. There is general peroxidation going on; there is inflammation of the ears, the eyes, the mucous membranes, the joints, the serous membranes; everywhere there is great chemical disturbance. This is *small-pox*, and the terribly disgusting, wretched condition of the bodily functions is due to the introduction of a particle so infinitesimally small that no optical instrument can discern, and no balance can weigh it.

The poisonous germs producing intermittent fever, or *fever and ague*, from whatever source they may arise, are probably of a highly complex and nitrogenous nature, and are capable of being dried and carried great distances by the wind. They enter by the mouth with the dust, pass into the blood, and soon produce a kind of fermentation, which results in high fever preceded by a chill. After this is over, the poison is spent in part; but during the remission of from one to three days, sufficient is reproduced to go through the same action again. This remarkable poison, producing intermittent chill and fever, will work on, unless utterly destroyed by medication, until the victim is so far weakened as to falter and die. The ague ferment is totally unlike that producing small-pox and measles, for by the action of the latter the textures of the body are so changed that they are incapable of going through the same process again; but one can have ague a dozen or more times in the course of his life. It is indeed a great mercy that some of our worst zymotic or infectious diseases can attack us but *once*.

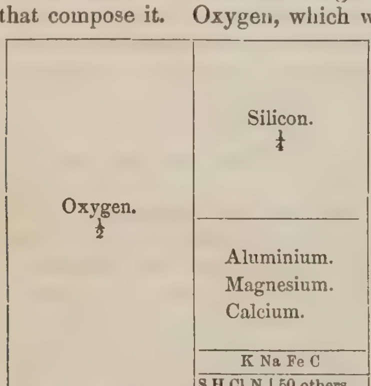
We might as well expect to learn the nature of soul or spirit, as to expect to obtain any precise knowledge of the chemical differences in the germ poisons which affect men and animals. How can we ever know anything regarding the actual difference between a germ producing pleuro-pneumonia or disorganization of the lungs in a cow or ox, and one producing suppurating sores and ugly ulcers in the mouths and hoofs of the animals? Both are specific poisons, exerting specific action upon different parts of the animal organization. It is inconceivable how this can occur; and yet perhaps it is no more inconceivable or mysterious than most diseases, which, after all, are but derangements of the chemical reactions or forces of the animal economy.

We can manage and control chemical changes quite perfectly when they occur in inorganic bodies, and, thanks to science, we can manage tolerably well those which occur in the human or animal organization when they happen under ordinary conditions, and are not of too violent a nature. There is a class of reagents called "remedies," which, when rightly used, serve to control in some degree destructive chemical action in the body. We have learned that the

poisonous germs which we have had under consideration cannot maintain their vitality in the presence of certain chemical agents, among which are carbolic and cresylic acids, sulphurous acid, the chlorides of some of the metals, etc. These destroy the life of spores, as arsenic or prussic acid destroys life in the human body, and therefore they are the proper agents to employ to arrest the spread of infectious diseases. By the exercise of proper caution, and by observing the laws of hygiene, by keeping the body clean, and the blood in good condition, by plenty of air and exercise, we can in a considerable degree fortify ourselves against the attacks of poisonous germinal affections.

SILICON AND ITS COMPOUNDS.

What is the chemical composition of this earth we live upon? The air that envelops the great ball is, as we know, a mixture of two gases, — oxygen and nitrogen, — with a little carbonic acid and watery vapor, and a few other substances in even smaller proportion. The oceans and seas, and all the other waters under the firmament and above the firmament, are also made up of two gases, — oxygen and hydrogen, — with the compounds, comparatively insignificant in amount, which the liquid holds in solution. The solid globe itself — or, rather, its crust, so far as we have been able to examine it — is somewhat more "mixed" in its composition, being made up of a countless variety of substances. If, however, we trace these back to their elements, we find that, as in the case of the atmosphere and the ocean, a few elements constitute by far the greatest portion of the complex mass. The following diagram, for which we are indebted to Prof. Cooke, is intended to show how unequally the *weight* of the earth is divided among the elements that compose it. Oxygen, which we have



already found making up four fifths of the air and eight ninths of the water, is also the most abundant here, forming one half of the whole. Silicon, aluminium, magnesium, calcium, potassium (K), sodium (Na), iron (Fe), carbon (C), sulphur (S), hydrogen (H), chlorine (Cl), and nitrogen (N), fill out nearly the entire remainder. In fact, the thirteen elements already mentioned make up at least 99 hundredths of the whole, while the other fifty elements (including all the useful metals, except iron) do not amount to more than *one* hundredth.

But what *is* this silicon which forms one fourth of the known mass of our earth-crust? Though, next to oxygen, the most abundant of all the elements, it is one of the rarest of substances, on account of the difficulty of obtaining it in a pure state. In this form it is known only as a curiosity in the laboratory of the chemist; but combined with oxygen as *silica*, it is common and cheap, — except when it forms a large ingredient in commercial "fertilizers." Ordinary quartz and flint are pure silica, and the yellow sand of the seashore and the desert is silica contaminated with a little oxide of iron. All the varieties of sandstone, and many other rocks, are mainly made up of it.

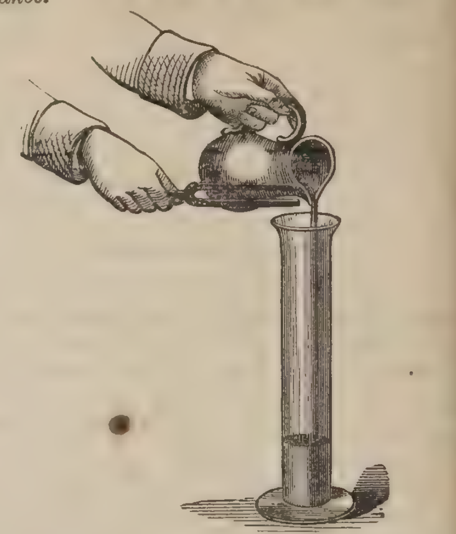
In its chemical relations this tasteless solid is an *acid*, and is known as *silicic* acid. It forms a large class of very important salts, or *silicates*. Among these are the familiar minerals, felspar and mica, which enter into the composition of granite and other extensive rock formations.

Silica is found also in the vegetable kingdom, especially in the grains and the grasses. The outer glossy covering of these plants is mainly this substance, which the plant has sucked up from the earth. There is so much silica in some canes that they will strike fire with steel. Some species of *Equisetum*, or "horse-tail," are used for smoothing and polishing wood, on account of the silicious "grit" in their cuticle. Considerable quantities of the *Equisetum hiemale* are imported into England from Holland for this purpose, under the name of "Dutch rushes." Certain native species are much used by the common people of Great Britain for scouring tin and pewter vessels.

The artificial silicates are of incalculable importance in the arts. When we add that all the forms of *glass* are to be reckoned among these "salts" (for such, chemically speaking, they *are*), it will be readily admitted that their value to mankind is immeasurable. To do justice to so suggestive a theme would more than exhaust the space at our command. In addition to all that we owe to glass in the domestic and the useful arts, consider for a moment how much it has extended the field of human knowledge. There is no one substance to which chemistry has been more indebted for its development and progress. It has given us the microscope, the telescope, the spectroscope, — the windows through which we look out upon the wonders and the beauties of the universe, which were otherwise concealed from our gaze as by thick impenetrable walls. *All* that we know of "the infinitely little," and *all* that we have learned of "other worlds than ours" in the immensity of space, we owe to a few grains of sand fused into chemical union with alkaline earths, — in other words, to a compound of silicon.

RESONANCE.

It is well known that a tuning-fork cannot be heard at any great distance unless its sound is reinforced or strengthened by some contrivance; as, for instance, by attaching the fork to a sounding-box. The figure illustrates another way in which the same result may be attained. If the vibrating fork be held over a glass jar, some eighteen inches deep, and water be poured in slowly and as noiselessly as possible, we find that the sound becomes louder as the column of air in the jar becomes shorter; and when the water reaches a certain level, the sound is all at once greatly augmented. If we continue to pour in water, the sound becomes fainter and fainter until it ceases to be heard. By repeating the experiment we find that there is one particular length of the column of air in the jar which causes the fork to give the loudest possible noise; and this reinforcement of the sound by means of a vibrating column of air is what we mean by *resonance.*



If we try tuning-forks of different pitch, we find that the length of the resonant column of air is not the same for all. The higher the pitch of the fork, the shorter the column will be. Our readers probably know that the *pitch* of sounds depends upon the *rapidity* of the vibrations producing them. The higher the sound, the faster the sonorous body must vibrate. But since all sounds travel through the air with the same speed, the faster the vibrations, the shorter are the sound-waves produced. Now it can be proved — but we shall not take the space to do it here — that the length of the resonant column of air for a tuning-fork is equal to just one fourth the length of the sound-wave produced by the fork. For example, if the fork sounds loudest when the level of the water is 13 inches from the top of the jar (as it will if the fork vibrates 256 times in a second), the sound-wave will be four feet and four inches long.

The experiment we have described is only one out of many that have been devised to illustrate the laws of resonance; and many natural phenomena are due to the same cause. Tyndall, in his "Lectures on Sound," thus refers to some of these: —

"The resonance of caves and of rocky enclosures is well known. Bunsen notices the thunder-like sound produced when one of the steam jets of Iceland breaks out near the mouth of a cavern. Most travellers in Switzerland have noticed the deafening sound produced by the fall of the Reuss at the Devil's Bridge. The noise of the fall is raised by resonance to the intensity of thunder. The sound heard when a hollow shell is placed close to the ear is a case of resonance. Children think they hear in it the sound of the sea. The noise is really due to the reinforcement of the feeble sounds with which even the stillest air is pervaded. By using tubes of different lengths, the variation of the resonance with the length of the tube may be noticed. The channel of the ear itself is also a resonant cavity. When a poker is held by two strings, and when the fingers of the hands holding the poker are thrust into the ears, on striking the poker against a piece of wood a sound is heard as deep and sonorous as that of a cathedral bell. When open, the channel of the ear resounds to notes whose periods of vibration are about 3,000 per second. This has been shown by Helmholtz; and a German lady named Seiler has found that dogs which howl to music are particularly sensitive to the same notes."

SPONTANEOUS COMBUSTION.

A few weeks ago, more than forty thousand dollars' worth of property was destroyed by fire in a furniture manufactory at East Cambridge, on account of carelessness in leaving oily rags lying about. In our January number we devoted a leading article to this subject of spontaneous combustion; and the following communication just received from one of our best chemists furnishes some striking illustrations of the varied ways in which such combustion may arise: —

Any light that can be obtained on spontaneous combustion adds not a little to the value of real estate. We believe a large percentage of the fires charged to incendiarism are really owing to spontaneous combustion, so called. We purpose giving three cases, two of which have come under our own experience.

1. Within a year, twenty-eight rolls of cotton cloth in one of our large dyeing establishments were dyed black, and were delayed a few days before they could be starched and finished. Two of these rolls were discovered to be on fire, — not in flames, but in a smouldering condition, or charred into tinder; a third roll was so hot that hands could not handle the cloth, and the wooden roller upon which the cloth was wound was heated almost to the point of ignition.

The rolls of cloth destroyed were the *first dyed*, and consequently had been longer exposed than the others, which *in a measure* explains why all the rolls were not in the same condition.

In the dyeing, the first rolls were dyed *without washing*, by an oversight of the dyer. This is the *point of importance*, as the chemical salts were left in the cloth. Logwood, potash, sulphate of copper, and sulphate of iron constituted the dye, and we suggest this explanation of the probable cause of the fire. The potash and sulphate of iron change to sulphate of potash and hydrate of iron; the latter changes to oxide of iron by the absorption of oxygen from the atmosphere or from moisture in the cloth, and the heat thus developed reaches the point of ignition. Cloth in drying is very liable to contain heated moisture.

2. Within a year a fire was discovered in a silk-mercer's shop in London. The fire originated in a lot of *black-dyed silk*, and was discovered, as in the first instance, before flame had burst out. The conclusion reached was that it was not safe to have black-dyed silk in large masses, and that each piece ought to be so placed as to allow a free circulation of air. We think it quite probable that the explanation of the combustion is the same as in the preceding case.

3. In trying to get rid of rats in a dwelling-house, the floors were taken up, in order to cut off their ingress, if possible. The box that held the hot-water pipes was found to be a favorite resort for the vermin, and had *actually been on fire*. The sides were charred, but there had not been sufficient air to sustain combustion. Upon investigation as to the cause of the incipient fire, we were not left long in doubt, for a store of remnants of greasy cloths used in washing dishes was found, which had been brought by the rats from the kitchen. Some of these were charred, and the others were well saturated with grease and oils. This fire was quite a distance from the kitchen range, forty feet at the least.

It would be very natural in all these cases, if the real causes had not been so apparent, to attribute the origin of the fire to incendiarism.

We have a very firm impression that the introduction of coal oils for lubrication of machinery has very materially reduced the numbers of fires from spontaneous combustion, owing to the fact that the coal oils *do not absorb oxygen*; and that for this reason, if for no other, insurance companies can afford to insure mill property for less rates than they charge at present.

THE SIZE OF THE SUN.

More than one attempt has been made to convey some adequate idea of the vast bulk of the sun as compared with the earth. The following, which we take from Mr. Proctor's "Other Worlds than Ours" (recently reprinted by the Appletons), is very good in its way, and may serve as an average sample of an exceedingly interesting book: —

"Let the reader consider a terrestrial globe three inches in diameter, and search out on that globe the tiny triangular speck which represents Great Britain. Then let him endeavor to picture the town in which he lives as represented by the minutest pin-mark that could possibly be made upon this speck. He will then have formed some conception, though but an inadequate one, of the enormous dimensions of the earth's globe, compared with the scene in which his daily life is cast. Now, on the same scale, the sun would be represented by a globe about twice the height of an ordinary sitting-room. A room about twenty-six feet in length, and height, and breadth, would be required to contain the representation of the sun's globe on this scale, while the globe representing the earth could be placed in a moderately large goblet.

"Such is the body which sways the motions of the solar system. The largest of his family, the giant Jupiter, though of dimensions which dwarf those of the earth or Venus almost to nothingness, would yet only be represented by a thirty-two inch globe, on the scale which gives to the sun the enormous volume I have spoken of. Saturn would have a diameter of about twenty-eight inches, his ring measuring about five feet in its extreme span. Uranus and Neptune would be little more than a foot in diameter, and all the minor planets would be less than the three-inch earth. It will thus be seen that the sun is a worthy centre of the great scheme he sways, even when we merely regard his dimensions.

"The sun outweighs fully seven hundred and forty times the combined mass of all the planets which circle around him; so that when we regard the energy of his attraction, we still find him a worthy ruler of the planetary scheme."

HOUSEHOLD RECIPES.

Liquid Bluing. — To one part of Prussian blue add gradually two parts of concentrated muriatic acid. Let the paste stand for twenty-four hours, then add nine parts of water, and bottle it.

The solution of indigo in sulphuric acid is also used for the same purpose. To prepare it, pulverize one ounce of pure indigo, and add it by degrees to four and a half ounces of concentrated sulphuric acid, mixing it well by stirring with a glass rod. If desired, the acid may afterwards be neutralized with carbonate of potash.

Yeast. — The following is recommended by first-rate authority as a method of making good yeast that will keep for weeks, even in hot weather: —

On Monday morning put two ounces of best bale hops into a gallon and a pint of cold water, boil half an hour, strain hot, and dissolve two ounces of finest table salt and half a pound of sugar in the liquor; when cooled to new milk warmth, put one pound of sifted flour into a large basin, make a well in the centre of it with the hand, and add the liquor by degrees, stirring round and round with a spoon until the whole of the flour is evenly mixed with the liquor; set the pan containing the liquor on a stool by the stove, in winter time, day and night. In hot weather this is not requisite. On Wednesday morning boil and mash finely three pounds of good potatoes, and mix them with the liquor in the same way as the flour. On Thursday morning there should be a heavy dark scum on the surface. The yeast must now be stirred thoroughly and strained through a sieve or colander into a gallon jug, corked firmly, tied down, and placed in a cool cellar. Shake well before using.

To Remove Grease from Silk. — Rub together fine French chalk and spirits of lavender to the consistence of a thin paste, and apply thoroughly to the spots with the fingers; place a sheet of brown or blotting paper above and below the silk, and smooth it with a moderately heated iron. The French chalk may then be removed by brushing.

Paste that will Keep a Year. — Dissolve a teaspoonful of alum in a quart of warm water. When cold stir in as much flour as will give it the consistency of thick cream, being particular to beat up all the lumps; stir in as much powdered rosin as will lie on a dime, and throw in half a dozen cloves to give a pleasant odor. Pour this flour mixture into a pan containing a teacupful of boiling water, and stir it well over the fire. In a very few minutes it will be of the consistency of mush. Pour it into an earthen or china vessel; let it cool; lay a cover on, and put in a cool place. When needed for use, take out a portion and soften it with warm water. Paste thus made will last twelve months. It is better than gum, as it does not gloss the paper, and can be written on.

Curing Beef and Hams. — The following recipe has been used for forty years by a manufacturer who is noted for the superior quality of his dried beef and hams: —

For every 100 lbs. of beef, 7 lbs. salt, 2 oz. saltpetre, $1\frac{1}{2}$ lbs. brown sugar, 4 gals. water. Boil and skim, and pour over the meat when cold. If properly packed, that amount of water will cover the meat.

For pork, pack the hams and shoulders together. To every 100 lbs. take 8 lbs. salt, 4 oz. saltpetre, $1\frac{1}{2}$ lbs. sugar, 4 gals. water.

The hams and beef for drying may be taken out after four weeks. To keep the meat after warm weather, the pickle will have to be boiled.

A Cheap Breakfast for Eight Persons. — "A good breakfast for eight persons for about a dime. Put half a pound of rice and half a pound of Scotch barley into one gallon of soft water; stew them gently for four hours. Then add four ounces of molasses and a little cinnamon; boil another half-hour. This will produce eight pounds of good food."

The above quotation, clipped from a journal ostensibly devoted to the promotion of health, is a fair sample of the teaching of many of these pseudo-medical publications. The entire amount of solid matter contained in this "mess" is twenty ounces, which gives each person of the eight two ounces of farinaceous food and one half an ounce of molasses for a breakfast. The writer of this recipe ought to be made to take three meals per diem of his "pap" for three weeks. If at the end of that time he should retain strength to write another, we will concede that six ounces of mixed rice and barley and an ounce and one half of molasses are a liberal day's rations for an adult. — *Scientific American.*

Economical Board. — It is said that the hunters of Siberia, when pressed by hunger, take two pieces of board, and, placing one on the pit of the stomach and the other on the back, gradually draw together the extremities, and thus allay, in some degree, the cravings of appetite.

The Arts.

A STEAM LOCOMOTIVE FOR COMMON ROADS.

Ever since the introduction of railways, the problem of the adaptation of the steam-engine to travel upon ordinary roads has attracted more or less attention, but until recently every attempt to solve it has proved a failure. At last, however, we have a road locomotive that both works well and wears well. "Thomson's road steamer," as it is called, is already much used in Europe, and a manufactory for building it has been established in New Jersey. The English manufacturers are unable to fill their numerous orders, and have had to give a firm in Scotland the right to supply that country.

The most important feature in the machine is the construction of the driving wheels, which have a broad rim, covered by a thick india-rubber tire, which is itself surrounded by an endless chain of steel plates. This chain, the rubber tire, and the rim of the wheel are not fastened together; so that, in running, especially with a heavy load, the tire slips gradually around the wheel, and is thus saved from being torn by any sudden strain upon it.

The steering apparatus is simple, and the steamer can turn a very sharp corner, the inner driving wheel describing a circle of less than three feet radius. The gearing and working parts are strongly constructed, and protected from dirt and the weather. An ingenious device in connection with the exhaust steam suppresses almost entirely the noise caused by its escape. There is a single gear for quick speed, and a double gear for heavy loads. Either of the driving-wheels can be thrown in or out of gear, so that, in turning corners, the inner wheel is out of gear while the outer wheel drives the steamer around. Two sizes are made, of 8 and of 12 horse power, which draw loads of 20 and of 30 tons, respectively, on an ordinary level road, and 12 and 17 tons up inclines of 1 in 12. The speed is $2\frac{1}{2}$ to 6 miles per hour for freight steamers, and 10 miles for passenger service. The consumption of coal is about half a ton daily.

This engine not only travels over soft roads without injuring them, but it actually repairs and improves them. This was well illustrated in one of the English experiments, where the steamer, with a heavy vehicle attached, was driven round and round in a field thoroughly saturated with melted snow. The steamer left the merest track in the slushy ground, while the wheels of the vehicle behind cut it into deep ruts. But as the engine passed over these ruts, when retracing the circle, it effaced them; and by and by, being detached and allowed to run over the spot alone, it repaired the surface, and made it perfectly smooth and even.

An eight-horse-power steamer has been in use for many months, making six trips daily from Aberdeen, Scotland, to some flouring mills, three miles distant, and carrying a load of ten tons each time. The road on which it travels is described as "perhaps the worst road in the kingdom," being narrow and crooked, and with gradients for half the distance varying from one in nine to one in eight. Up these inclines the steamer, which weighs six tons, draws a load of ten tons. We may add, to give a better idea of these grades, that the steepest incline on the road over the Simplon Pass, in Switzerland, is one in thirteen.

On the whole, this new engine, which virtually converts all our highways into steam railways, is to be considered as one of the most important inventions of this inventive age.

MEMORANDA IN THE ARTS.

Compressed Air as a Motive Power. — The success which has attended the use of compressed air as a means of transmitting power, in the operations at the Mont Cenis tunnel, has had much to do with the completion of that great enterprise. It would have been quite impossible to carry steam at a high pressure through pipes four miles long; but it was found that very little force was lost in working with air, although all the engines and condensers, as well as the cylinders for storing the air, were outside the mouth of the tunnel. No heat is produced in a tunnel by this process; but, on the contrary, since the escaping air absorbs heat as it expands, it serves at the same time to cool and to ventilate the interior.

It is not improbable that the same means may come to be employed for transmitting the power of waterfalls to great distances, as proposed by Mr. Day, of Bloomingdale. It is in this way that he would convey to Buffalo five thousand horse-power taken from Niagara Falls, twenty miles distant. It is estimated that this may be done by means of a pipe 42 inches in diameter, through which a column of air, compressed so as to exert a force of 100 pounds to the square inch, is sent with a velocity of 10 feet a second; or a pipe of 36 inches would do, if the velocity were $14\frac{1}{2}$ feet a second. It is proposed to make the pipe of boiler iron a quarter of an inch thick, and to paint it inside and out with a strong indestructible varnish, which will at once make it absolutely air-tight and protect it perfectly from corrosion. We shall not be surprised to see the project carried out.

To Cut or Bore Glass. — Any hard steel tool will cut glass with great facility when kept freely wet with camphor dissolved in turpentine. A drill-bow may be used, or even the hand alone. A hole bored may be readily enlarged by a round file. The ragged edges of glass vessels may also be thus easily smoothed by a flat file. Flat window glass can readily be sawed with a watch-spring saw by aid of the solution. In short, the most brittle glass can be wrought almost as easily as brass by the use of cutting tools kept constantly moist with camphorized oil of turpentine.

Parchment Paper. — Paper can be readily converted into vegetable parchment by immersing it for a few moments in a mixture of two volumes of sulphuric acid and one of water. The acid should be washed off the paper by immersing and slightly agitating it in a large quantity of cold water. The last trace of acid may be removed by finally immersing the paper in water to which a small quantity of ammonia has been added. To prevent contraction or wrinkling, the paper should be stretched on a frame while yet wet. Paper so prepared is transparent, and can be used for tracing paper; and may also be employed as a very good substitute for sheepskin parchment.

To Fuse Platinum with the Common Blow-pipe. — It has been found that if the loss of heat by conduction be prevented, platinum can be fused with an ordinary blow-pipe blast through a candle or lamp flame. This is effected by using, instead of the metallic nozzle, a tube of clay or glass. In this way Mr. Skey fused fine platinum points to beads. To make sure that the metal was not rendered more fusible by admixture of other substances, he prepared some pure platinum with special care for experiment; and with this he obtained the same result. As the fusing point of platinum is 4,593° F., it is evident that even that high temperature can be produced by the ordinary blow-pipe, if no heat is wasted.

PRACTICAL RECIPES.

Water-Proof Packing-Paper. — Water-proof packing-paper is now made by some manufacturers. The paper is covered with a resinous liquid, then painted over with a solution of glue and soot, as without this the paper will later show blotches. After this is dried, the actual water-proof coat is applied. This is prepared with two and a half ounces of powdered shellac, dissolved in two pints of water, which is gradually brought to boil, and is stirred until the substance is perfectly dissolved and softened; when gradually one third ounce of powdered borax is added, until an intimate union of the substances takes place. The liquid is then left to cool, and while still hot any mineral color may be added, such as lamp-black, yellow ochre, red ochre, iron blue, or burnt umber, after which it is left to get entirely cold. It is then ready for use. The operation can be so quickly performed with a brush that two women can prepare three thousand feet in ten hours.

Turner's Cement. — The following is a very excellent cement for the use of turners and artisans in general: sixteen parts of whiting are to be finely powdered and heated to redness, to drive off all the water; when cold, this is mixed with sixteen parts of black resin and one part of beeswax, the latter having been previously melted together, and the whole stirred till of uniform consistence.

Printing Ink. — An extemporaneous superfine black ink may be made by the following formula: Take of balsam of copaiba (pure), 9 oz.; lamp-black, 3 oz.; indigo and Prussian blue, of each $\frac{1}{2}$ oz.; Indian red, $\frac{3}{4}$ oz.; yellow soap (dry), 3 oz.; grind the mixture to an impalpable smoothness by means of a stone and muller. Canada balsam may be substituted for balsam of copaiba where the smell of the latter is objectionable, but the ink dries very quickly.

Indelible Ink for Type. — The *Druggists' Circular* gives the following recipes for making ink to be used with type or stencil plates: —

1. Sulphate of manganese, two parts; lamp-black, one part; sugar, four parts; all in fine powder and triturated to a paste with a little water.

2. Black oxide of manganese and hydrate of potassa are mixed, heated to redness in a crucible, and then triturated with an equal weight of *pure white clay*, and water enough to give consistency. The work is to be rinsed well in water after it is dry.

To Revive the Color of Faded Black Cloth or Leather. — Take of the best quality of blue galls, four ounces; of logwood, clean sulphate of iron, (copperas), clean iron filings, and sumac leaves, each one ounce; put the galls, logwood, and sumac berries into one quart of the best white wine vinegar, and heat to nearly the boiling point in a sand bath, then add the iron filings and copperas; digest for 24 hours, and strain for use. Apply with a sponge.

Furniture Oil. — To one quart of linseed oil add one ounce of bruised alkanet root, and boil them together in a glazed earthen vessel until the color is extracted from the root; then cool, and strain for use.

Curing Skins without Removing the Hair. — A correspondent sends the following recipe for curing skins without removing the hair.

Take of soft water	10 galls.
Wheat bran	$\frac{1}{2}$ bushel.
Salt	7 lbs.
Sulphuric acid	$2\frac{1}{2}$ lbs.

Dissolve all together and place the skins in the solution, and allow them to remain twelve hours; then remove and clean them well, and again immerse twelve hours, or longer if necessary. The skins may then be taken out, well washed, and dried. They can be beaten soft if desired.

Agriculture.

HOW TO PREPARE BONES FOR FERTILIZING USES.

We have repeatedly given information in the Journal regarding the best and most convenient methods of preparing bone material for the farm and garden, but requests still come for further or more specific instructions. If a farmer has collected a pile of bones which he desires to utilize or fit for plant food, he can accomplish the end in two or three different ways: 1st, by dissolving them in sulphuric acid in the raw condition; 2d, by dissolving after burning to whiteness; 3d, by dissolving them in connection with caustic lye from ashes and soda. Bones cannot be dissolved in acid economically, unless they are reduced to a fine powder. Pounding them into small fragments will not do, as but a part of the bone substance can be acted upon by the acid when fragments are submitted to its action. An insoluble coating of sulphate of lime forms around each fragment after the first action of the acid, and this arrests further decomposition. As a matter of experiment, we have submitted powdered bones to the action of strong and dilute acid, for six months, and the solution at the end of that time was far from being complete. Raw bones are very difficult to grind in any mill accessible to farmers, and therefore it will be best, if it is desired to make "superphosphate," to construct a rough kiln of stones, throw into it the bones, along with sufficient wood to kindle them; and by igniting the wood, the bones will readily take fire and burn to whiteness. In this state they are brittle, and can be ground in a bark, plaster, or grist mill. The organic matter, or the gelatine, is destroyed in this process, and the bones lose about twenty-seven per cent. in weight. To convert the bone ash into superphosphate, procure two or three good sound molasses casks, divide them in the middle with a saw, and into each half put two hundred pounds of the powder moistened with a couple of buckets of water. A common hoe may be used to turn over and mix the powder and water, and also it may be used to stir up the mass after the acid is added. Oil of vitriol or sulphuric acid should be purchased in carboys, and the common commercial strength is suitable, that of specific gravity 1.70, or 140° Twaddell. A stone pitcher holding a gallon is a suitable vessel in which to receive and measure the acid; and in turning it out of the carboy, do not be nervous or act in a hurry. Turn it out gently, and be careful that it does not spatter upon the face or clothing. Place the carboy upon a low box, remove the stopper, and, tipping the vessel, allow a small, smooth stream to fall into the pitcher. The two hundred pounds of bone powder will require the entire contents of the carboy of acid; in fact, a little more is needed to produce perfect decomposition. A carboy holds about one hundred and fifty pounds, and one hundred and seventy-five will be appropriated by the bone if the action is perfect and entire. The contents of a carboy, however, have answered in our experience. The acid must be added gradually, one gallon at a time, stirring with the hoe, and waiting for the effervescence to subside before more is added. In a few hours the action will be over, and a liquid resembling water will be seen floating upon the top of the powder. This liquid is *excessively sour, being free phosphoric acid*, holding a little soluble lime in combination. Many who have tasted of this liquid have supposed that it was *uncombined oil of vitriol*, and, fearing that it would *burn up* their crops, have been afraid to use the mixture. To *dry* this pasty mass, so that it can be pulverized, is the most troublesome and protracted part of the labor. Superphosphate should be made by the farmer *in the summer* after hoeing, when the weather is warm. He should provide twenty or thirty rough shallow boxes, in which the moist mass can be placed and put in the sun to dry. They can be taken under cover in wet weather. Before drying, a barrel of sifted loam should be mixed with the bone paste, and thoroughly worked into it. This will greatly facilitate the drying process. When the mass is dry, it can be pounded fine with a mallet, or it can be ground in any kind of a mill. The powder thus manufactured is most excellent, and when further diluted with two more barrels of dry soil or loam, is equal to the best superphosphate found in the market. A handful put in each hill of corn or potatoes at time of planting will give fine results. This superphosphate *must not be mixed with lime, or ashes*, as from their action it will undergo decomposition, and new salts will be formed. It may be mixed up with dry fish pomace, and form a very perfect and excellent fertilizer for all kinds of crops.

The manipulation described above is adapted to the preparation of superphosphate from ground *raw bones*. The only variation is in the amount of acid needed. *For raw bone powder, only half as much acid should be used*, or six gallons for a barrel of bone dust. The processes for its manufacture are the same. Bones may be dissolved in moistened wood ashes, if care is taken to bring them completely under the action of the caustic lye.

To accomplish this, it is necessary to break the bones into fragments and pack them in a tight, shallow box with an equal weight of good sound wood ashes. Mix with the ashes, before packing, twenty-five pounds of slaked lime and twelve pounds of powdered sal soda (carbonate of soda) to every one hundred pounds of the ashes. The box in which to conduct that process may be made of rough boards, but it must be tight, and it should not be over eighteen inches deep. It may be as broad as is necessary. The bones should be packed in layers; first upon the bottom a layer of ashes, then a layer of bones, and so alternately until the box is filled. About twenty gallons of water must be poured upon the heap (that is, for every one hundred pounds of bones) to saturate the mass, but more may be added from time to time to maintain permanent moisture. In three, four, or six weeks, the bones will be broken down completely, and the whole may be beaten up together, after adding an equal bulk of good sifted soil. This compost is of the highest efficacy, as it embraces quite all the great essentials of plant food, namely, potash, soda, lime, phosphoric acid, and the nitrogenous element. This is a very convenient way for farmers who have ashes, to dispose of their store of bones. If plenty of ashes can be procured, it will facilitate the decomposition of the bones to employ *twice* as much ashes as there are bones: the solution will be effected sooner, and more perfectly.

If powdered bones are employed, a barrel of the powder may be mixed with a barrel of good ashes, and the whole turned into the half of a molasses cask, moistened with two bucketfuls of water, and stirred up well with a hoe. In a week this will be ready for use, and it forms a most efficient and convenient fertilizer for all the cereal crops. We think it does more for corn, in giving plump, full kernels, than any concentrated fertilizer we have employed. A handful is enough for a hill, put in at time of planting. Before dropping the seed, a little earth should be kicked over the powder, so that it may not come in direct contact with it.

In the statements above given, we have but repeated, although in another form of words, what we have many times before stated. We have endeavored to give the processes for preparing bones, in the most practicable way, and in words unaccompanied with technical phrases. This must make all plain to the comprehension of every reader. Our statements are based on actual experience, and experience probably more extensive than has fallen to the lot of most others.

If farmers will place the paper containing these statements where it can be readily found when wanted, it may be of great service in the conduct of their farms, and it will save them the trouble of writing, and us the trouble of replying, when they desire information upon the proper treatment of bones for fertilizing uses.

ASHES, LEACHED AND UNLEACHED.

Wood ashes have been recognized and used as a manurial agent by nearly or quite all the civilized and semi-civilized nations that have ever existed on the earth. The Roman farmers in the days of the Republic and the Empire were in the habit of burning the stubble of their grain fields and using the ash to enrich succeeding crops; and that stern old husbandman Cato recommends the burning of twigs and branches of trees, and spreading the ash upon lands. The Indians of this country and of South America were led by observation to know the value of ashes, and often burned the stems and leaves of the corn plant to improve the soil. There has never been a time, however, when a higher value was placed upon ashes than the present, and this estimate is by no means an exaggerated one. Inquiries are frequently made regarding the comparative value of leached and unleached ashes; and in order to answer them, let us consider the nature or chemical constituents of the two heaps as we find them at the soap-boiler's. In one bin are the dry, fresh wood ashes; in another the wet, lixiviated mass as thrown from the leach tubs. If the former are like the ashes produced in our own dwelling, by burning in the open fire-place oak, pine, hickory, birch, and maple woods, a bushel will weigh about 50 lbs., six and three fourths pounds of which are soluble in warm water. Of the soluble constituents there are a little more than $4\frac{1}{2}$ pounds of potash and soda, the remainder being the sulphuric, muriatic, and carbonic acids with which the alkalies are combined. Forty-three pounds are *insoluble* in water, and consist of

Carbonate of lime	32 lbs.
Phosphate " "	3 lbs.
Carbonate of magnesia	4 lbs.
Silicate of lime	3 lbs.
Oxides of iron and manganese	1 lb.

It is the work of the soap-boiler to remove from ashes that which is soluble in water, which is accomplished in the leach tub, and this is all the change they undergo in his establishment. The ashes go in dry, holding the soluble and insoluble substances; they come out wet, deprived of $6\frac{2}{4}$ pounds of potash and soda. It should be stated, however, that about one pound of quick-lime is added to each bushel of ashes in the leach, to render the lye caustic. This adds one pound more of lime to the insoluble residuum, or the leached ashes, making it weigh, if it was free from water, 44 pounds. In leaching, the ashes do not change much in bulk, but they are largely increased in weight from the contained water.

Now, what is the commercial value of the ashes before and after they pass through the soap-maker's hands? In the dry state the

$4\frac{1}{2}$ lbs. of potash and soda are worth	6 cts. per lb.	27 cts.
Other soluble constituents		3 cts.
32 lbs. carbonate of lime		3 cts.
3 lbs. phosphate of lime		6 cts.
3 lbs. silicate " "		0 cts.
Iron and manganese		0 cts.
		39 cts.

This estimate, which is a fair one, gives a value per bushel of 39 cts., that is, the substances found in a bushel of good sound wood ashes are worth in the market that sum at the present time. By leaching the ashes, 30 cts. of the commercial value is removed and converted into soap; this leaves 9 cts. as the value of the constituents of a bushel of leached ashes. The silicate of lime and the metals practically have no market value, and are not considered.

What is the agricultural value of the two forms of fertilizers? The ashes holding all their normal constituents are worth more applied to soils than for other uses when separated, dollars and cents being considered. A bushel judiciously employed will return in most seasons 60 or 70 cts. worth of products the first year. The potash and soda combined as they are in ashes, in the form of carbonates, sulphates, and silicates, are in precisely the right condition to be readily assimilated, and also to aid in rendering assimilable many important constituents of the soil.

The leached ashes also are worth more to the farmer than 9 cts. the bushel. Relatively they are worth more for soil employment than the unleached, regard being had to the commercial value of the substances when separated. A good honest bushel of moist leached ashes will give returns the first year of the value of 15 or 20 cts.; and owing to the peculiar decomposing influence upon the insoluble constituents of the soil of the silicates, etc., remaining in the mass, their influence extends outside of themselves, and continues for a long time. A pound of phosphate of lime found in ashes is worth more than a pound of bone dust, as it is in a condition to be readily taken up by plants. The carbonate of lime, we are inclined to think, is worth more than chalk or the same agent in other forms, inasmuch as it has once passed through plant structures.

The estimates here presented are only rough ones, but they are sufficiently exact to serve as a guide in learning the value of leached and unleached wood ashes. We have experimented considerably with ashes in both forms, upon soils of various kinds, and what we have here stated is the result of our practical experience. We shall present soon another article upon ashes, as there is need of more extended remarks than we have room for at present.

COTTON-SEED AS A FERTILIZING SUBSTANCE.

It is pleasant to learn of the great interest felt in agricultural matters at the South. Earnest inquiries are made by soil owners and planters in all directions as regards the most improved methods of cultivating, not only the cotton, but the cereal crops. The best farm implements are brought into requisition, and fertilizing substances are sought for in all quarters. We would caution our Southern friends against the frauds and deceptions connected with commercial fertilizers. They cannot afford to throw away their money in purchasing the worthless compounds which flood the Southern market. They must resort to every expedient to increase home products of manure. No waste should be allowed either in connection with households, stables, or vaults. Many questions come to us regarding the best methods of converting cotton seed into fertilizers. Without having had opportunity of experimenting in this direction, we incline to the opinion that it is not profitable or practicable to use fresh cotton-seed for manurial purposes. If composted, which of course is the readiest way of utilizing it, we think the large amount of oil held in the seeds would interfere with the process of fermentation. We do not well see how a rich oil could be brought readily under the influence of putrefactive changes. The other portions of the seeds would change by fermentation if the oil was removed. The following is an analysis of cotton-seed, whole, and with the husk removed.

	Whole Seed.	Decorticated Seed.
Water,	11.34	8.29
Oil,	6.18	16.05
Albuminous compounds.	23 72	41.25
Gum, sugar, mucilage,	30.98	17.44
Woody fibre,	21.24	8.92
Mineral matter,	6.54	8.05
	100.00	100.00

The demand for cotton-seed oil is increasing rapidly both at home and abroad, and it will continue to command high prices for many years. It will manifestly be better first to express the oil, and then use the remaining rich constituents of the seeds for plant fertilization. If practicable at the South, it would be better to feed the cotton-seed cake to animals, as it is a rich milk-producing and fattening food, and then save the solid and liquid excrement of the animals for the land. There is much to be learned as regards the best course of procedure for Southern farmers, but there are good advisers and many excellent agricultural journals in that section, and improvement must be rapid.

KAINIT.

A NEW fertilizing agent has been recently introduced into the European markets under the name of *Kainit.* It is found as a natural product, in immense quantities, in Germany, and the mines open up an almost inexhaustible supply of *potash.* This is one of the most important discoveries of modern times, and it cannot fail to be of great service to agriculture. With plenty of potash coming to us at cheap rates from natural sources, and with the phosphates from our own immense deposits in South Carolina and New Jersey, the future of agriculture is full of promise. We must not expect to reap immediate satisfactory advantages, as it is by slow processes that the gifts of nature are made fully available. But the time is near at hand when plant food will be furnished in great abundance, and at low prices, to husbandmen everywhere.

Kainit in commerce is a calcined and ground product, and according to analysis contains

Sulphate of potash	30.00
" " magnesia	20.00
Chloride " "	5.00
" " sodium	35.00
Sulphate of lime	10.00
	100.00

The product is not uniform, as it varies in quality in various localities or parts of the same deposit. These potash, magnesia, soda, and lime salts are all of great utility in agriculture, and we think kainit, as soon as it is understood, and the best methods of preparation or combination are known, will be largely employed.

Mr. C. D. Hunter, experimental chemist on the farm of our friend, Wm. Lawson, Esq., Blennerhasset, England, made some experiments with kainit upon potatoes and other crops last year; and although he did not find it to give results equally satisfactory with muriate of potash, still its effects were promising. If the highest results depend upon the *form* in which potash is presented to the soil, methods will soon be devised by which the potash found in kainit will be placed in the most available condition. Mr. Hunter's experiments are fully presented in the *North British Agriculturist*, of December 28, 1870.

A Baltimore house (Mr. C. L. Oudesluys) has commenced to import kainit, and we shall procure a supply, and after full experiment during the coming season will give our readers the results in detail.

THE LESSON OF THE RECENT DROUGHT.

THE following extract is from a Report by W. W. Daniels, Professor of Agriculture in the University of Wisconsin, which we find in that excellent journal, the *Western Farmer:* —

"While there is no means of preventing the recurrence of these extremes of climate, and perhaps no means of modifying their effects that will be universal in its application, there is a remedy, general in its nature, which is within the reach of all farmers. It is the *adoption of a better system of culture,* — better and deeper ploughing, better cultivating, and better manuring.

"The stratum of soil needs to be deepened, to be more thoroughly pulverized, and to be made richer. Any means that may be adopted, that will accomplish these ends, will be of value as a remedy against drought.

"There is another means of preventing the evil effects of both droughts and floods upon all clay lands or upon those having a clay subsoil, and which at the same time increases the productiveness of the soil as to pay well for its adoption. It is under-draining. The effect of under-draining is to pulverize the soil by natural means to nearly or quite the depth of the drains, and by this deep pulverization the soil is enabled successfully to withstand droughts so severe as to ruin crops upon similar land undrained, while the drains beneath the surface form a ready means of escape for the surplus water of wet seasons. In the adoption of a thorough system of under-draining upon all heavy soils will be found the most effectual remedy, and the one most general in its application, against such extremes as those of the past three seasons."

SEEDS AND CUTTINGS.

To prevent balls of snow on horses' feet, let the hoof and fetlock be well cleaned and then rubbed with soft soap previous to their going out in snowy weather. — A drove of 98 Merino sheep, selected from the best stock in Vermont, were sent overland to California recently. — A Down East cow has furnished 365 pounds of butter in a year, besides bringing up a calf to 110 pounds. — Mr. Thos. Meehan states, in Forney's *Press*, that a respectable firm in this country has received a "confidential" circular from Hamburg, Germany, offering to furnish at a low price three hundred cwt. of *sand* for mixing with clover-seed; and the parties claim that they do a large business in that line in England. — Out of six million owners of real estate in the whole country, more than two thirds are farmers. — California expects soon to raise all the raisins needed for home use, with possibly a surplus for exportation. — The State entomologist of Missouri says that the washing of fruit-trees with soap, or the application of any alkaline solution, is an infallible protection against borers; and this is confirmed by the experience of some of the most extensive fruit growers in that section. — The mole is a friend to the farmer, and not an enemy, as he is popularly considered; it having been proved by experiments upon the animal in captivity, that while he readily eats insects, grubs, and the like, he will sooner die of starvation than eat roots or other vegetable substances.

THE CURRANT WORM. — We are informed by Dr. E. Worcester, of Waltham, Massachusetts, that the currant worm, so destructive to a favorite fruit, may be fully and almost immediately destroyed by the use of *carbolate of lime.* The Doctor tried the powder in many instances during the past summer, and found that while it was fully as effective as hellebore, it was less disagreeable, less costly, and perfectly safe. The method of using it is to sprinkle it over the vines as soon as the worm makes its appearance, bringing it well in contact with the leaves, and soon the insect is destroyed. It will need but two or three applications, and the work is done. In this way for a few cents large quantities of currant bushes may be saved and the fruit allowed to mature, and no danger whatever incurred. Neither the foliage nor the fruit is in any way injured by the carbolate of lime. It will be well for our readers to remember this when the fruit season returns.

THE NEW BIRDS. — The new South American birds which we are endeavoring to domesticate at Lakeside Farm, the *Palvons* and *Pauheils*, have stood up bravely against the severe cold of the present winter. They unfortunately cast their feathers in winter, and at the present time (February) are almost without the needed feather protection. It may be that under the influence of climate a change will take place in the time of moulting, so that it will conform to that of our other domestic birds. We sincerely hope that they may prove hardy, and become fully domesticated, as they will make a fine addition to our various families of barn-yard fowls.

THE CATTLE DISEASE. — Dogs, cats, and fowls must be looked after and prevented from running at large, in those sections where the mouth and hoof disease prevails. Unquestionably, many animals have had the infection brought to them through birds and domestic animals. A gentleman of Hingham informs us that a favorite cat, in her visits to the barn of a neighbor, conveyed the disease to his herd, and they are now suffering severely from it. Every avenue through which the contagion can be propagated must be vigilantly guarded, if we would check the spread of the disease.

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, MARCH 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

PEACE AND WAR.

Is it probable that the nations of the earth will ever sheathe the sword and cease to war against each other, and that all national disputes and difficulties will be settled by diplomacy or a congress of nations? In the light of past and present experience, in view of the exhibitions of the murderous spirit exhibited so palpably in the occurrences of the times, it must be confessed that there is a strong probability that wars will continue so long as human beings exist.

Twenty or more years ago, we had the honor of being selected as one of the delegates to represent this country in the great Peace Congress held at Berlin; and at that time, in the last days of a long interval of peace, it did seem as if advancing Christianity, science, literature, art, humanity, national comity, everything, was conspiring to place a ban upon war. The kings and emperors of Europe, the great statesmen and diplomatists, looked favorably upon every effort to create an overpowering public sentiment against war. The gentlemen composing the Congress in Germany were treated with every mark of respect, and a strong hope was expressed, by war-making powers at home and abroad, that the era of continued peace had dawned upon the earth. But alas! what have we seen and experienced during the past quarter of a century? Seven important wars have occurred; at least six millions of nominally Christian people have marched upon the fields of strife, and probably one and a half millions of men have fallen victims to insatiate cruel war. This is a dreadful record for a period of time extending over only a quarter of the nineteenth century. We have recently read over again an old book, *Crevier's History of the Roman Emperors*, which is the bloody record of a race of men who cursed the world by their presence. These men rioted in carnage, revelled amid the desolation of ruined cities and empires; but they were *heathen.* How much better, more humane, more open to pity, are we than the men of pagan Rome? Look at poor France at the present time, bleeding, starving, and filled with the wailings of anguished widows and orphans? What more did the cruel Romans do in their Gallic wars, what more *could* they do, than storm cities, murder and pillage the people, and place them in a condition of starvation? *O tempora! O mores!*

DANGEROUS BURNING FLUID.

THE following note has been sent to us by the President of one of the large Insurance Companies in New York, and we take pleasure in appending to it some remarks in the way of a reply: —

"DEAR SIR: — Will you not give us in the next number of the BOSTON JOURNAL OF CHEMISTRY, a practical method of dealing with the naphtha peddlers? We want to be instructed how to blow up naphtha vapor *on call.* As the matter now stands, it works in this way: we refuse permits to our customers for its use, and tell them that their policies are voided if they burn the lighter petroline distillates in lamps. We know their danger; our loss records have taught us that. But our patrons grow indignant, and send the gasoline man to convert us. Gasoline man shows 'tests.' 'The thing will burn, but you *can't* explode it. Try; I will give you a week. You know more chemistry than I do, but the *practical* question, after all, is, will this liquid or its vapor explode? I maintain that it won't, — your chemistry to the contrary notwithstanding. I submit the fluid for trial. If *you* can't blow it up, it isn't likely that it will blow up of itself. You are bound either to *show* that it is explosive, or to admit it.' Now this sounds reasonable, and is difficult to meet. The 'Gasoline' man, the 'Sunlight Oil' man, the 'Danforth Oil' man, etc., etc., are perfectly ready to admit that *other* preparations have caused accidents, — but theirs are something new and harmless; they have been 'oxygenated,' or 'chlorinated,' or 'ozonized,' or otherwise rendered non-explosive. Now there is only one way to satisfy these parties; the soundest discourse on the chemistry of the hydrocarbons won't do it — *but you must blow up their gas. That* is conclusive, and may save a murder or a fire. Unfortunately, while we have definite ideas upon the affinity of hydrocarbon vapor for oxygen, and of their behavior when brought together in the presence of flame, we do not know the proportion of atmospheric air requisite to produce detonation — nor, were we informed upon that point, would we know how to present it in the proper proportion. Can you not instruct us herein, by a description, and cuts, if need be, of a suitable apparatus?"

Reply. — As preliminary to making reply to the above, it should be remarked that a wrong impression is conveyed by speaking of burning liquids as "explosive." There is no fluid used for furnishing light that will "*explode.*" The naphthas sold by dealers and travellers through the country, under a variety of names, "oils," "fluids," "gasolines," etc., etc., will not explode like gunpowder, gun-cotton, nitro-glycerine, etc. It must be distinctly understood *that it is only the vapor which rises from the surface of the liquids, mixed with air, which suddenly explodes.* A lamp or can holding these dangerous volatile fluids *cannot explode if it is full or nearly so*, as there must be a space above the fluid filled with the vapor mixed with air, in order that any detonation may occur. The men who vend naphtha under assumed names, deceive purchasers by setting the naphtha on fire, and by turning it out and handling it in a way which seems very dan-

gerous to uninformed bystanders. They say to their victims, "See, this oil won't *explode;* I put flame into the lamp, into the can, turn it out upon the floor, burn it under all possible conditions, and it don't explode; can anything be safer than this?" This kind of experimenting is unfortunately deemed satisfactory by many, and they readily introduce the dreadful combustible into their families. Now the fact that these men are able to ignite their fluids so readily *is positive proof* of their *dangerous character;* for any liquid, so volatile as to take fire at ordinary temperatures, will supply vapor in lamps and cans which, when mixed with air, will explode like gunpowder. But it is not often that the conditions are favorable in lamps and cans for explosions, and they do not often occur. Three fourths of all the accidents which are reported as lamp explosions *are not explosions;* they are horrible burnings from the simple ignition of the fluid by the spilling of the same upon the clothing, or by the breaking or upsetting of lamps. These naphtha fluids are not so dangerous from the liability of the vapor to explode, as from the inflammability of the liquids themselves. Now remember this. The loss of life, and the loss to insurance companies from the burning of buildings, is due much oftener to the ignition of the fluid than to explosions; occasionally a genuine lamp explosion occurs, but not often, for it is difficult to have in a lamp or can just the right mixture of air and vapor. Equal parts of air and vapor will not explode; three parts of air and one of vapor give a vigorous puff when ignited in a vessel; five parts of air to one of vapor give a tolerably smart report; but to attain the highest amount of force, about eight or nine parts of air with one of vapor are required. Now, as an experiment, it requires considerable skill and experience to get up a perfect explosion with naphtha vapor, or with gasoline. We once experimented with a fluid taken from a can, the vapor of which had exploded in a lamp, killing a woman, and it required several hours before we could manipulate so as to obtain powerful detonations with the air-mixed vapor. Few business men, we think, will have the patience to conduct such experiments to a successful issue. The best vessel to employ for the experiment is made of tin, holding about a quart. It should be in the form of two short cones, soldered together at the bases, with orifices an inch in diameter at each end, closed by corks. A small "touch-hole" may be made in the middle. Into this vessel put about ten drops of the "safe oil," replace the cork, warm *slightly* and apply a match at the touch-hole. If the mixture of air and vapor is right, a smart detonation will follow, blowing out both corks, and probably throwing the vessel from the hand. But it is not often that success is met with by one or two experiments; by careful observation and the exercise of skill, considerable dexterity and success will, however, soon be acquired.

It is not necessary for officers of insurance companies, dealers, etc., to be put to this experimental trouble. They should know that any liquid which will burn readily at ordinary temperatures *is unsafe. Nothing can be added to gasoline or naphtha which will render it safe, or the vapor inexplosive.* The travelling quacks do not add anything to their liquids but cheap insoluble substances, and this they do to keep up the deception. The dangerous volatile liquids cannot be "carbonized," "ozonized," or "oxygenized," and to claim to do this is low, vulgar quackery. When any one comes before officers of insurance companies, dealers, or consumers, claiming that they have an "inexplosive oil," which is "perfectly safe," etc., and challenging a trial, let them turn a little of the fluid into a cup or saucer, and if it takes fire when touched with a match, *it certainly will afford explosive vapors, and is a dangerous agent.* After making this simple trial, as a matter of justice, call the porter or a servant, and order him to tumble the rascal into the street, or what will be better, make an arrest, and have him tried as a dangerous mountebank, a conspirator against life in the community. There is not a jury in the country but would send such an impostor to the State Prison.

This vending inflammable liquids under false names, to be used in households, is a very bad business, and should be stopped. More than *two thousand* persons were killed or dreadfully burned last year in the United States, from the use of these liquids, and this loss of life was wholly unnecessary. It resulted from the recklessness and cupidity of men who ought not be outside of prison walls. There should be no timidity or hesitation in dealing with this class of persons. An end can be put to the business in a few months, if the people will it.

ZINC POISONING.

ANOTHER case of zinc poisoning is given under our medical head. They are evidently quite common in all parts of the country. Some further comments on the remarkable Report of Dr. Winsor were prepared for this number; but as we learn that he is to appear again in defense of the galvanized pipe makers, we defer our remarks to another time. Dr. J. L. Cassels, Professor of Chemistry in the Cleveland Medical College, Ohio, makes the following statements in a Report upon the various kinds of water-pipes, prepared at the request of the Trustees of the Cleveland Water Works:—

"A series of experiments were also made, to determine, as near as possible, the action of the water on galvanized iron. The object of these was to ascertain what might be the result in using galvanized iron pipes to convey the water from the main pipe to the dwellings of the consumers. It is well known that galvanized iron is simple iron coated with zinc, which, from their electrical relations, protects the iron from corrosion. This protection of the iron, however, is at the expense of the zinc, which is thus rendered more easily acted upon by solvent agents than it would be if not thus associated with the iron.

"Although the salts of zinc are not generally ranked among the more virulent metallic poisons, yet they are undoubtedly exceedingly injurious to the human constitution. Their continued use, even in minute quantities, is followed by a series of ailments which may not be immediately fatal, but ultimately result in very serious sequences.

"These effects of zinc were demonstrated to a sad degree, a few years ago, in Lancashire, England, from the use of zinc milk-pans in butter-making. It was found that the cream separated more readily in zinc than in tin pans, as the zinc combined with the acid of the milk as soon as formed. But this salt of zinc found its way into the butter, and almost every person who used it was taken sick of a disease of a peculiar type. Many of these cases proved fatal. An analysis of the butter revealed the cause of this peculiar and wide-spread sickness. The public authorities, when the cause was ascertained, interfered and prohibited the use of zinc milk-pans under a severe penalty.

"The zinc commonly used for galvanizing iron is of a very inferior quality, a large proportion of it being old zinc; which, of course, is much mixed with other metals, such as lead, antimony, brass, etc., all of which contribute largely to the formation of soluble salts in the water. But even new zinc is seldom free from these impurities. Hence even the best of galvanized iron pipes, met with in market, must necessarily endanger the formation of soluble salts, both of zinc and other metals, which may be neither safe nor pleasant to the consumer of the water conveyed through them.

"In order to test this matter by direct experiment, 1,211.95 grains of new galvanized iron chain, such as that used in the common chain pump, were put into a pint of the water taken from the hydrant near the College, in a glass beaker, loosely covered to exclude dust. In twenty-four hours the water was of a bluish white color, and tasted distinctly of the salts of zinc. In three days a whitish sediment was observed collecting on the zinc, which was easily detached by agitation. After remaining a week in the water, a large deposit of the carbonate of zinc was formed, and the water was strongly impregnated with the chloride of zinc. Traces of lead were also detected in the water, derived, probably, from the lead impurities of the zinc. The links had decreased in weight 1.04 grains, and were heavily coated with the carbonates of zinc and iron.

"From the foregoing described experiments, I am very much inclined to the opinion that both lead and galvanized iron pipes should be, as much as possible, discarded for service pipe in our city. Although the water, when constantly flowing through either of these pipes, may not become contaminated, yet when remaining in them a sufficient length of time, there can be no question on the subject; and as it is very difficult to set exact bounds to the length of time required to produce these effects, their use must always be attended with more or less risk."

THE FELLOWS OF THE MASSACHUSETTS MEDICAL ASSOCIATION.

WE have received a copy of the new Catalogue of the members of this Society, and have examined it with much interest. It is a matter of regret that it could not have been made complete, and the full name and age of every member given. The committee of revision addressed circulars to members requesting information, and not more than one half of them met with any response. Let us have this interesting catalogue complete, and this end can be reached if every member will send to Dr. Francis Minot, No. 7 Charles St., Boston, the desired facts regarding himself and his neighbors. The age of about one thousand physicians is given, and of these nearly *one hundred have lived to be over eighty years old.* The profession seems to be distinguished for health and longevity.

Among the 3,000 names, we find that 1,075 are marked with a * as deceased. Of these the ages of 858 are given as follows:—

Between 20 and 30	34	
" 30 " 40	121	
" 40 " 50	123	
" 50 " 60	155	
" 60 " 70	154	
" 70 " 80	158	
" 80 " 90	104	
" 90 " 100	8	
100	1	858

These figures may not be exact, but they are essentially so. The oldest was Dr. Edward Augustus Holyoke, of Salem, who died 1829, aged 100. Those aged 90 and over were—

John Williams, Cambridgeport,	1846,	aged 99
Oliver Partridge, Stockbridge,	1848,	" 97

William Hooker, Westhampton,	1861, aged	94
Matthias Spalding, Amherst, N. H.,	1865, "	92
John Walton, Pepperell,	1862, "	92
Benjamin Waterhouse, Cambridge,	1847, "	92
Austin Flint, Leicester,	1850, "	90
James Thacher, Plymouth,	1843, "	90
The youngest was John Heard Manning, Ipswich, died	1837, "	24

Of the above 271 were 70 and over........31.58 per cent.
113 " 80 " "........13.17 " "

EDITORIAL NOTES.

Chloralum. — This new antiseptic and disinfectant, which is attracting so much attention in England, is a chloride of aluminium. It is claimed that solutions containing but a small fraction of *one per cent.* of this compound are sufficiently strong to preserve fish and meat which have been simply dipped therein, and then suspended in dry air. It is quite odorless, which gives it an advantage over carbolic and cresylic acids for many purposes. It has been received with especial favor by medical men, who are using it in the treatment of wounds, for arresting the fetid emanations of cancers, checking the throat lesions in diphtheria and scarlet fever, preventing suppuration, and the like. It absorbs from the air the odor of fresh paint, in a manner not yet understood; and the range of its practical applications is rapidly extending. As yet it is considerably more costly than carbolic acid, but as soon as suitable works can be erected for its manufacture on a large scale, it can be furnished at a greatly reduced price. We shall give a fuller account of it hereafter.

The "Heathen Chinee" and the Telegraph. — The extension of the electric telegraph in the Flowery Kingdom is attended with some difficulties on account of the peculiar notions of the natives, as the following extract from a recent writer may show: "A few years ago some Americans at Shanghae thought it was a good speculation to construct a telegraph line between that city and the mouth of the river. The distance was about fifteen miles, and when finished the line operated satisfactorily. The Chinese made no interference, officially or otherwise, with its construction. They did not understand its working, but supposed that the foreigners employed agile and invisible devils to run along the wires and convey intelligence. All went well for a month or two. One night a Chinese happened to die suddenly in a house that stood near a telegraph pole. A knowing Celestial suggested that one of the foreign devils had descended from the wire and killed the unfortunate native. A mob very soon destroyed the dangerous innovation."

Civilization and Health. — The interesting address on this topic, delivered by Dr. Francis Bacon, of New Haven, before the American Social Science Association, has been printed at the Riverside Press. It is characterized by sound sense and clearness of statement, and evinces much patient research on the part of the author. He does not believe in the physical or mental deterioration of mankind, but, on the contrary, shows conclusively that the race was never so healthy, comfortable, intelligent, and happy as in the present age. We may make some extracts from the address at a future day.

Huxley for a Penny. — In England they have courses of scientific lectures for workingmen at a penny each; and printed reports of the lectures, revised by the authors, are sold at the same price. A "second series" of these lectures in the Hulme Town Hall included one by Huxley on Coral and Coral Reefs, and one each by Roscoe and Huggins on Spectrum Analysis. The British workman may be very badly off in some respects, but his Yankee brother may well envy him such opportunities as these. When shall we have something like it in this country?

ATOMS.

The hog crop of 1870 is 15 per cent. less than that of 1869, but it amounts to *twenty million tons.* — Chicago sends squashes to Boston, which might at first seem like sending coals to Newcastle. — One factory in Prussia furnishes for the army 80,000 cans of preserved meat daily. — The marine losses of the United States for the past year foot up to more than nineteen millions of dollars. — The "Scientific Miscellany" is an excellent feature in the new volume of the *Galaxy*. — A spring of fresh water has been found in the rainless desert of Atacama in South America, and has been granted to the discoverer for ten years, after which it is to belong to the State. — The *Bowdoin Scientific Review*, published by Professors Brackett and Goodale, at Brunswick, Maine, is admirably edited, and ought to be more widely known. — A portion of one of our familiar articles on the stereoscope, after crossing the Atlantic and being copied by *Nature*, has come back again and appears in the *Living Age*, being duly credited by both periodicals to "The American *Journal of Chemistry*." — Somebody has calculated that New York spends $8,500 a day for bread, and $10,000 for cigars, and that the aggregate expenditure of the United States for tobacco in all forms is not less than six hundred millions of dollars. — A piece of flannel wet with turpentine, and put among woolen clothes, will keep the moths away from them. — In California poplars grow from ten to fifteen feet in a single year. — Of forty-seven Sisters of Charity employed in the Paris hospitals, eleven have died of small-pox. — A correspondent of the *Western Rural* asks how he can best propagate the locust; whereupon somebody suggests that he had better not encourage the production of the insect at all. — In Great Britain, during the year 1869, mineral wealth was dug out of the earth to the amount of $176,260,000; the heaviest item being 107,428,557 tons of coal. — It is reported that the famous tower of Pisa, which has had "a leaning that way" for several centuries, is likely to fall soon; but we are inclined to think that the tower has a better foundation than the story. — An attempt is to be made to establish a silk manufactory near New York on a larger scale than ever before in this country, French machinery and workmen being imported for the purpose. — The *American Educational Monthly*, which we are happy to add to our clubbing list, gives a broad interpretation to the "educational" in its title, and ought to be as popular among parents as among teachers. — We note quotations from the Journal in recent numbers of five London periodicals, — the *English Mechanic*, the *Popular Science Review*, the *Building News*, the *Food Journal*, and *Nature*. — It is stated, on good authority, that 20,000 persons die annually from snake-bites in British India. — The French artificial stone, known as *béton coignet*, is now made in large quantities in Brooklyn, N. Y. — The *College Courant* has shown up R. Grant White's "Words and their Uses," in a series of articles which will be worth to any teacher of the English language a good deal more than the cost of a year's subscription to that journal. — During the siege of Strasbourg the cannons were heard at Baden, fifteen miles off. — The Spanish foot is equivalent to 11.03 English inches; the Prussian, to 12.36; the Austrian, to 12.45; and the Russian, to 13.75. — The narrow gauge railway, which has been so successful in Wales, is likely to be tried quite extensively in this country and in Canada; one line being already in operation in Ohio, and a dozen others projected in that State and elsewhere. — The *Scientific American* is publishing an interesting series of articles on "Perpetual Motion," with many curious illustrations of the devices by which a perverted ingenuity has attempted, not only in the dark ages but in our own day, to achieve that mechanical impossibility. — A Mr. Silber, in London, proposes to distribute illuminating oils through towns, factories, and other buildings, as water is now distributed, the flow of the liquid being regulated at the burner by certain novel devices. — Rolfe's edition of *The Merchant of Venice* is very generally commended by the press and by practical teachers. — Ritchie of Boston has made an induction coil, which with fifty miles of wire gives a spark of 21 inches; while Professor Pepper's famous coil, which, we believe, has three times that length of wire, gives a spark of only 28 inches. — The "Chemistry" of the *Cambridge Physics* appears to be the most popular book of that series, having now reached its *ninth* edition. — Our articles on water-pipes are attracting attention, not only in England, where they have been indorsed by several scientific journals, but also in the Sandwich Islands, where the use of lead pipes, like many other vices of civilization, has been introduced, though the abomination of galvanized iron, it would seem, is as yet luckily unknown. — The *Literary World*, edited and published by Mr. S. R. Crocker, of this city, at fifty cents a year, is the cheapest literary monthly in the country, and as good as it is cheap.

LITERARY NOTES.

Wöhler's Handbook of Mineral Analysis, published by Baird of Philadelphia, and advertised in the present number, is commended by high critical authority as "the most complete collection of examples for practice in quantitative mineral analysis extant, guiding the student through the whole range of the subject, from the analysis of simple compounds to the separation and determination of the ingredients of the most complex minerals." No living chemist has accomplished more for this branch of analytical chemistry than Wöhler, and his fame has for years attracted large numbers of foreign students to Göttingen. It is said that he can reckon among his pupils more American chemists than any other European professor.

Wood's American Botanist and Florist, published by Messrs. A. S. Barnes & Co., of New York, is a model book of its class. The new Flora is noteworthy as being at once very full and very concise. In 370 duodecimo pages are recorded and defined nearly 4,000 species, including all the cultivated as well as native plants known in the Atlantic States. Nothing essential is omitted, but much space is saved by avoiding needless repetitions. Exotics are distinguished from native plants by putting their names in different type; and there are other little devices of the kind to aid the student and the teacher. The illustrations are numerous and excellent.

Life and Nature under the Tropics, by H. M. and P. V. N. Myers, from the press of the Appletons, is another of the fruits of the scientific expedition from Williams College to the tropical regions of South America. One division of the party made their way to the Amazon from the north by the valleys of the Orinoco and Rio Negro; the other crossed the continent from the west, passing over the Andes to the Rio Napo, and down that river by canoes to the Amazon, which they followed to its mouth. Professor Orton has given us an interesting account of the latter division in his "Andes and Amazon" (published by the Harpers), and the young authors of the book before us have been equally successful in their report of the other party. The work is a valuable addition to the literature of South American travel.

Counsel to a Mother, by Pye Henry Chavasse, is a neat little book published by the Lippincotts. As the author states, it is "a continuation and the completion of *Advice to a Mother*," which has been commended by the London *Lancet* and other leading medical critics, and has already reached its *ninth* edition in this country. This supplementary volume will probably be no less popular.

The third volume of the *Gynæcological Journal* (to use the generally accepted abbreviation of its un-

manageable title) has just been issued, by Mr. James Campbell, in the same tasteful style as its predecessors. Physicians who wish to have complete sets of the magazine should secure these early volumes before the edition is exhausted.

The first two volumes of the *American Journal of Obstetrics* have also been issued in bound form. As contributions to our standard medical literature, they well deserve the elegant dress given them by the publishers. No physician's library is complete without them.

The Gas Consumer's Guide, elsewhere advertised, is a very useful manual, and readable withal. Not one out of a thousand knows how to use gas economically, but this little book will enable him to do so.

☞ WE do not often print the complimentary notices with which our brethren of the press honor us, but we cannot deny ourselves the pleasure of copying the following from the *Boston Post* of January 26th, 1871 : —

" The signs of prosperity which this really excellent magazine shows are gratifying to the large number of readers to whom its monthly appearance is so welcome. It is enterprising, lively, fearless, and edited with a rare combination of scientific knowledge and popular common-sense. Its contents are of practical value in every household, and its merits hardly need the very liberal premiums which are offered as further inducements to subscribers."

OUR SCIENTIFIC AND MEDICAL EXCHANGES.

THE *American Journal of Science and Arts*, for February, has articles on the Variation of the Magnetic Needle in connection with the Aurora, by A. M. Mayer; on Granitic Rocks, by T. S. Hunt; Siredon Metamorphoses, etc., by E. D. Cope; Lower Carboniferous Limestone in Ohio, by S. B. Andrews; Some Imperfectly Known Ascidians from New England, by A. E. Verrill; Insects Inhabiting Salt Water, by A. S. Packard, Jr.; The Nummulitic Formation in China, by Baron von Richthofen; Memoir of Thos. Graham, by J. P. Cooke; Auroral Belt of Oct. 24, 25, etc.; with more than twenty-five pages of Miscellaneous Scientific Intelligence.

Archives of Science, and Transactions of the Orleans County Society of Natural Science is a new quarterly, published by J. M. Currier, M. D., at Newport, Vt., for $2.50 per annum. We can furnish it, *with the* JOURNAL, for that price. It is to be entirely made up of original articles, especially upon scientific matters connected with Vermont, and the first number is a very good one.

The *New York Medical Journal*, for February, has original communications, by Prof. Hammond, on Diffused Cerebral Sclerosis; by Dr. R. A. Vance, on the Ophthalmoscope in the Treatment of Epilepsy; by Dr. S. G. Armor, on Catarrhal and Croupous Inflammation of Mucous Membranes; and by Dr. E. R. Peaslee, on Intra-Uterine Medication. Thirty-five pages are devoted to a valuable Report on the Progress of Ophthalmology for 1870, by Dr. H. D. Noyes, of New York.

The *Chicago Medical Journal* has the following original communications: Cases in Practice, with Remarks upon the Use of Veratrum Viride, by B. O. Reynolds, M. D.; Cases in Private Practice, by Jno. E. Owens, M. D.; Obstinate Dyspepsia Cured by the Use of Milk, by I. N. Danforth, M. D.; on Instruments for the Treatment of Uterine Diseases, by Philip Adolphus, M. D.; on Operation for Hare-Lip, by F. C. Hotz, M. D.; Cases in Electro-Therapeutics, by Wm. J. Maynard, M. D.; Cook County Hospital, by Curtis T. Fenn, M. D.; Satan in Society, by Volta Reeke.

The *American Practitioner* contains original articles on Emmenagogues, by Prof. Parvin; on a Case of Hydrocele, by Dr. G. W. H. Kemper; on Gonorrhœa Treated without Injections, by Dr. A. Given; on Subnitrate of Bismuth in Cholera Infantum, by Dr. C. K. Alexander; and on the Treatment of Granular Lids, by Dr. H. Ruschhaupt; with Reviews, etc., etc.

The *Journal of Psychological Medicine*, for January, has the following original communications: Clinical Lectures delivered at the Bellevue Hospital Medical College, Session of 1870–71, by William A. Hammond, M. D.; A Letter to the Editor on some Recent Contributions on Mental Science and Anthropology, by George Edward Day, M. D., F. R. S.; Sleep and Dreams, by Ewald Hecker; A Case of Hydrophobia, by S. G. Cook, M. D.; Buried Alive, by T. Edwards Clark, M. D.; with over a hundred pages of reviews and minor articles on the physiology and pathology of the nervous system, anthropology, etc.

The *Nashville Journal of Medicine and Surgery* contains original articles on Enchondromatous Tumors of the Hand, Fore-arm, and Arm — Amputation at the Shoulder-joint; Wound of the Peritoneum from a Stab — Recovery; Tobacco an Antidote to Malaria; New Method of Reducing Dislocations at the Shoulder-joint; Large Doses of Calomel in Uræmic Poisoning; with Editorials, Reviews, etc.

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — home science, arts, agriculture, medicine, etc. — will be answered under this head, but *only when the subject is one of general interest to our readers.*

J. FOGG, of HOLDEN, writes about his subscription. There are three post-offices of that name. We answered to Holden, Mass., but the letter has been returned to us by the Postmaster, uncalled for.

MRS. M. P. J., PORTLAND, ME. Not having had much experience with aquariums, we cannot answer your question. Cotton and linen are bleached by the same agents.

DR. F. REGNIER writes from Pekin for a sample copy. There are six Pekins. Which one is it ?

M. K. — For a long while there was some doubt as to the chemical equivalent of mercury. At first *calomel* was considered a chloride, and its formula was given as HgCl ; and corrosive sublimate was a bichloride, with the formula $HgCl_2$. Subsequently, calomel came to be viewed as a subchloride, Hg_2Cl, and corrosive sublimate as a chloride, HgCl. Under the *new* system of notation (the equivalent of mercury being 200, oxygen counted as 16) calomel is *mercurous chloride*, with the formula Hg_2Cl_2, or, as some write it, HgCl ; and corrosive sublimate is *mercuric chloride*, $HgCl_2$. Of course these changes have led to a good deal of confusion on the subject in text-books and other scientific publications.

A. B. S., CRAFTSBURY, VT. — Mercury does *not* expand upon solidifying, but contracts considerably. If a thermometer bulb bursts when the mercury freezes, it would appear to be from the pressure of the air outside, the contraction of the mercury leaving a vacuum between the metal and the thin glass. There are but few metals or alloys that expand when they become solid. Iron does, and hence it is well adapted for castings, completely filling the mould as it solidifies. Bismuth expands in the same way, and so does the alloy of lead, tin, and antimony, which is used for printers' types.

Other answers are unavoidably crowded out this month.

Medicine.

HYDRATE OF CHLORAL.

THIS important agent continues to attract much attention from medical men, and we are daily receiving communications upon the subject. We give below two recent letters from the West, and append a few remarks by way of reply.

EDITORS OF JOURNAL OF CHEMISTRY : — In your issue for January, 1871, I find an extract from a contribution of my own in the *New York Medical Gazette* for November 26, 1870, on the use of " Hydrate of Chloral in Parturition," to which are appended some remarks of your own, to which in a brief manner, I wish to advert.

Your inference that I had " put in jeopardy the lives of several patients " is hardly correct; though you doubtless have some grounds for the supposition, as the article in question was written under a misapprehension in regard to some antecedent facts, namely, that I had used the " Hydrate " but one time before, and had reported the results of that experience to the *Gazette*, in the columns of which I was then, Nov. 10, looking for its publication. The manuscript was lost in the mails. The *second* case, that of Mrs. W., from which your extract is taken, and the case of Mrs. L., the " nervous lady," are the only " several " cases in which I have ventured on prescribing the " vile, impure compound " — a nomenclature, by the way, in which I heartily con ur.

Following are the symptoms excited in my first case — the " nervous lady," to whom from 11 A. M. to 6 P. M. I had given 50 grs. of the " Hydrate," to quiet a neuralgic condition, attended for many hours before with insomnia. 11 A. M. 15 grs. in aqueous solution, followed by *severe* cephalalgia as the only noticeable result. 1 P. M. 15 grs., followed by flushed face, injected conjuctivæ, greatly intensified headache, moaning, with mutterings of grave apprehension, accompanied with a wild semi-delirious condition, analogous to that sometimes observed from the excitement of the inhalation of chloroform, or the intoxication of alcohol. About 5 P. M. supposing that I had been too timid in its employment, I returned to my office and *weighed* 20 grains, and almost with electric rapidity it exerted its action, s[o] with such alarming power that I began seriously [to] wish that the great Liebreich had kept his discov[ery] to himself. The patient's lips became livid, pu[lse] ceased to beat, the respiratory system became [in]stantly paralyzed, the whole muscular system pow[er]less; the patient's body, to use a very domes[tic] but suggestive term, was limber as a dish-rag. [In]deed, familiar as a lengthy practice had render[ed] me with scenes of danger, I was deeply concern[ed] for the patient's safety.

My first efforts were to hastily turn the pati[ent] from side to side, draw the tongue forward, da[sh] the face with cold water, etc., with the hope to re[es]tablish the respiratory functions, which I succeed[ed] in accomplishing in a short time. I could not sa[t]isfy myself as to the condition of the pupils duri[ng] the suspended animation, owing to the darkness [of] the room at the time ; but the anæsthetic conditi[on] of the cutaneous structure was very complete, [as] sharp pinching elicited no response.

After the circulatory and respiratory functio[ns] were properly reëstablished, the patient lapsed in[to] a profound sleep, from which she awoke in the mor[n]ing well as usual.

There may have been a special idiosyncrasy b[e]longing to the patient, rendering the remedy ina[p]propriate ; or the idiosyncrasy, if you please, mig[ht] have pertained to the *medicine*, and not to the p[a]tient ; however the case might have been, *I* do n[ot] " think it very strange that any physician should *ri[sk]* so much as to use a new and powerful agent whi[ch] comes into his hands," etc., as a physician is suppos[ed] to be familiar with the normal therapeutic action o[f] the remedies he prescribes ; and it is now the custo[m] for him to depend on the honesty and intelligence [of] his apothecary to supply him with the genuine artic[le] for which he calls. It is hardly expected of the ph[y]sician, at least here in the somewhat primitive We[st] to apply proper chemical tests to each remedy su[p]plied him ; and mere physical properties are unce[r]tain as to the worth of an article. Nor is the *nam[e]* of the manufacturer every time a guarantee of th[e] genuineness of the contents of the bottle, for unfo[r]tunately pharmacy has its empirics as well as th[e] profession of which I am an unworthy member.

Your very excellent JOURNAL might confer a ben[]efit on the profession of medicine, and through [it] on the general public, by publishing a simple an[d] reliable *test* by which practitioners could try th[e] properties of the Chloral before purchasing, or a[t] least before prescribing it. J. P. CHESNEY.

NEW MARKET, PLATTE CO., MO.

EDITORS BOSTON JOURNAL OF CHEMISTRY : — Just now the newspapers are warning against th[e] use of Chloral Hydrate, on the ground, that, ente[r]ing into combination with the soda of the blood, [it] tends to decompose that fluid, and leads under cer[]tain circumstances to hemorrhage !

Is this so ? and if so, can we ascertain when [it] may or may not be safe to use it ?

The question has arisen in my own mind, whethe[r] the chemical purity of the salt might not have some[]thing to do with the results. But if its chemica[l] character is allied to that of Chloroform , or if, a[s] is stated by some writers, it is changed into Chloro[]form in the system, can it be so modified as to ren[]der it safe ?

Will you please to give in the JOURNAL what i[s] *really known* on the subject, as it often happens tha[t] newspapers make loose statements, and give some[]body's surmises, rather than actual facts.

BENJAMIN WOODWARD, M. D.

WYANDOTTE, KANSAS.

Reply. — The fact that hydrate of chloral has been used extensively for a period of nearly two years by physicians in all parts of the world, and that few, if any, well-authenticated instances

'injury have been reported, is evidence that it is safe agent to employ. Dr. Liebreich has pub-ished cases where its use was continued in large ›ses for months, and the general health of the ıtients steadily improved. Physicians should ›t be turned away from the use of a medicinal ;ent of the greatest service, by any sensational ıragraphs in newspapers, or by the statements ' a class of medical men who are incompetent to ıdge correctly of the therapeutical value of any 'ug. We believe *pure* hydrate of chloral to › a safe agent in the hands of every judicious, ,nsible, educated physician. The quacks have ıfortunately seized hold of it, and flooded the 'arket with their chloral nostrums. We called tention to the various "syrups," "solutions," ıd "elixirs" of chloral, some months since, ıd stated that hydrate of chloral underwent ›ontaneous change from being kept in any ›quid form, and consequently all these mixtures ere inert or injurious. The *pure crystals* are e only form in which it should be kept, and ›m these, physicians can make their own com-ıations for the use of their patients. Large ıantities of the crystals are sold which are *ry impure*, and in response to Dr. Chesney's ggestion, we would state that when a frag-ent of pure hydrate of chloral is placed in a st tube or wine-glass with a little water, and few drops of liquor potassæ allowed to fall ›on it, no discoloration takes place, and there evolution of pure chloroform, which can be tected by the odor. If the specimen experi-ented with is *impure*, a *dark* or *brown* reac-›n will result, and the odor evolved will be ıpleasant. In this way a certain class of com-on impurities may be detected. In an article ›on this important agent, to be published soon, › shall give a more extended account of it in ı its relations.

A CASE OF ZINC POISONING.

BY IRA F. PACKARD, M. D., STURGIS, MICHIGAN.

Editors Journal of Chemistry: — Permit › to give you my experience in a case of zinc isoning, myself and wife being the victims. I ve in my house a water-cistern holding one hun-ed barrels or more. In the bottom of the cistern a filter through which the water has to pass be-e entering a small cistern, where the pump is. I en made use of a galvanized iron pipe, thirteen t in length, attached to the pump through which › procured the water used for culinary and drink-g purposes. In the spring of 1870, the first ill ects were noticed, which were manifested by a ntinuous dull pain across the forehead over the ›ntal sinuses, accompanied with extreme sensi-lity of the cartilage of the ear and nose, so se-re that the least friction or bending of the ear or e nasal cartilage would cause acute pain. Then me stiffness of the joints, with sharp, lancinating ins above the joints, always transverse, not length-ays of the limb. Pressure on the joints produced reness and pricking pains, which would last for me minutes.

This was continued until about the first of Sep-mber, 1870, when I thought the trouble might in me way be connected with the use of cistern ater. I then had my cisterns cleaned and washed, aving the zinc pipe, which on the outside did not pear to be much corroded.

We now closed our house, leaving the conduct-g pipes so as to carry the water into the larger cis-rn. We were absent one month, or until the 8th y of November. During our absence the bad symptoms nearly all disappeared, and we considered ourselves quite well.

In our absence sufficient rain had fallen to fill the cisterns more than half full, and the water appeared very pure. We now began to use the water for all purposes again; and in about one week the old pains and troubles returned with increased violence; and in addition, a severe pain in the region of the heart was experienced, with a slight swelling externally, and great tenderness over the cardiac region.

I now became convinced that we were suffering under the influence of some slow poison; and that probably it was due to the oxide of zinc found in the galvanized water-pipe. From this time we discontinued the use of the cistern water; and in a short time we both began gradually to improve in health, and now consider ourselves well, with the exception of a slight stiffness of the knee-joints.

On removing the pipe from the cistern, it was found corroded, and the zinc covering removed. The portion immersed in water was corroded in a spiral form, and so far oxidized that a portion fell off upon exposure to air.

MEDICAL MEMORANDA.

The New Anæsthetic. — The new anæsthetic, *chloræthyl*, or *æthyliden chlorid*, discovered by the distinguished Dr. Oscar Liebreich, of Berlin, the discoverer of Chloral Hydrate, is really an agent of great promise. We have during the past two months experimented with it considerably; and we find in our own case, it produces anæsthesia quickly, and is free from any unpleasant after-symptoms. It certainly produces less nausea than chloroform or ether, the insensibility is very profound, and the agent has a pleasant odor. These are important considerations. The only drawback is its high cost, it being ten times greater than chloroform. With improved methods of manufacture this objection may be overcome.

Chlorodyne. — Dr. Long, U. S. Consul at Panama, contributed to the last number of the Journal a formula for chlorodyne, which, upon more careful inspection than was given it when received, appears objectionable in several particulars. The quantity of morphia is quite too large for employment, unless in cholera, or other formidable acute diseases, and the ammonia is an incompatible agent in the mixture. It will be well to wait for explanations from Dr. Long before preparing or employing this form of chlorodyne.

The Food of the Armies. — The Germans (says the London *Lancet*) appear to be a more hardy race than their opponents. They can eat black bread, the issue of which had to be prohibited among the French prisoners on account of their inability to digest it. *En passant*, we may state that the Germans have practically managed to solve for themselves the difficult problem of an economical and compressed ration for field purposes. Their soldiers, we read, on several occasions during forced marches, consumed a diet composed of mixed peas and meat — a highly nitrogenous but not very digestible compound. The Rhine wines were always consumed where they could be procured, and we do not hear of a rum or spirit ration being issued, as in our army. The craving for tobacco exhibited by the troops, and their almost universal use of it, corroborate the opinion entertained by practical men that the consumption of tobacco is of real value to men undergoing the hardships of a campaign.

Fatigue to the Eyes caused by Artificial Light. — It is stated by M. Meunier that the great difference between sun and artificial light is due to the fact that, of the light emitted from the former, about half the quantity of rays are luminous and calorific at the same time; but, as regards our artificial light (colza oil), the amount of non-luminous, yet colorless, rays is 90 per cent.; for white-hot platinum, 98 per cent.; alcohol flame, 99 per cent.; electric light, 80, and gaslight, 90 per cent.; while for petroleum and paraffine oils, the amount is 94 per cent. It is this large proportion of calorific rays in artificial light which causes fatigue to the eyes; but this inconvenience may be almost entirely obviated, according to the author, by intercepting the thermic rays by glass, or better, by mica plates. These render the light soft and agreeable.

Rand's Medical Chemistry. — A second revised and enlarged edition of Professor Rand's excellent manual has been issued by the Lippincotts. It is fresh in its facts, though conservative in its nomenclature and notation. Until the nomenclature of the Pharmacopœia is revised, it is well enough to retain the old names in a book intended for the special use of the medical student; but we think that the new notation should have been given (even if only in brackets, in addition to the old), as it is now so extensively used by medical writers.

VALUABLE FORMULÆ.

Tonic Tooth Powder. — Triturate well together one ounce of pulverized Peruvian bark, one ounce of pulverized white Castile soap, and two ounces of the best prepared chalk. It may be flavored by adding a little of the oils of wintergreen and rosemary, with the latter in a very small proportion. This powder is not only good for the teeth, but also a preventive of, and a remedy for, spongy gums. Another very good tooth powder may be prepared by the addition of one ounce of pulverized orris root to the above. The addition of bole armenia to tooth powders is only for the purpose of coloring them, and is not of the slighest benefit. The Peruvian bark will impart sufficient color to this preparation.

Transparent Pomade. — Spermaceti, 2 ounces; castor oil, 5 ounces; alcohol, 5 ounces; melt the spermaceti and oil together, and gradually add the alcohol, stir well together, and when nearly cool perfume with a mixture of 30 drops of oil of bergamot, 15 drops of oil of lemon, 10 drops of oil of lavender, and 10 drops of oil of neroli. Any other perfume may be used, if preferred.

For Skin Affections. — Powdered starch, zinc, lycopodium, etc., are very useful in allaying the heat and itching in acute inflammation of the skin, as erysipelas, shingles, or eruptions attended with moisture. The following is an excellent prescription containing camphor, which is an important adjunct: —

℞.	Powdered starch . . .	dr. vj.
	Oxide of zinc . . .	dr. iij.
	Powdered camphor . . .	dr. ss.
	Cochineal	gr. j. M.

To be kept in a stoppered bottle, to prevent evaporation.

Lip Salve. — Take of

Spermaceti, ...	one ounce.
Yellow wax, . .	half an ounce.
Oil of almonds, . .	two ounces.
Oil of rose, . .	twelve drops.

Melt with gentle heat, add alkanet root, q. s., to color, then strain, and lastly add the oil of rose.

Tooth Wash. — Take of

Soap tree bark, in powder, two ounces.
Orris root, in powder, one ounce.
Canada snake root, in powder,
Cloves, in powder, of each half an ounce.
Alcohol, ten fluid ounces.
Water, five fluid ounces.
Honey, two ounces.

Mix the alcohol and water, and exhaust the powders by the process of percolation, add the honey to the percolate, and filter through paper.

Pills of Sandal-wood Oil. — The Chicago *Pharmacist* says: "On several occasions we have been requested by physicians to prepare pills from the oil of yellow sandal-wood, each containing from

five to ten drops. This we have accomplished to the satisfaction of both prescriber and patient, by the following method: —

Take of Oil of Yellow Sandal-wood,
Yellow Wax, each, half a troy-ounce.

"Melt the wax in a capsule, and weigh into it the oil of sandal-wood; mix and stir until cold, then roll out the mass, and divide it into 80 pills, by means of the pill-machine or pill-tile, in the same manner as an ordinary mass, and sprinkle with marsh-mallow root powder. Each pill contains three grains, or about five drops of the oil. The excipient is unobjectionable, as it is readily soluble in the juices of the stomach. In the same manner we have made pills of the oils of cubebs, black pepper, and fleabane."

Rose-water. — The following is from the same authority: "When rose-water is prepared from the oil by rubbing with magnesia, and adding water, a certain loss of oil occurs (absorbed by the magnesia), and the resulting water will not give clear solutions with nitrate of silver, owing to the solution of a minute quantity of the carbonate of magnesia, or of saline matters contaminating the latter, or both. A better method, and which of course yields a pure product, is to drop the oil into boiling distilled water, and incorporate by agitation. Other medicated waters may be prepared in a similar manner."

A REMEDY FOR ASTHMA.

Dr. James S. Bailey, of Albany, says in the *Medical Record*: Having during the last fifteen years prescribed many remedies with indifferent and uncertain success, after much careful study I have prepared the following formulary, which has, during more than half this period, acted to my entire satisfaction. I now place it at the disposal of the profession, hoping it may meet with the same success in their hands as in mine, in relieving the distress of this unfortunate class of sufferers: —

℞	Syrup of tar compound	oz. iv.
	Sulphuric ether	oz. ii.
	Pulv. gum acacia	drs. vi. M.

Take one teaspoonful every two or three hours until relieved. Oftentimes two or three doses are quite sufficient to relieve an aggravated attack of spasmodic asthma.

As the syrup of tar compound is my own preparation and not pharmaceutical, it is necessary to give the formula for its preparation: —

℞	Picis liquidæ	oz. iv.
	Scillæ acet.	O. j.
	Antim. et potass. tart.	grs. xvi.
	Magnesiæ carb.	oz. ss.
	Sacch. albi	oz. xxx.
	Sulph. ether	
	Spts. vini rectificati, aa	f. oz. j.

Mix the tar and carb. magnesiæ intimately in a mortar, adding the alcohol first and then the ether, then add the acet. scillæ and throw the whole upon a stout filter. Having added sufficient acet. scillæ (if may be) to make the filtered liquid measure O. j., proceed to make the syrup by the usual U. S. P. formulary, taking care to apply a gentle heat. Lastly, strain through flannel and add the tart. antimonii in solution.

After the paroxysm is relieved, the patient is left in a relaxed and debilitated condition; it is then necessary to resort to a tonic course of treatment. A generous diet, with simple bitters or mild preparation of iron, is generally sufficient to restore the system to its accustomed health.

COLORED FIRES.

Druggists are occasionally required to furnish colored fires; and though we know that there is no lack of formulæ for their preparation, we suppose that the source from which the following recipes are derived is some guarantee of their superiority. The formulæ were presented to the Physical Society of Frankfort by a member of the German artillery corps: —

1. White light: 8 parts saltpetre, 2 parts sulphur, 2 parts antimony.
2. Red light: 20 parts nitrate of strontia, 5 parts chlorate of potash, 6½ parts sulphur, 1 part charcoal.
3. Blue light: 9 parts chlorate of potash, 3 parts sulphur, 3 parts carbonate of copper.
4. Yellow light: 24 parts nitrate of soda, 8 parts antimony, 6 parts sulphur, 1 part charcoal.
5. Green light: 26 parts nitrate of baryta, 18 parts chlorate of potash, 10 parts sulphur.
6. Violet light: 4 parts nitrate of strontia, 9 parts chlorate of potash, 5 parts sulphur, 1 part carbonate of copper, 1 part calomel.

CARBOLIC ACID AS A REMEDY FOR CARBUNCLE.

The following is from an article by Dr. J. C. Nott, of New York, in a recent number of the *N. Y. Medical Journal*: —

My attention having been attracted recently by several articles in the medical journals on the anæsthetic effects of carbolic acid when locally applied, I determined to test the remedy in a case of carbuncle which came under my care a few weeks ago. All the methods of treatment usually recommended had proved unsatisfactory in my hands, I never having seen carbolic acid recommended for this malady; and, seeing no good reason why it should promise better results, I used it without faith, and more with the idea of doing something to amuse the patient, while Nature worked the cure, than with any expectation of doing good.

A gentleman of respectability and good habits, about fifty years of age, had suffered severely, within the last twelve months, with carbuncles on his back, which had been prescribed for by another surgeon. When sent for I found a carbuncle, with several small honeycomb openings in the centre, and surrounded by the usual inflammation and hardness, covering a space about the size of the palm of my hand. It was very painful, presented all the characteristics of a severe carbuncle, and I thought the patient would make a good escape if he got off with a slough as large as a silver dollar. The tissues seemed to be so deeply involved that I could not conceive that the result would be otherwise. I made a deep incision into it about an inch and a quarter, and stuffed it with cotton saturated with the pure carbolic acid. I also painted over the whole surface of the hardened mass with the acid. The patient complained of a sharp, burning sensation for a few minutes, when the pain subsided completely. The cuticle, by the next day, came off, and the surface looked like a burn.

After the first few minutes he was free from pain, and never complained of any afterwards. I continued every day for a week to insert the acid, in the same way, into the cut, which sloughed all around to the depth of one eighth of an inch; the surrounding inflammation and induration subsided rapidly, and in a week there was nothing left to treat but the small open wound made by the knife and acid. Three other small carbuncles commenced, an inch or two from the large one; they were all treated by incision and the acid, and they all aborted.

There was, I think, something more than a mere *caustic* effect from the acid in this case. I have used incisions and caustics very often before, but this was the only real abortion of a carbuncle I ever saw. There was, I think, clearly some specific action. We know that a process of embalming has been recently introduced into this city, by which bodies are preserved by *simply sponging* them over freely with carbolic acid. It permeates the tissues in some way, so as to preserve the deep-seated as well as the superficial tissues for an indefinite time and it is only by some process of this kind that I can account for its influence on the surrounding tissues when inserted into the centre of a carbuncle th inches in diameter.

SMITH'S UNIVERSAL MEDICINES.

John Smith is ubiquitous; he turns up in the most remote and unheard-of places, and is engag in all sorts of business. Recently he has taken humbugging the people, and has chosen a first r field in which to work successfully and reap to hi self large profits. Would you believe it? John h set himself up in the quack medicine business! has opened a shop in fact, and intends dealing cure-all medicines to the waiting thousands, who only too anxious to avail themselves of John's me cal skill. John has located himself in Syracuse t time, and hails from some wonderful instituti dubbed the "New York Medical University," whi is claimed to be located on the corner of Clint Place, in New York. This establishment, Jo claims, has cured 26,340 patients in one year! O think of that, invalids! John has very graciou opened a branch office of this wholesale-curing esta lishment at No. 89 Warren Street, Syracuse, a offers to cure anybody or anything, by wholesale retail, who will send him from five to ten dollars his Universal medicines. John advertises liberal knows the advantage of printers' ink, and uses unsparingly. John is a *chemicopathic* physician a surgeon, which shows that he is shrewd in his sele tion of a name; chemicopathic is good, very goo much better, we fear, than John's University me cines. John is down on all other kind of docto and gives them particular fits in the various "su plements" which he issues to the different count papers throughout the State. This is a good tra in John — it convinces every one who reads the that John is right, and understands his business, f what John can't cure, it is useless for any oth member of the Smith family to waste time upon.

It is needless for us to wish John success — he wi certainly have it. People *will* be humbugged, a we suppose John might as well do it, with his "Un versity medicines," as any one else. It is a firs class way for people to waste money and trifle wi disease, and we recommend all in search of such i nocent amusement to apply to "Dr. John E. Smit of the Syracuse wholesale branch of the New Yor Medical University," and dispenser of the cure-al heal-over-recuperating-medico-quacko-*chemicopath* University medicines. — *The Bistoury.*

A New Styptic. — Dr. Ehrle describes a simpl preparation of cotton, which he has found of grea service in surgical operations followed by great eff sion of blood. American cotton of the best qualit is cleansed by boiling it for an hour in a weak solu tion of soda (about 4 per cent.), then repeatedl washed in cold water, and dried. By this proces it will be perfectly disinfected and adapted to mor ready absorption. After this it should be steepe once or twice, according to the degree of strengt required, in liquid chloride of iron, diluted with on third water, pressed, and thoroughly dried in the air — *neither in the sun nor by the fire*, — then lightl pulled out. The cotton so prepared will be of a yellowish-brown color. It must be kept very dry as it is affected by the damp. Lint may be simi larly treated, but the fine texture of the cotton ren ders it preferable. When placed on a fresh wound it causes a moderate contraction of the tissue, and gradually coagulates the blood in and beyond the injured veins, thus closing the source of the effusion. This property of the chloride of iron is increased by the dryness of the cotton and the extended surface offered for the development of the chemical action.

Boston Journal of Chemistry.

VOLUME V. BOSTON, APRIL, 1871. NUMBER 10.

Familiar Science.

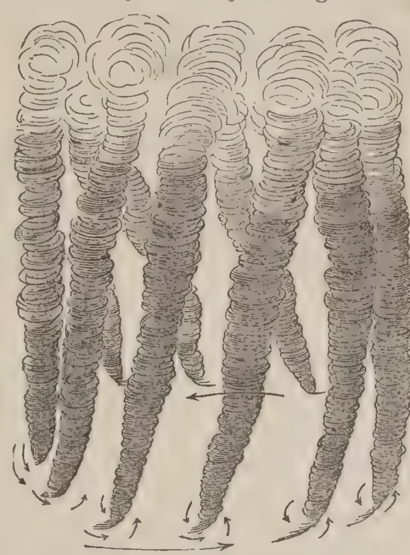
WHIRLWINDS AND DUST-STORMS.

OUR ordinary storms are virtually whirlwinds, as will be evident from a brief account of their origin. When the air over a large extent of country becomes excessively heated, it rises, and the air from all the surrounding region flows in to supply its place. But the atmospheric currents thus set in motion do not converge directly to the centre of the district where the disturbance takes place. Their motion is modified by the rotation of the earth on its axis, so that it becomes a spiral, tending gradually towards the centre. Sometimes the centre of this whirling of the winds remains stationary, but generally it moves forward, — in the United States, in an easterly direction. This progressive motion of the storm as a whole must not be confounded with the spiral motion *within* the storm. While the former is steadily eastward, so that the storm at Boston begins about twenty-four hours later than at St. Louis, and will take about another day to reach Newfoundland, the winds *inside* the storm have every possible direction at different points in their spiral path.

The rain or snow is caused by the cooling of the ascending current of air, and the consequent condensation of its moisture. As our readers are aware, the amount of moisture which air can hold depends upon its temperature; the hotter it is, the more watery vapor it can hold. If it contains all, or nearly all, the moisture it is capable of holding, and the temperature falls considerably, a part of that moisture must be condensed and precipitated.

Whirlwinds, properly so called, differ from storms in several particulars. They seldom last longer than a minute, and sometimes only a few seconds. They are equally limited in the space over which they extend, being from twenty to a few hundred yards in breadth, and seldom sweeping over a course of more than twenty-five miles. While they last, moreover, the changes of the wind are sudden and violent; and the direction of their whirling is not uniform, as in the case of an ordinary storm (which, as we have said above, owes its spiral motion to the earth's rotation), but depends upon the direction of the stronger of the two winds that give rise to them. Thus, if a whirlwind be produced by the rushing of a north wind against a south wind, the former being the stronger and to the westward, the whirl will be from left to right, or as the hands of a watch move; but if the south wind be the stronger, the whirl will be in the opposite direction.

Whirlwinds often occur in tropical countries during the hot season, especially in flat, sandy deserts. These become unequally heated by the sun, and numerous ascending columns of air are thus set in motion. In their contact with each other these ascending currents give rise to eddies, and thus produce whirlwinds which carry up with them clouds of dust. The *dust-storms* of India are whirlwinds of this description, and are illustrated by the subjoined figures. In the



first, the large arrows show the rotation of the whole whirlwind round its axis, while the small ones show the rotation of each column round its own axis. The other figure shows the general appearance of a dust-storm as seen from a distance. The storm generally comes on without warning from any direction, and the barometer

is said not to be perceptibly affected by it. A low bank of dark cloud is seen in the horizon, which rapidly increases, and almost before the spectator is aware, the storm bursts upon him, wrapping everything in midnight darkness. An enormous quantity of dust is whirled aloft, which is sometimes broken into distinct columns, each whirling on its axis. Violent gusts or squalls succeed each other at intervals, which gradually become weaker; and, at the close of the storm, a fall of rain often takes place.

In one of Lady Barker's letters from India there is a graphic account of a dust-storm. As soon as the natives perceived the signs of the coming whirlwind, the most active preparations were made to meet it. The tent-pegs were driven down more firmly, everything movable was hurried under shelter, and candles lighted in the tents. The horses were led to the lee-side of the tents, and servants stood by their heads, holding tight by the halters. The drivers of the camels made the creatures kneel with their backs to the approaching storm, and they themselves crouched close under the lee of the camels. But we will let Lady Barker continue the narrative in her own way: —

"Scarcely had the servants fastened firmly to the ground the large curtain which formed our tent-door, and which was generally festooned back with green wreaths of mango-leaves, when the tent shook and swayed backwards and forwards, and in a few moments everything was covered, more than an inch deep, with the finest dust, which had filtered through the numerous folds of the canvas. It was impossible to read or work; the candles only gave a little gleam of light through the thick atmosphere, and all we touched was gritty. For four long hours our imprisonment lasted, and it was not until sunset that the servants pronounced it safe to release us. As soon as the tent-flaps were lifted up, we all burst out laughing at each other, — such objects you never saw! No one had an eyebrow or an eyelash to be seen; the bronzed and red complexions which out-door life had produced were all hidden under a thick coating of dust, and we needed only a few streaks of paint to have looked like Clown in the pantomime, for our faces were quite as white as his. We could see the dense cloud moving on to the south-west, but all was beautifully clear behind it; only a slight haze between us and it showed that the atmosphere was not quite free from dust a little beyond us. I looked at the horses, they were all as white as if they had been powdered with flour; and the water-carriers were very busy filling the large goat-skins which serve them as water-jugs, to give every live thing which had been outside a good drink, and to wash the dust out of their eyes and ears. The camels had buried their noses in the sand, and did not appear to have suffered at all."

PYROPHORI, OR MAGICAL FIRES.

A LITTLE knowledge of chemistry enables one to perform feats that rival the wonders of the Arabian Nights. Indeed, chemistry is magic, just as the ancient magic was often nothing more than chemistry. In those days, the man who had discovered a few simple reactions, and was shrewd enough to keep the secret to himself, had all the capital necessary for setting up as a wizard or enchanter. The modern school-boy, with a few cheap salts and such apparatus as the kitchen cupboard may supply, can outdo all the marvels of those jugglers of the olden time.

A favorite performance with magicians used to be the instantaneous production of fire. A common friction match would have seemed an enchanted wand in the hands of one of those worthies. That piece of magic is too familiar to need explanation, but there are others of a similar kind not so well known to unscientific people. Liquids can be poured from bottles, or dry powders shaken from a box, that burst into a blaze as they fall through the air. *Cacodyl*, as it is called, — or *arsendimethyl*, if you prefer that name for it, — is such a liquid. It is a compound of arsenic, carbon, and hydrogen, very poisonous and ill-smelling, and not easy or safe for inexpert persons to make. *Triethyl stibine*, made up of carbon, hydrogen, and antimony, is another liquid of the kind; and there are several of the same class, in which boron, zinc, etc., take the place of the antimony. But with such spontaneously inflammable liquids we advise the reader to have nothing to do; nor with bad kerosene, which is almost as combustible and quite as dangerous.

What are known as *pyrophori* (from a couple of Greek words meaning *fire-bearing*) are solid substances, and may be safely made and used by persons of ordinary discretion. The *lead pyrophorus* is a good example of these compounds. To prepare it, fill a small bottle or test-tube one third full of tartrate of lead, place it upon a sand-bath (which you can extemporize by filling any small iron or earthen vessel with sand), and heat it as long as any fumes escape. It must then be corked tightly, and set aside to cool. It can be kept for any length of time thus corked up, but if you open the bottle and shake out the contents upon an old plate or a hearth, they take fire and burn with a reddish flame. The tartrate of lead you can make for yourself, by mixing solutions of sugar of lead (acetate of lead) and tartaric acid. Dissolve five parts, by weight, of sugar of lead and two parts of tartaric acid. Wash with water the white powder that is precipitated on mixing the solutions, and dry it thoroughly in the air, or by a very gentle heat.

Another pyrophorus may be made by mixing powdered sulphate of potash with half its weight of lamp-black, and heating it in a covered crucible. The sulphate is thus reduced to sulphide of potassium, which remains in a finely divided state, mixed with the residuum of carbon. The mixture must be kept from the air, as in the other experiment, until you wish to burn it.

Still another compound of the kind may be prepared from three parts of alum and one of sugar, dissolved in water, and then evaporated to dryness and treated in the same way as the tartrate of lead.

Now what is the chemical "moral" of these little fire-making tricks? In two words, rapid oxidation. In each case, the oxygen of the air seizes upon something in the mixture with such avidity that light and heat are evolved, or, in other words, it takes fire. But in order that the oxidation may be so rapid, the substance must be in a very fine powder, finer than you can make by any mechanical process. Many of the metals, as iron, lead, and nickel, will take fire spontaneously when in this minutely divided state; and it is lead that burns in the first experiment. When the tartrate of lead (a compound of carbon, hydrogen, oxygen, and lead) is heated, the hydrogen and oxygen and a part of the carbon are driven off in the form of carbonic oxide and water, and there remains behind a mixture of lead and carbon in powder so fine that it will burst into a flame as soon as oxygen gets access to it. The sulphide of potassium takes fire spontaneously in a similar way from the rapid absorption of oxygen. The third form of pyrophorus mentioned is essentially like the second. The alum — a so-called "double salt" — is a sulphate of potash and alumina; and the sugar is a compound of oxygen, hydrogen, and carbon, which last is left after the heating. It is hardly necessary to state that the fine powder is oxidized more rapidly than larger masses, simply because it exposes a greater surface to the action of the gas.

Thus the blaze that we make for sport serves to throw light upon some of the properties of oxygen. We see how intense is its affinity for certain substances on which it acts but feebly under ordinary circumstances; and how light and heat are evolved by the clashing of the atoms in this violent combination, just as they are by the striking together of steel and flint.

ANTOZONE.

ANTOZONE (*anti-ozone*, or the opposite of ozone) appears to be produced at the same time with ozone, whenever the latter is formed. Some chemists, indeed, believe that ordinary oxygen may be viewed as a compound of these two modifications of the element, and that under certain circumstances it can be decomposed, and the two constituents obtained in separate form. On the whole, this seems to be the most plausible theory of the relations of these three kinds of oxygen to one another.

Antozone may be obtained, separate from ozone, in various ways. If dry air, through which electric sparks have been sent, be passed through a saturated solution of iodide of potassium in water, all the ozone that has been formed will be absorbed, and the antozone will be left behind.

A portion of the oxygen in certain compounds appears to exist as ozone, while in others it is antozone. Permanganate of potash is an example of the former, and ozone may be obtained from it by the action of sulphuric acid. Put three parts of the concentrated acid into a bottle, and add two parts (by weight) of the pure dry permanganate, finely pulverized; ozone will be given off at once, and will continue to be evolved for a long time.

Peroxide of barium, on the other hand, is an example of a compound in which the oxygen — or a portion of it — appears to be antozone, which may be obtained by a process similar to that just described. Put a little concentrated sulphuric acid into a bottle, and add pure peroxide of barium in small fragments. There will soon be an evolution of gas, and the air in the bottle will be found charged with antozone. Sometimes the bottle must be heated to 120° or 140° F., before the gas is set free, while at other times it may be evolved so rapidly at the ordinary temperature that it is necessary to check the action by putting the bottle in cold water.

There is a variety of fluor-spar found in Bavaria which on being rubbed emits the characteristic odor of antozone. If the mineral be ground up with water, antozone is set free, and is absorbed by the water.

Antozone, like ozone and ordinary oxygen, is a colorless gas. It has an odor somewhat like that of ozone, but more disagreeable. It is much less permanent than ozone, changing to common oxygen quite rapidly at ordinary temperatures, and instantly when heated. It is not easy to keep it unchanged for more than an hour, while ozone, with proper precautions, may be kept for months.

One of the most remarkable characteristics of antozone is the property of forming fogs or clouds with water. It has been thought that the formation of mist and cloud in nature may be often, if not always, due to the presence of antozone in the air; but further investigation will be necessary before the question can be settled. It is certain that if air charged with antozone be passed through water, it comes out in the form of a thick white mist. When electrized air or oxygen is mixed with moist air, a similar mist appears; but the effect will be more marked if the ozone has been removed by means of iodide of potassium. The thick mist obtained by the process first mentioned may be poured from one vessel into another. If conducted through a tube into a dry bottle, it will displace the air, and the boundary between the two will be sharply defined. If the bottle be nearly filled with the mist and then closed, the mist gradually becomes thinner, and in half an hour or more wholly disappears. The water which the antozone had taken up will be deposited on the side of the bottle in little drops, and the antozone itself will have become ordinary oxygen.

It is pretty certain that both ozone and antozone are produced in all processes of oxidation and combustion. Most of the ozone unites with the body burned, while the antozone remains free or combines with water. In cases of slow combustion, antozone is produced in abundance, and, if moisture be present, forms the characteristic mist. We have examples of this antozone mist in tobacco smoke, in the gray smoke from chimneys, and in that of gunpowder. It appears also in the white fumes produced by the slow oxidation of phosphorus in moist air; and when phosphorus is burned rapidly in air or oxygen, the antozone cloud remains after the oxides of phosphorus have been completely absorbed by water.

It is well known that if this latter experiment be performed in a close vessel, the phosphorus, though it has so strong an affinity for oxygen, will not take up all that may be present. A residuum of oxygen is always found after the phosphorus has ceased to burn. The most plausible explanation of this singular result is, that the phosphorus cannot combine with antozone, but only with ozone; so that after it has burned up all the latter, the former is left unconsumed.

Antozone not only takes up water in the way that we have described, but often combines with it chemically to form peroxide of hydrogen. This reaction can be brought about in various ways, which it would exceed our present limits to describe. In this respect antozone is radically different from ozone, which has no such action upon water. It is probable that in the peroxide of hydrogen, as in the peroxide of barium, one of the atoms of oxygen is in the form of antozone. Certain other peroxides, as those of potassium, sodium, and strontium, have the same peculiarity, and they have therefore been classed together

under the name of *antozonides*. On the other hand, certain oxides — the peroxide of lead and the binoxide of manganese, for example — are supposed to contain an atom of ozone, and are called *ozonides*. When an ozonide is mixed with an antozonide, mutual decomposition takes place, the two active forms of oxygen disappear, and common oxygen is set free. It will be readily seen that this favors the theory mentioned above, that common oxygen is a compound of ozone and antozone. Several of the most important tests for antozone depend upon this action of ozonides and antozonides on each other.

Some of these tests it was our purpose to describe, but the length to which this article has already extended forbids. We may revert to the subject at some future time.

HOW WE GO TO SLEEP.

The immediate antecedents of sleep — as languor, a sensation of weight in the upper eyelids, partial temporary relaxation of certain muscles, as shown by the nodding and dropping of the head upon the breast, comparative obtuseness to external impressions, yawning, etc. — call for no very special remark. The order in which the muscles lose their power is, however, deserving of a passing notice. The muscles which move the arms and legs usually become relaxed before those which support the head; and the latter before those which maintain the body in an erect position. There are, however, many exceptions to this rule, as may be seen in church on a hot Sunday, when some of the congregation are almost certain to be seen with their chins quietly resting on their chests, but yet tightly grasping their prayer-books. Moreover, in relation to the special senses, that of sight is first lost, the closing of the eyelids setting up a barrier between the retina and the external world; but, independently of the eyelids — if they have been removed by the surgeon, or cannot be closed through disease — the sight is still the first sense whose function is abolished. Some animals, as the hare, do not shut their eyes when asleep; and in cases of somnambulism the eyes remain open, although the sense of sight is temporarily lost. The other senses, as Dr. Hammond tells us, are not altogether abolished; but their acuteness is much lessened. Taste is the first to disappear, and then smell; hearing follows; and touch is the most persistent of the senses. So, conversely, a person is most easily awakened by touch, next in order by sound, and then by smell.

ABSORPTION BY ROOTS OF PLANTS.

We have been taught by the botanies and agricultural chemistries that the food of plants is taken up in a soluble state by the porous, spongy tissue at the tips of the roots. The peculiar structure of these tips has been carefully pictured, and regarded as a beautiful instance of the adaptation of parts to their uses, of structure to function. But all this turns out to be a mistake, and illustrates anew the danger of reasoning in such matters in advance of experiment. Because the structure of these spongioles, as they are called, resembles sponge, which sucks up water so greedily, the fact that they are the true mouths of roots was looked upon as settled. Recent experiments, however, have shown that where these spongioles are the only parts of roots supplied with water, plants wither and die; while, on the contrary, if they are cut off, and the lower half of the root left in water, the plant continues fresh and vigorous. Further experiments have shown that the seat of absorption is in those parts of roots that are covered with fine hairs, called root hairs. They are mere tubular extensions of the external root-cells, and are usually invisible without microscopic aid. It is to the newer parts of roots, where these hairs are young and active, that the soil adheres with remarkable tenacity; while the growing tips, which have not yet put forth hairs, are seen to be quite clean of the soil when plants are pulled up by the roots. It has been observed that these absorbent hairs are more abundant in poor than in good soils. The roots of those plants which are destitute of hairs have a highly absorptive cuticle and numerous rootlets.

NOTES ON HOME SCIENCE.

Willow Leaves for Yeast. — A correspondent of the *Journal of Agriculture* states that the leaves of the common basket willow (*Salix nigra*, Marshall) make an excellent yeast, if treated in the same way as is usual with hops. "The discovery," he says, "was made in my family last summer, and after a thorough trial I was convinced that there is nothing equal to it, as it rises much quicker than hops — in half the time — imparts none of that hop flavor so disagreeable to some, and in fact makes better bread in every way. The thing is well worthy the attention of every good housewife; and lest some should hesitate in consequence of not knowing the medical properties of the willow in question, I will add that it is a healthful tonic, from which no harm can possibly arise."

A New Way to Cook Meat. — A good way to cook meat is to seal it in a vessel hermetically tight. Cooked thus a long time in its own juices, it is rendered very tender, and has a peculiar, appetizing flavor.

Take an earthen jar that will stand heat, with tight fitting cover. If beef is to be the dish for dinner, cut it in convenient pieces, lay them in the jar, rub each piece with salt and pepper and a little lump of sugar, and put in a little water; then lay on a piece of thick buttered paper, and press down the cover. If you think it will allow any steam to escape, mix shorts or rye meal with water to a paste; press strips of this all round the edge of cover. Bake in a moderate oven four or five hours, according to tenderness of meat. Chickens or turkeys are excellent cooked in this way. The toughest meat is rendered tender by this process; and none of the nutritious matter is wasted, as in many of the forms of cooking.

Curing Meat. — The following method has been thoroughly tested, and always proved satisfactory: To one gallon of water add one and a half pounds of salt, half a pound of sugar, half an ounce of saltpetre, half an ounce of potash. In this ratio the pickle can be increased to any quantity desired. Let these be boiled together until all the dirt from the sugar rises to the top and is skimmed off. Then throw it into a tub to cool, and when cold, pour it over your beef or pork, to remain the usual time, say four or five weeks. The meat must be well covered with pickle, and should not be put down for at least two days after killing, during which time it should be slightly sprinkled with powdered saltpetre, which removes all the surface blood, etc., leaving the meat fresh and clean. Some omit boiling the pickle, and find it to answer well; though the boiling purifies the pickle by throwing off the dirt always to be found in salt and sugar.

Cleansing Varnished Paint. — In cleansing paint which has been varnished, there is nothing better than weak tea. All the tea leaves from several drawings should be saved and boiled over early in the morning of the paint-cleansing day. If boiled in an old tin pail or pan, the tea can easily be strained off for use. Wet a flannel in it and wipe the oak-grained paint, and you will be surprised at its brightness. No soap is needed, no milk; the tea is the most capital detergent ever invented. Wipe the paint dry with a soft cloth; you will find that very little elbow-grease is needful. White varnished paint is cleansed as rapidly with it as the grained.

HOUSEHOLD RECIPES.

Protection against Moths. — A correspondent of the *Cabinet Maker* (an interesting and valuable journal, by the way) gives the following recipe as one which has kept the moths out of a furniture warehouse for ten years past: —

"Flour of hops, one drachm; Scotch snuff, two ounces; gum camphor, one ounce; black pepper, one ounce; cedar sawdust, four ounces. Mix thoroughly, and strew, or put in papers, among the goods."

To Wash Silk. — Half a pint of gin, four ounces of soft soap, and two ounces of honey, well shaken. Wet a sponge with this mixture, and rub the silk, which should be spread upon the table. Then wash it through two waters, in which put two or three spoonfuls of ox-gall, which will brighten the colors and prevent their running. Do not wring the silk, but hang it up to dry, and while damp, iron it. The lady who furnishes this recipe says she has washed a green silk dress by it, and it looks as good as new.

To Make Embroidery Patterns. — The traced patterns for embroidery are printed, when many copies of the same pattern are required. When a few are needed, they are made by hand, as follows: The drawing is made upon paper; then lay the drawing upon an even cloth, and perforate all the lines with a fine needle, close and even. Then take finely powdered charcoal, three parts, resin one part in fine powder; mix and tie it in a piece of porous calico, so that it forms a dusting bag. Lay the perforated drawing upon your material, hold down with one hand, rub the dusting bag over the drawing; the dust will fall through the holes and form the drawing on the material. Remove the paper drawing, lay blotting paper over the dust pattern, and go over it with a warm flat-iron. The heat will melt the resin and fix the drawing.

Wash for Cleansing Silver and Britannia Ware. — Take one pound of common hard soap, three table-spoonfuls of spirits of turpentine, and half a tumbler of water. Allow the soap to dissolve; then boil ten minutes, and before it cools add six table-spoonfuls of spirits of hartshorn. Make a suds of this preparation, and wash the silver with it.

To Iron Velvet Ribbon. — Dampen the under side slightly, and draw it backward and forward over a hot stove-pipe until the velvet is quite dry. A still better plan — though in winter it is not always as convenient — is to lay a wet piece of cotton cloth on a hot flat-iron placed upside-down, and while the steam is rising from it, to draw the under side of the velvet tightly backward and forward over the wet cloth.

To Make Leaven. — Stir corn meal in a pint of fresh buttermilk; add an old yeast cake dissolved in water; make it about the consistence of batter bread, and set in a warm place to rise. When well risen, add more meal, make it into cakes, and dry in the shade.

To Remove Acid Stains and Restore Color. — When color on a fabric has been accidentally or otherwise destroyed by acid, ammonia is applied to neutralize the same, after which an application of chloroform will in almost all cases restore the original color. The application of ammonia is common, but that of chloroform is but little known. Chloroform will also remove paint from a garment or elsewhere, when benzole or bisulphide of carbon fails.

The cuts on our first page are copied from the chapter on "Meteorology" in Rolfe and Gillet's *Natural Philosophy*.

A LIBERAL EDUCATION.

THE following striking passage is from Prof. Huxley's "Lay Sermons:" "That man, I think, has had a liberal education who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all the work that as a mechanism it is capable of; whose intellect is a clear, cold, logic-engine, with all its parts of equal strength, and in smooth, working order; ready, like a steam-engine, to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of nature and of the laws of her operations; one who — no stunted ascetic — is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art; to hate all vileness, and to respect others as himself. Such an one, and no other, I conceive, has had a liberal education; for he is, as completely as man can be, in harmony with nature. He will make the best of her, and she of him. They will get on together rarely: she as his ever beneficent mother, he as her mouthpiece, her conscious self, her minister and interpreter."

The Arts.

MEMORANDA IN THE ARTS.

ARTIFICIAL EBONY. — In ancient times sea-weed was a synonym for worthlessness; but modern science has found many valuable uses for this good-for-nothing product of the waters. One of the latest ways in which it has been utilized is in the manufacture of artificial ebony. The process consists in first treating the plants for two hours with dilute sulphuric acid, then drying and grinding them up. To sixty parts of this product, five parts of liquid glue, five parts of gutta percha, and two and a half parts of india-rubber are to be added, the latter two being first dissolved in naphtha. Afterwards ten parts of coal tar, five parts of pulverized sulphur, and five parts of pulverized resin are added, and the whole heated to about 300° Fahr. When cooled, a mass is obtained which in color, hardness, and capacity for receiving a polish, resembles ebony, and is much cheaper. This material is now made on a large scale, and used for nearly all the purposes to which genuine ebony can be applied.

NEW MAIL LOCK. — They are now making at Colt's factory a new patent lock for the United States mail bags. When fastened, a numbered plate of glass covers the key-hole, and this glass has to be broken before the bag can be unlocked or the lock tampered with. It is said to be the most complete lock ever invented. Five thousand of them have been ordered by the Post Office Department.

WOOD-SAWING MACHINE. — A recent Western invention for sawing wood consists of two saws so placed that two cuts can be made at once. The wood is fed to these as grain is fed in a threshing machine, and after being sawed is carried away by an elevator, like the threshed straw. The machinery is propelled by an eight-horse-power engine. The whole apparatus, engine, boiler, saws and elevator, is built upon a platform, and enclosed like a box-car, in convenient compass to be loaded upon a flat-car, and shipped from station to station. With a little change, trucks can be placed underneath like a pile-driving car, and then it can be moved upon the track as a separate car. In ten hours it can prepare from 90 to 100 cords easily. It requires nine men to work it, feed and take care of the wood.

SILK MANUFACTURE IN CANADA. — The *Ottawa Journal* gives some interesting facts concerning the French colony that is now trying the experiment of silk culture in Canada. A building twenty-five by eighty feet is now going up for a factory, and it is expected that a larger one will soon be added. Seed for twenty thousand mulberry trees was planted last spring. M. De Boussière, one of the managers of the enterprise, says that the young trees have grown much more rapidly here than in France. Some of them are now thirty inches high, having grown as much in six months as they do in France in nine months. The velvet trimming manufactures heretofore have been of different widths up to half an inch, but new looms, which will manufacture much wider goods to conform to the present fashions, are on the way from New York, and will be put up at once. Another loom, to weave silk dress goods, is to be put up at an early day. One great advantage of this trimming above most of the ordinary goods is that it has a selvage on both edges, an advantage readily appreciated by the ladies.

A FLOOR-WASHING MACHINE. — A canny Scotchman has invented a machine for washing floors. It consists of a frame on wheels to be moved over the surface to be cleansed. This frame carries two tanks or cisterns, one of which holds the cleansing water or other liquid, while the other receives the liquid after it is made dirty in the operation. On the lower part of the machine a revolving brush is carried, and in front of it is a rose or perforated pipe, by means of which the washing liquid from the tank or cistern is discharged upon the floor. The brush is geared by bevel or mitre wheels to the shaft of two other brushes, all the brushes being brought in contact with the surface to be washed.

BLEACHING FEATHERS.— The *Moniteur de la Teinture* gives an entirely new process by which even black ostrich and eagle feathers can be easily bleached, and thus rendered much more valuable. These feathers are immersed for three or four hours in a lukewarm solution of bichromate of potash, to which a few drops of nitric acid have been added. At the expiration of this time the feathers will have assumed a green color, due to the deposition upon them of finely divided oxide of chromium. This oxide is removed by means of sulphurous acid, and the feathers after this treatment are perfectly white. The precautions to be observed are, not to take too concentrated a solution of bichromate of potash, and to avoid an excess of nitric acid.

SIZE FOR DRESSING COTTON. — An improved size for dressing cotton yarn or cotton warps is stated to consist of 280 pounds of flour, one pound of tallow, and one half to two per cent. of the amount of flour employed, of paraffine. The paraffine may be made to replace the whole or a part of the tallow usually employed.

TO UNITE WATER-PIPES. — An excellent material for uniting water-pipes is prepared by combining four parts of good Portland cement and one part of unslaked lime, mixed together in small portions in a stout mortar, adding enough water to permit it to be reduced to a soft paste. Pipes thus united have been in use more than six years without any leak.

A GALVANIC CELL WITH ONE LIQUID. — A French chemical journal describes such a cell, composed of zinc and carbon placed in a fluid made up of 40 parts of water, 4.5 parts of bichromate of potassa, 9 parts of concentrated sulphuric acid, 4 parts of sulphate of soda, and 4 parts of the double sulphate of potassa and iron. This produces a very regular current. The zinc need not be amalgamated, and no gas is evolved.

PRACTICAL RECIPES.

A CEMENT TO STOP FLAWS OR CRACKS IN WOOD OF ANY KIND. — Put any quantity of fine sawdust of the same kind of wood into an earthen pan, and pour boiling water on it; stir it well, and let it remain for a week or ten days, occasionally stirring it; then boil it for some time, and it will be of the consistence of pulp or paste; put it into a coarse cloth, and squeeze all the moisture from it. Keep for use, and, when wanted, mix a sufficient quantity of thin glue to make it into a paste; rub it well into the cracks, or fill up the holes in your work with it. When quite hard and dry, clean the work off, and, if carefully done, you will scarcely discern the imperfection.

WHITE POLISH FOR LIGHT WOODS. — White (bleached) shellac, 3 oz.; white gum benzoin, 1 oz.; gum sandarac, 1-2 oz.; spirits of wine, or naphtha, 1 pint; dissolve.

TO CLEAN AND RESTORE THE ELASTICITY OF CANE CHAIR BOTTOMS, COUCHES, ETC. — Turn up the chair bottom, and with hot water and a sponge wash the cane-work, so that it may be thoroughly soaked. Should it be dirty, use a little soap. Let it dry in the air, and it will be as tight and firm as when new, provided the cane be not broken.

TO CLEAN MARBLE OR SCAGLIOLA. — Mix the strongest soap-lees with quicklime, to the consistency of milk; let it lie on the stone for twenty-four hours; then clean it off, and wash with soap and water, and it will appear as new.

This may be improved by rubbing or polishing it afterwards with fine putty-powder and olive-oil.

CEMENT FOR LEATHER BELTING. — Take of common glue and American isinglass, equal parts; place them in a boiler, and add water sufficient to just cover the whole. Let it soak ten hours, then bring the whole to a boiling heat, and add pure tannin until the whole becomes ropy or appears like the white of eggs. Apply it warm. Buff the grain off the leather where it is to be cemented; rub the joint surfaces solidly together, let it dry a few hours, and it is ready for practical use; and if properly put together, it will not need riveting, as the cement is nearly of the same nature as the leather itself.

PAPER LABELS FOR GLASS BOTTLES. — These will last as long as glass if they are covered with egg albumen, and then exposed to the action of steam until the albumen coagulates. If they are now dried in a temperature of 212° F., the albumen will become hard and clear, and oils or acids will not affect them.

TO BLEACH SPONGES. — The *Druggists' Circular* gives the following in reply to an inquiry for a method of bleaching sponges without weakening their texture: —

"White sponge is prepared commonly by soaking the common sponge in very *dilute hydrochloric acid* to remove the calcareous matter, then in cold water, changing it frequently, and squeezing the sponge out each time; it is then soaked in water holding a *little sulphurous acid*, or a very little *chlorine* in solution. Lastly, the sponge is washed in clean water and scented with rose or other fragrant water, and dried. Another way is to soak it in *dilute hydrochloric acid* for ten hours, then wash well with water and immerse in a solution of *hyposulphite of soda*, with a small addition of diluted hydrochloric acid, wash and dry. Be careful to use the acids not too strong."

If the sponge be afterwards dipped in glycerine, and well pressed, to remove excess of liquid, it remains elastic, and can be used for mattresses, cushions, and general upholstery. Sponge mattresses prepared in this way are now finding great favor. It is, of course, not necessary to bleach the sponge where it is intended to be used for such purposes.

VARNISH FOR CARVED WORK. — The following is highly commended as a "polish varnish:" One ounce white resin and one ounce seedlac, dissolved in half a pint of alcohol. Lay on with a brush, warm; and warm the work, if possible; at any rate, have it thoroughly dry.

Electric Signals for Brakemen. — The experiment of using the galvanic current for train signals is being tried on the Boston and Worcester railway. An electro-magnetic telegraph, worked by a small battery, extends from the cab of the locomotive, through the whole length of the train. There is an alarm-bell in the cab and upon each car. Two wires pass between the cars, covered with tarred twine. One end of this "cable" is securely fastened to the car, while at the other end is a copper link, which is placed on a spring-hammer on the other car. This link, when in its proper position, keeps the connection open. It is so arranged that, should a part of the train become detached, the link is pulled off, the circuit is broken, and the bell in the locomotive and on each car is kept ringing until the circuit is again closed. Besides automatically indicating the breaking of a train, the apparatus is useful in signaling between the engineer and his brakemen. Instead of blowing the whistle to notify them to apply or let off the brakes, the engineer simply touches a little knob that rings the bell on each car almost instantly. By this method the brakeman on the rear car is notified as surely as though on the first car, which is not the case by the present arrangement, for it frequently happens that the sound of the whistle does not reach the end of a long train. If there is trouble in any car, the conductor or brakeman touches a little knob, the signal is given, the engineer and the other brakemen are warned, and the train is stopped.

The War Balloons. — Hereafter no city can be so shut in by siege that messengers cannot be sent out with an approximation to safety. No incidents of the contest have been more picturesque than the assembling of the population of the capital to witness the starting of the aerial envoys; the passing in a few seconds of time from the heart of the French city to the encircling lines of the Prussians; the gauntlet of musket-balls and shells and rockets; the audacious scattering from a safe height of printed appeals inciting to mutiny in the German ranks; the double peril of landing, in which an unlucky wee may be more fatal than the shot of an enemy, or an exultant enemy may be hiding behind the nearest tree; the ovation awarded to the successful voyagers by a friendly people, the distribution of letters and messages, the sending back of carrier pigeons to bear to the besieged the news from without. . . . But there are possible developments of air-ships which would imply a revolution in warfare; and an English journal speaks half seriously and half jocosely when it inquires the value of the wooden walls, the iron turrets, the gallant tars and harbor-forts of a maritime nation, in case of a descent of some scores of thousands of Uhlans and Zouaves, each squad coming fully armed and provisioned in its own balloon. — *Boston Advertiser.*

Agriculture.

RECLAIMING WET MEADOWS.

In the Address upon "Manures General and Special," by the Editor of the Journal, the following statements are presented regarding some experiments upon bog lands at Lakeside Farm: —

Upon my reclaimed meadows no farm dung has been used excepting on a small patch for the purpose of experiment, and I have secured large crops of red-top and timothy during the past five years. The method of treatment has been varied with the view of ascertaining the best way of bringing them into condition to produce upland grasses. I have dressed certain parcels with the farm-made superphosphate, with a mixture of bone and ashes, with guano, fish pomace, combinations of salt and lime, and with sulphate of ammonia and nitrate of soda. It must be remembered that my low lands are pure peat bogs, of such a nature that, if the water was withdrawn, and the deposits allowed to become dry, fire would consume the whole to ashes. The elevation of the bog above the level of Lake Kenoza, on which it borders, is only nine inches in the winter and spring when the lake is at its highest altitude; consequently, it is an unpromising and difficult field upon which to experiment with the view of driving out the worthless meadow grasses. Indeed, no one in whose judgment I placed confidence would afford me any encouragement to expect success. It was regarded as impossible to renovate meadows which for so large a part of the year were almost submerged, and which could not be drained. Nevertheless the experiment has proved successful, and crops already secured have paid all the expenses of renovation and treatment. Upon two acres of the six which are now producing upland grasses, a coating of sand three inches in thickness was placed, after thorough spading and pulverizing the bog; upon this a dressing made of equal parts of fine bone and ashes, two thousand pounds in quantity, was evenly distributed, and it was then seeded down with red-top and timothy, covered in with a brush harrow. The work was done in the months of August and September, 1866. The first crop of hay in 1867 was a little above one and a half tons to the acre, the succeeding crop was two and a half tons, and those which have since been taken from the field have averaged about the same amount. The present autumn a light top dressing of farmyard dung has been given the field with the view of observing its effects. Meadow grasses have not yet made their appearance to any extent. After removing the crop next season, a new seeding will be given the field, and the experiment continued. One acre of the remaining six received no coating of sand, but after digging out the hassocks and burning them, the patch was turned over with the spade, fertilized with three hundred pounds of bone dust, and two hundred of guano, and seeded down similar to the other. This was accomplished in the autumn of 1868. In 1869 the first crop and aftermath gave three tons to the acre. The present season the two crops have exceeded that amount. Another acre bordering directly upon the lake, but slightly more elevated, was reclaimed in the same manner in 1867, and treated with one ton of dry fish pomace. It gave a crop the succeeding year of one and a half tons to the acre, and since the yield has been about two tons each season. In 1869, two more acres were put in condition, fertilizing one half with pure bone and spent ashes, the other with farm superphosphate. The crop this season upon both sections has been nearly alike, slightly exceeding one and a half tons to the acre. The remainder has been seeded down the present autumn, using upon one portion farm dung, upon another lime, upon two other portions various combinations of salts, which it is needless to mention, as no results have yet been reached. Some of these experiments have been continued long enough to learn something of the value of the methods of treatment, while the others have not. Several plats of the meadow have been put in condition and left one season without any fertilizing agent, and the result has been that ferns and coarse meadow plants have flourished together in rank luxuriance, thus proving the needed presence and high utility of the plant stimulants employed.

I think from the brief and imperfect statements presented, it will be conceded that wet peat meadows can be profitably reclaimed, and fertilized by special or concentrated agents easy and convenient to handle. I shall not venture upon the expression of opinions at present regarding the most effective and cheapest agents, as these points are not satisfactorily settled. After a few more seasons have passed, we shall have results which will enable us to form a more exact and reliable judgment in regard to the matter. The great value of our low lands in Massachusetts is as yet imperfectly understood, although attention has been called to them persistently through books and the agricultural press. Farmers, as a general rule, fear to have anything to do with the soft peat-bogs so common throughout the State. Their experience in miring oxen and horses in attempting to plough or haul manure, is not favorable to a prosecution of the work of renovation. When it is known that the spade will do the work of the plough, and that fertilizers of great efficacy can be carried in a basket upon the shoulder, a little more courage may possibly be infused into the owners of such lands, and they may seek to draw from them their hidden wealth by the work of reclamation. It must, however, be distinctly understood that all meadows are not of a character to pay for any labor that may be bestowed upon them. It is important that every farmer should carefully examine his low grounds before commencing improvements, that he may not subject himself to disappointment and loss. It is certainly difficult clearly to describe a meadow that will not after working bear good crops of sweet grasses, but I am confident I could point out such if allowed five minutes' work upon it with a spade. A piece of low land deficient in peat, with a superficial, clayey covering, overrun with moss or short matted grass, will not pay for the labor of renovation; neither will a meadow pay which is surrounded with a forest which places it in the shade half the hours of the day, no matter what may be the nature of the deposit. A meadow permanently wet, and which cannot be drained, is one upon which labor is usually wholly lost. Any low land open to the air and sunlight, and which is raised one foot above the highest water-level in the spring, can generally be converted into a profitable field, yielding abundance of the nutritious grasses. More attention should be bestowed upon such lands, as the hay crop is one of the most important and profitable produced upon our farms.

SOUND ADVICE TO SOUTHERN FARMERS.

From an admirable Address by General Capron, Commissioner of Agriculture, before the Agricultural Congress at Augusta, Ga., we make the following extract, which, though of special interest to Southern agriculturists, has no sectional limitation in the *principles* inculcated: —

"My first counsel would be — practice a restorative instead of an exhaustive system of agriculture. A system that involves abandonment of lands and removal to new scenes is unworthy of the age, and a reproach to modern civilization.

"No man is worthy to be a farmer who does not annually leave his land in better tilth and strength than he found it. The intellect must share more largely with muscle the toil of agriculture; machinery directed by skilled labor, and propelled by brute force, and also by the mighty power of steam, must take the place of expensive and insufficient human strength. This change, as I said in this State a year ago, 'involves the necessity for smaller farms, better culture, liberal use of manure, rotation in crops, and a larger working capital in proportion to permanent investment.' You are already spending millions annually on the old lands of the Atlantic States for commercial fertilizers. While I would commend a judicious expenditure in this direction, I would make this a basis of a practical rotation with a course of grasses and other restorative agencies of scientific agriculture.

"The business of agriculture should be an industry and not a speculation. The insane pursuit of specialties has long been a curse to American agri-

culture. A whole community runs wild upon hops, when selling at fifty cents per pound, and in two years they are scarcely worth the price of picking, and extravagance begotten of high expectations is forthwith followed by bankruptcy. Wheat brings $2 per bushel, and whole States become wheat fields, while every othe interest languishes, until the bread crop becomes so abundant as to be fed to swine in preference to shipment for human food. The sheep, with wool at $1 per pound, holds high place in popular esteem, but is kicked from the pasture by every Randolph of the farm at the first indication of a heavy decline in the value of its fleece. In your section cotton, a great boon to your agriculture as a constituent in your aggregate of production, may become an unmitigated evil if left to usurp the place of all other crops. The crop of last year produced $100,000 000, more than 150 per cent. larger than ten years ago. Three millions of bales may command a profit of $40 per bale, while five millions may not bring a dollar above their cost. But present profit is not the main consideration. The increase in value and enlargement of the productive capacity of the soil, by a judicious rotation, including the restorative influences of green cropping and cattle feed ng, is an increase of capital, a source of larger annual income, and an addition to the inheritance of one's children. It not only insures a profit from cotton culture, but enables the planter to pocket the entire proceeds of its sale, other products feeding man and beast."

WHAT DOMESTIC ECONOMY MEANS.

FROM an article with this heading in *The Farmer and Artisan*, one of our esteemed Southern exchanges, we make the following extracts : —

It means the careful saving of *every item* of any value, no matter how small, and the putting of every item to some *good* use; or it means the careful husbanding of these little odds and ends that occur in every family, but which many families throw away, and the application of these little items to *service* in the economy of the household. It has reference to *every article*, of whatever kind, that passes through the hands of the family. It means that the farmer knows just how much to feed his stock, also where and how to feed it that nothing be lost; that he knows how to save feed by providing comfortable shelters for his stock, and how to save his buildings by keeping them in good repair; and that he knows how to save money by turning everything around him, that has any of the elements of plant food, into manures. . . .

Domestic economy means that all old iron, old tin-ware, nails, shoes, worn-out tools, bits of wire, broken glass, empty bottles and vials, cast-off garments, bits of cloth and thread, scrap paper, etc., are put away in appropriate places, each by itself, for any service that occasion may require. It means that ashes, sweepings of the yard, old mortar, pounded brick-bats, bones, hair, feathers, urine from the chamber, the accumulation of privies, weeds, soap-suds, even the washings of the hands and face, dead animals, old salt, and everything of like character are composted under shelter to be applied to future crops.

It means that the excrements of every animal upon the farm are protected under cover until wanted for use in the fields; that carts and wagons are frequently oiled; that farm tools are painted annually, and kept under cover when not in use. It means that insectivorous birds are encouraged upon the premises; but that dogs and cats are rightly banished. It means that the best breeds of stock and the best implements of husbandry are used. It means that the health of the family, and of the stock, are looked after by providing plenty of good water, and a free circulation of pure air in the dwellings of both man and beast. . . .

Domestic economy is a *science* — the science of *saving*. It is comprehended in one brief sentence, uttered by the wisest Being that ever walked on earth: "Gather up the *fragments* that remain, that *nothing be lost!*"

POISONOUS FERTILIZERS.

A CORRESPONDENT calls attention in a scientific journal to a source of ill-health that we do not remember to have seen noticed before. Speaking of preparing animal manures by sulphuric acid, he says: —

Common oil of vitriol is, as far as I know, the substance used by all manufacturers; but I think none but the chemically pure acid should be used. The common acid often contains a small quantity of lead and arsenic, both of which are known to be absorbed by plants when presented to their roots.

Dr. Edmund Davy, professor of agriculture and agricultural chemistry in the Royal Dublin Society, published a paper, in 1859, calling attention to the danger of using manures containing arsenic; yet there has not, up to the present time, I believe, been a pure article of superphosphate of lime put in the market. I think the use, for the purpose mentioned, of acid containing arsenic or lead ought to be prohibited by law.

Remarks. — The above absurd item has been "going the rounds" of the press during the past six months, and it is quite time that it was stopped. This attempt to frighten farmers who are enterprising enough to dissolve bones and prepare their own fertilizers is hurtful to the interests of agriculture and derogatory to science. In the ordinary sulphuric acid of commerce, which is made from Sicilian sulphur and condensed in platinum retorts, the amount of sulphate of lead present is but a mere trace, seldom exceeding one fourth of one per cent. The same may be said of arsenic; some specimens of acid from the best makers do not afford even a trace of this metal or any of its salts. The dunce who started this item, probably read in some old book or journal, that specimens of acid, prepared in England some years ago from iron pyrites, were found by Dr. Rees, Mr. Watson, and others, to contain arsenic, and hence seized hold of the idea of making a sensational article on "poisonous fertilizers." Such loose statements are fraught with evil, and cannot be too severely condemned. It may be said that the quantities of lead and arsenic found in the worst specimens of commercial acid would not have the slightest influence upon crops, when presented through the medium of superphosphates. Farmers and horticulturists need have no fear of deleterious effects from the use of any of the acids found in the market.

TEA CULTURE IN THE UNITED STATES.

EXPERIMENTS recently made in Tennessee, South Carolina, and California, have demonstrated that the climate of many parts of the United States is well adapted to the cultivation of the Chinese tea plant. In China it is grown between the twentieth and fortieth degrees of north latitude. It does not require a warm climate, is very hardy, and is said to thrive better when subject to freezing in the winter than when not thus exposed. While it grows wild in some sections of China on the hill-sides, it flourishes best with careful culture on the plains, where the soil is well drained and not too rich. One crop of leaves usually is gathered in the spring and another in the fall, the former being considered the best. The plants are set in hills, very much as plant corn, three or four feet apart; the growth about three feet in height, and an ordinary plan productive for about ten years, at the expiration which time it requires to be renewed. No e worth gathering is produced until the plant is th years old.

The proper time for planting is in November a December; and the plants are very prolific. T picking season begins about the first of April a continues until October, at intervals of from fift to twenty days. The yield of a well cultivated pl tation is about one pound of prepared tea to plant, or four pounds of leaves in their green sta An acre of land will sustain about twelve hund plants, and consequently yields that number pounds of tea when in full bearing. The Chin method of preparing and manufacturing tea is v primitive, and can doubtless be improved by the of machinery, especially in the rolling process.

Dr. Smith, of Greenville, South Carolina, has c tivated tea in the mountainous districts of the Sta exposed to the frosts and ice of winter without jury. It is his opinion that there is no climatic stacle to its successful cultivation in the Unit States. If the experiments now making prove su cessful and remunerative, there will hardly be limit to the extent which the culture may assu on the Pacific coast, as well as in the hilly regio of some of our Southern States.

AGRICULTURAL NOTES.

EGGS AND ORANGES IN CALIFORNIA. — T California papers could easily furnish material f a "Library of Wonders" much more extended th the one which Scribner and Company are publis ing. The *Scientific Press*, of San Francisco, whi is thoroughly trustworthy even when it tells "tal stories, reports eggs 8 1-4 by 6 1-8 inches in circu ference, and says that such achievements are co mon with the hens out there. The same pap gives a picture of a "bouquet" of Californ oranges, of which the following is a descriptio "This branch is about two feet long, and som thing less than an inch in diameter, where it w taken from the tree. It contained, when tak off, 75 oranges, five having dropped off after th were matured, but before the branch was remov from the tree. Thirty-seven, only, are seen in t engraving, the balance being concealed by the fo age, or fruit in front. When looking up direct underneath the branch, the eye rests upon a perfe mass of fruit, much as it would appear if pack in a basket. We doubt if a more prolific grow could be produced in any part of the world.

"The tree from which the branch was taken about 13 years old, and bore in all about 2,0 oranges."

A NEW USE FOR VINE PRUNINGS. — The ne wood prunings of the vine have lately been utilize for making wine and vinegar. After being cut smal they are bruised and put into a vat or mashing tu and boiling water poured on them, in the same wa as is done with malt. One experimenter says th they produce liquor of a fine vinous quality, whic on being fermented, makes a very fine beverag either mild or strong, as you please, and on bein distilled, produces an excellent spirit of the natur of brandy. In the course of his experiments h found that the fermented liquor from the pruning particularly the tendrils, when allowed to pass int the acetous fermentation, makes uncommonly fin vinegar.

A WESTERN BEAN. — We wonder if the famou beanstalk cultivated by Jack in the nursery tale wa a castor bean. This seems not improbable, when we learn that the editor of *Howe's Monthly*, at Saint Louis, has raised the past season a castor bean plant which was 12½ inches in circumference at the

round, and 15 feet 3 inches high, and the aggregate ength of the branches was 90 feet 8 inches; so that he whole longitudinal growth of the main stem and ranches was 105 feet 10 inches. The branches vere evenly distributed along the length of the stem, iving the tree (for such it may be called) a very ymmetrical form.

REAPING AND MOWING MACHINES. — The nanufacture of these machines has increased to normous proportions in this country. The annual roduction is now estimated at about 125,000 machines. Few facts more clearly demonstrate the nmense wealth of the farmers of our country than hat they expend each year about $20,000,000 in he purchase of this one class of implements.

SLOW CHURNING PREFERABLE. — The *Scottish Farmer* is unwilling to concede any merit to the ewly invented churns that claim to produce butter o quickly, and argues strongly in favor of the atient, careful mode of churning. It says: —

And here we would state that we do not believe quick or rather rapid churning. We have, of te, been accustomed to the advertisements of hurns, the great merit of which is stated to be that ey produce the butter in a very short time. This uickness is very delusive; it conveys the idea that mething is gained; but the point is not, is time ined? but is the butter in the condition in which should be? To do work quickly is not always to it well; on the contrary, we are inclined to say at, as a rule, good work almost always includes e outlay of patient labor. But this notion of ick churning as the right thing to aim at proceeds om an ignorance of what the points involved in tter-making really are. Quickly made butter may good enough if it is to be used at once, but it ill not keep well. The reason is simply this — at all the buttery particles of the cream or milk e encased with thin pellicles of caseine or the eesy particles of the milk; if these are allowed be in too great a proportion, the butter has that eesy flavor we all so much dislike, and this will the case if the churning is done so quickly as fail to break up or separate the caseine pellicles m the oily or buttery particles; this perfect sepation can only be effected by slow churning. Of urse there is a medium; but we should be inned to place the minimum time in which the urning operation is to be kept up at thirty mins; between this and forty-five or sixty minutes, he butter "comes," then the quality, other things ng equal, will be good.

THE "FAT CONTRIBUTOR" ON FARMING. — correspondent asks us what we think of late ughing. Ploughing should not be continued later n ten or eleven o'clock at night. It gets the ses in the habit of staying out late, and unduly oses the plough. We have known ploughs to acre spring-halt and inflammatory rheumatism from ploughing. Don't do it.

To another correspondent, who wants us to sugt a good drain on a farm, we would say a heavy rtgage at ten per cent. will drain it about as idly as anything we know of.

When you make cider, select nothing but the ndest turnips, chopping them into sled length ore cradling them. In boiling your cider use nty of ice, and when boiled hang it up in the to dry.

A pick-axe should never be used in picking apples. has a tendency to break down the vines and dam the hive.

n cutting down hemlock trees for canning, select largest. Don't throw away the chips, as they ke fine parlor ornaments, encased in rustic frames salt and vinegar.

Boston Journal of Chemistry.

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BOSTON, APRIL 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

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Advertisers are hereby informed that the Boston Journal of Chemistry circulates more copies monthly than any other periodical of its class in this country. It goes into every State and Territory of the United States, and to the British Provinces, England, Scotland, Germany, Australia, etc. It is the best medium for advertising drugs, medicines, chemical substances, chemical and philosophical apparatus, telescopes, microscopes, educational institutions, lectures, books, musical instruments, articles of food, furniture, agricultural implements, seeds, fertilizers, wines, soda-water apparatus, surgical instruments, the business of physicians and druggists, etc., etc., that the country affords.

THE SPREAD OF "DARWINISM."

DARWIN'S "Origin of Species by Means of Natural Selection" was first published in 1859. Its doctrines at first met with little favor from scientific men. On the contrary, they were generally denounced as false and absurd. But they soon began to be accepted here and there, especially among the rising generation of naturalists; and at the present time, it is safe to say that those who oppose them are decidedly in the minority. There is no more striking fact in the history of theoretical science than the progress which this radical and revolutionary system has made in the brief period of ten years. "The views of Mr. Darwin," as a recent writer has said, "will undoubtedly undergo both modification and extension in the future; but in their broad scope they are not only extensively assented to, but they are guiding the researches of the foremost scientific minds of the world."

Among the recent conquests made by Darwinism, in England, is Sir Charles Lyell, who has been called "the most learned of living geologists." After fifty years of study upon the history of life as illustrated by "the great stone book of nature," and after teaching the older theories in his many works on the subject, he has at length given up those views as untenable, and become a convert to the Darwinian doctrines.

In Germany the new system has been more widely adopted than in England. Prof. Geikie, the eminent British geologist, after attending the recent Scientific Congress at Innsbrück, at which some eight hundred German *savants* were present, makes the following report: —

"What specially struck me was the universal sway which the writings of Darwin now exercise over the German mind. You see it on every side, in private conversation, in printed papers, in all the many sections into which such a meeting as that at Innsbrück divides. Darwin's name is often mentioned, and always with the profoundest veneration. But even where no allusion is specially made to him, nay, even more markedly, where such allusion is absent, we see how thoroughly his doctrines have permeated the scientific mind, even in those departments of knowledge which might seem at first sight to be farthest from natural history. 'You are still discussing in England,' said a German friend to me, 'whether or not the theory of Darwin can be true. We have got a long way beyond that here. His theory is now our common starting-point.' And, so far as my experience went, I found it to be so."

In this country, the acceptance of Darwin's views has not been so general, but it is evident that they are spreading among scientific men. At the last meeting of the American Association, at Troy, Prof. Meehan read a paper on one branch of Darwin's researches, in which he had at first supposed him in error, but at last found him to be right. In the subsequent discussion, Dr. Gray, the distinguished botanist, declared that "he had frequently attempted to catch Darwin tripping in this particular, and had referred to him many instances which he himself at the time considered opposed to the theory; but in every case he had been forced to withdraw his objection."

This is like the testimony of Müller, the famous German naturalist, who tested Darwin's doctrines critically in their application to the development of the crustacea. "I took no small pains," he says, "to detect any contradictions among the inferences as to the class of crustacea furnished by the Darwinian theory. But I found none either then or subsequently. Those which I thought I had found were dispelled on closer consideration, or eventually became converted into supports for Darwin's theory."

In the "Origin of Species" Darwin did not discuss the bearing of his theories upon the origin of the human race; for, as he has since said, "I thought that I should thus only add to the prejudices against my views." But in his recent book, "The Descent of Man" (reprinted here by the Appletons), he boldly takes the ground that man, like other organic beings, must have descended from preëxisting forms of lower rank. He says: —

"The early progenitors of man were no doubt once covered with hair, both sexes having beards; their ears were pointed and capable of movement; and their bodies were provided with a tail, having the proper muscles. Their limbs and bodies were also acted on by many muscles which now only occasionally reappear, but are normally present in the Quadrumana."

After remarking that "the most ancient progenitors" of vertebrate animals appear to have been "a group of marine animals, resembling the larvæ of existing Ascidians," and tracing the lineage down — or up — through lower orders and higher orders of fishes, reptiles, and birds (for "birds and reptiles were once intimately connected together"), until we come to mammals, he says: —

"In the class of mammals the steps are not difficult to conceive which led from the ancient Monotremata to the ancient Marsupials, and from these to the early progenitors of the placental mammals. We may thus ascend to the Lemuridæ; and the interval is not wide from these to the Simiadæ. The Simiadæ then branched off into two great stems, the New World and Old World monkeys; and from the latter, at a remote period, man, the wonder and glory of the universe, proceeded. . . .

"It is only our natural prejudice, and that arrogance which made our forefathers declare that they

were descended from demigods, which lead us to demur to this conclusion. But the time will before long come when it will be thought wonderful that naturalists, who were well acquainted with the comparative structure and development of man and other mammals, should have believed that each was the work of a separate act of creation."

For ourselves — not from "natural prejudice" or "arrogance," but simply because we cannot as yet accept our author's reasoning as conclusive — we are not satisfied with this genealogy; but it is too late to laugh at it as absurd and ridiculous. Neither is it necessarily inconsistent with the generally accepted theories concerning the creation. We do not deny the agency of the Divine Mind in the creation of the individuals of a species because they are developed from "pre-existing forms" by ordinary reproduction; and the Darwinian theory merely extends the range of this mode of development. It teaches, that species are developed from earlier and simpler forms, which have been gradually modified by the surrounding conditions of climate, etc., those modifications being perpetuated which suit the varied conditions. In other words, it teaches, as we said last November, that nature — or God, for we recognize God *in* nature — does just what man does when he produces new varieties. This is by no means ignoring creative action, but merely taking a new view of the way in which that action has been exerted. It is assuming that the creative power is everywhere present, acting now and forever, instead of acting once for all, as the more familiar theory of the creation supposes.

ENGLISH ADVERTISING.

If we are unwilling to believe that English inventors and manufacturers are more ingenious than we are in devising new machines or art processes, we must admit that they are far ahead of us in ingenious ways and methods of advertising their wares. At the last meeting of the British Association for the Advancement of Science, a Mr. A. McGordon succeeded in introducing and reading, in one of the sections, a paper on "How to Prevent Lead Poisoning in Water," in which unqualified commendation was bestowed upon the "tin-lined lead pipe," the manufacture of which had but recently been commenced in England, and which needed some novel mode of advertising to bring it into notice. Whether the "cat in the meal" was discovered by those who listened, we are not informed. Indeed, so far as Mr. McGordon was concerned, this was a matter of no account; for the moment he had read his "paper," his object was accomplished, and his gratuitous advertising secured. He could hardly escape criticism and rebuke, however, if any one remained to listen; for the "paper" is full of errors and absurdities, and affords evidence of being the work of a designing man and ignoramus in science. In order to bring into greater prominence the new "tin-lined lead pipe," he starts off with a sweeping condemnation of leaden pipes and vessels, and declares that everything is "poisoned and polluted which comes in contact with the metal." Galvanized iron water-pipes are dismissed with the wise remark that they are objectionable because they have "diminished tenacity, and are liable to splitting and corrosion." What is meant by "diminished tenacity," and by "splitting," we do not clearly understand. In this country we are not afraid of their "tenacity" or "splitting" weaknesses. It would indeed be better for the community if every foot of the pipe "split open" the moment it was put in position. The "corrosion" is what particularly troubles us, in the galvanized pipes. This paper has been published in the *Medical Times and Gazette*, of London, and that journal does not point out a single absurd statement, or express dissent from any one conclusion. It has also been republished in some medical journals here without comment, and so Mr. McGordon is passing his advertisement smoothly along without any detriment to his pocket. As regards the "tin-lined lead pipe," we have in the Journal expressed disapproval of its form of construction, and given reasons why we regard it as unscientific and unsafe. We have thus far seen no reason to change the opinions presented.

GALVANIZED WATER-PIPES.

The Board of Melrose Water Commissioners have taken prompt and active measures to prevent the use of the galvanized pipes by water takers. The following Circular has been printed and widely distributed: —

To Spot Pond Water Takers in Melrose.

Melrose, *March* 1, 1871.

After the expiration of our contract with Mr. Norman for laying lined service-pipes, Messrs. Ellis & Co. laid nine galvanized iron service-pipes. From investigation and facts which have come to our knowledge, we felt it to be our duty to take action, and at a meeting of the Board held last Saturday evening, a vote was passed authorizing the taking up of the galvanized iron as soon as possible, and substituting the lined pipe. In the mean time we recommend drawing liberally before using the water, so as to take as little poison into the system as possible.

We regret so many of our citizens have attached galvanized iron to their service pipe, thereby endangering the health of so many. We beg of you to remove such pipe at once, and substitute either iron lined with cement, or lead, which, according to analysis below, may be considered comparatively safe. We are in earnest in this matter, and are fully satisfied that any one drinking water through a galvanized iron pipe is taking more or less poison into the system.

Wingate P. Sargent,
Chairman of Melrose Water Commissioners.

Boston, *January* 14, 1871.

To Melrose Water Commissioners:

The specimen of water taken from Spot Pond in Melrose, Mass., has been received, and we have conducted a series of experiments with the view of ascertaining its action upon zinc-covered iron pipes (galvanized pipes), and upon pipes constructed of lead. We find its action upon galvanized iron pipe to be so energetic and immediate that, upon allowing a current of the water to flow slowly through a section of the pipe, the protoxide of zinc was formed in considerable quantities, and was detected in the water which passed through. A section of the pipe was filled with the water, and allowed to remain one hour. Upon examining the water, a still larger amount of the protoxide of zinc, and also a small quantity of the carbonate of the protoxide, was found to be held in it. The water allowed to remain twenty-four hours in a section of the pipe gave a mixture of the protoxide and carbonate of zinc amounting in quantity to six grains to the gallon. Experiments made upon a section of the pipe, changing the water every twelve hours, with the view of ascertaining if the action upon it was continuous, showed that the zinc salts were constantly present in the water, and that the action was unintermittin The water of Spot Pond acts directly upon the zi covering, forming a protoxide of the metal, and li erating hydrogen from water decomposition. part of the protoxide is changed into a carbonate protoxide, and a minute portion into other salts fro the action of organic acids held in the water.

The solution of the protoxide of zinc in the wat is facilitated by the presence of alkalies and alkali earths, and hence there is increased danger fro attaching galvanized pipes to mains constructed hydraulic cement, as there is communicated to th water an alkaline quality resulting from contact wi the cement. It is proved by our investigations th the use of galvanized iron service-pipes in conduc ing Spot Pond water, is highly dangerous to healt and should under no circumstances be permitte The action of the water upon leaden pipes corr sponds with that taken from Cochituate Lake, an from Round Pond in Haverhill, Mass. Leade pipes immersed in the water undergo slow oxidatio and the water affords a decided lead reaction whe tested during the first forty-eight hours. This rea tion is afforded in water changed as often as once two hours. By the change of the partially solubl oxide into insoluble carbonate, a coating is forme upon the pipe which arrests farther decompositio and the water in contact remains uncontaminate It is apparent that of the two varieties of service-pipe those constructed of lead are far less dangerous, under ordinary conditions the action of the water protective in the way described.

J. R. Nichols & Co., *Chemists.*

FRAUDULENT KEROSENE.

The readers of the Journal will rememb that about one year ago we gave an accou of a lamp explosion in this city, by which Mr Hiram Wellington, a lawyer, was seriously in jured. The fraudulent liquid was purchased o a retail dealer on Cambridge Street, who allege that he bought it of the Downer Kerosene O Co. Mr. Wellington, wishing to secure respon sible parties for defendants, and believing th the Downer Company were liable for the dam age, brought them into the Superior Court to an swer a suit. Judge Lord ruled that Wellingto had no cause for action against Downer, and th case was carried on appeal to the Supreme Cour A decision has recently been reached in the cas and Judge Lord has been overruled, and the cas remanded back to the Superior Court for tria This is an important decision, as it has a direc bearing upon the sale of naphthas by manufactur ers to dealers for illuminating purposes. Th following is a report of the decision, copied fro the *Advertiser* of this city: —

Hiram Wellington vs. The Downer Kerosene O Company. — The plaintiff in this case alleged tha the defendants are manufacturers and dealers in oi They sold to Nathaniel E. Chase, who was know to them to be a retailer of oils to be burned i lamps, a barrel of naphtha for the purpose of bein resold, they knowing the purpose of Chase to retai it. Chase, not knowing its dangerous character, re sold a pint of it to the plaintiff to be burned in lamp. While the plaintiff, not knowing that it wa dangerous, was using it for illuminating purposes, i ignited and exploded, whereby the plaintiff wa badly burned. There was a second count founde upon the statute of 1867, chapter 286. The plain tiff at the trial in the Superior Court having offere evidence tending to prove these allegations, th judge ruled that, if proved, they would not sustain the action, and directed a verdict for the defendants.

Exceptions taken to this ruling have now been

stained by the Supreme Court upon the ground that "upon the facts offered to be proved at the trial, the plaintiff, if in no fault himself, was entitled to maintain his action upon either count of the declaration."

EDITORIAL NOTES.

INCIDENTS IN THE SIEGE OF PARIS. — From one of the interesting letters of the Paris correspondent of the *Boston Courier*, we glean a few facts which will show the risks run by scientific men during the latter days of the siege. The bombs fell thickest on the left bank of the Seine, in the neighborhood of the Pantheon, where the colleges and seminaries are situated. "In one case, a shell drops into a lecture hall, while a professor is occupied with his class; it bursts, no one is injured, and the lesson proceeds. Daubrée, the famous geologist, who is largely occupied on the commission for the defense of the city by all chemical aids, is seated in his study; a bomb enters, rolls under a table, and remains there. The celebrated Abbé Moigno leaves his library for a few moments to post a letter; on his return, he discovers his furniture smashed and his valuable books burning, from a shell. Another falls in the chemical laboratory of the College Rollin, and would have been serious, only the chemicals had been previously removed. The Botanical Garden of the Medical School, where Buffon wrote, and Cuvier and Jussieu worked, has been torn up by the bombs. The Jardin des Plantes has its admired green-houses destroyed, its invaluable collection of exotics ruined." We may well rejoice that this devastation was checked before it had gone any farther. The mischief already done by war — which is but another name for barbarism — is almost irreparable, but it might have been much worse.

POLITICAL ZOÖLOGY. — The same journal laughs at the New York *Times* for confounding "that same old coon," which used to be so popular as a party symbol, with the 'possum. The *Times* had said, "The *'possum or coon* has long been recognized as an emblem of cunning;" but, as the *Courier* remarks, "the truth is that the opossum resembles the coon about as nearly as the pig does the wild-cat." It is very evident that the *American Naturalist* ought to have a wider circulation.

KINDERGARTEN TEACHING. — This rational method of training young children, originated by Fröbel in Germany, is gradually growing in favor in this country. Wherever it is fairly tested, it commends itself by its results. It turns work into play for the infant learner, and at the same time makes it more thorough work. It does this simply because it "begins at the right end," recognizing the child as a child, instead of treating him as if he had put away childish things and dried up into a sort of manikin. As Miss Peabody has said, "Kindergarten culture is the adult mind entering into the child's world, and appreciating nature's intention as displayed in every impulse of spontaneous life;" while the common method is rather forcing the child prematurely into the adult world, where no healthy natural life is possible for it. Several manuals for the use of teachers under Froebel's system have appeared in this country; but the only one that seems to be really complete and satisfactory is "The Paradise of Childhood; a Practical Guide to Kindergartners," by Edward Wiebe, published by Messrs. M. Bradley & Co., of Springfield, Mass., who also furnish all the "gifts" or apparatus necessary for carrying out the system. The author of the book, having had the advantage of personal acquaintance with Fröbel, as well as a long experience in teaching according to his methods, may fairly claim to be an authority on both the theory and the practice of the system.

"DOWN EAST" SCANDINAVIA. — The State of Maine has been trying an experiment in encouraging foreign immigration. An agent was sent to Sweden, and a colony of one hundred and fourteen Swedes were induced to pay their passage to this country and settle on the wild lands of Maine, some fifteen miles from the eastern line of the State. The young settlement appears to be doing well. Some of the results are thus stated in the Report of the "Commissioner of Immigration" just printed.

"Seven miles of road have been cut through the forest, one hundred and eighty acres of wood felled, one hundred acres hand-piled, burnt off, and cleared ready for a crop, and twenty acres sowed to winter wheat and rye. Twenty-six dwelling-houses and one public building have been built.

"A knowledge of Maine, its resources and advantages, has been scattered broadcast over Sweden, a portion of the tide of Swedish immigration turned upon our State, and a practical beginning made towards settling our wild lands and peopling our domain with the most hardy, honest, and industrious of immigrants."

If the policy thus inaugurated can be successfully carried out, the next census need not show a continued falling off in the population of Maine. By *giving* one hundred acres of land to every actual settler, "Down East" may compete with the West in furnishing "free homes for the homeless." The first and most difficult step appears to have been taken, and we do not see why a steady stream of Scandinavian immigration may not flow in through the channel thus opened for it.

LITERARY NOTES.

MESSRS. HURD AND HOUGHTON have furnished a unique and very useful book of reference in the *Handbook of Legendary and Mythological Art*, by Mrs. C. E. Clement. There was no manual of the kind in the English language, though there is so much in literature and art that people of ordinary culture cannot understand without a key. The information here condensed into one cheap volume could only be found scattered through many and for the most part costly books, accessible only to the favored few; and even those, on account of their bulk, were practically useless to the traveller, who especially needs such a guide in European galleries of art. The book lacks but one thing to make it perfect, and that is a good Index.

From Fourteen to Fourscore, published by the same house, is a well-written quiet story, which will not suit the lovers of "sensational" fiction, but is certainly none the worse for that.

American Mines and Mining, by R. W. Raymond, Ph. D., United States Commissioner of Mining Statistics, is a handsome volume of 800 octavo pages, published by Messrs. J. B. Ford & Co., of New York. It furnishes a greater amount of information concerning our American mining industry, its condition, prospects, methods, and appliances, than was ever before collected in any single work. It comprises a description of all the gold and silver mining districts of the West; a careful discussion of the laws affecting their titles; a thorough essay on mineral deposits in general, their characters and classification; a full description, profusely illustrated, of mining machinery and metallurgical processes; and an appendix, with valuable tables of statistical information. Three alphabetically arranged analytical indexes, one of *Mines*, one of *Mining Districts*, and one of *Subjects*, make the vast body of information in the work readily accessible for purpose of reference.

The Recovery of Jerusalem is "A Narrative of Exploration and Discovery in the City and the Holy Land," by Captains Wilson and Warren, of the Royal Engineers, acting under the auspices and at the expense of the Committee of the Palestine Exploration Fund. This fund was the gift of Miss Burdett Coutts, and amounted to five hundred pounds. The comely volume before us (reprinted by the Appletons) gives the results of the expedition, some of which are of the highest interest and value for the new light they throw on "the most interesting of all geographies," and on many points in biblical history and archæology.

Cornell's Physical Geography, a recent addition to Appletons' list of school-books, seems to us a better manual of the subject than any other on the same plan; and the plan is one which many excellent teachers approve.

Messrs. Scribner & Co. issue a new number of their "Library of Wonders" in *Wonderful Escapes* (that is, from prison), beginning with Aristomenes the Messenian and ending with Stephens the Fenian; also Vol. III. of Max Müller's *Chips from a German Workshop*, which is as good as its predecessors, and Vol. I. of *Curtius's History of Greece*, an admirable work, to be completed in five volumes uniform with *Mommsen's Rome*.

The Harpers have just published *The Apple Culturist*, by S. E. Todd; "a complete treatise for the practical pomologist; to aid in propagating the apple and cultivating and managing orchards; illustrated with engravings of fruit, young and old trees, and mechanical devices employed in connection with orchards and the management of apples." The author is well known by his *Young Farmer's Manual* and other works in the same line.

Rawlinson's Manual of Ancient History ought to have been reprinted sooner, and the Harpers have done teachers good service in furnishing a neat and cheap edition of it. It is an important accession to their valuable list of educational histories.

Messrs. Lindsay and Blakiston have now ready *The Change of Life in Health and Disease*, by Dr. E. J. Tilt, from the third London edition, in which the original work is much expanded. In its present form it is commended by the *Lancet* as "the best work on the subject of which it treats." Also, the second edition, enlarged, of *Byford on the Uterus*, a standard work in an improved form, both internally and externally.

Another valuable addition to the library of the gynæcologist is Dr. H. R. Storer's *Insanity in Women*, being his paper on that subject communicated to the American Medical Association, now reprinted from their "Transactions," at the request of many physicans. Messrs. Lee and Shepard have issued it in a neat little volume.

Mr. H. C. Baird has just published *A Complete Guide for Coach Painters*, translated from the French of M. Arlot, of Paris, by A. A. Fesquet, with an appendix containing information respecting the materials and practice of coach and car painting and varnishing in the United States and Great Britain. The publisher will send it, postpaid, to any address, on receipt of $1.25.

Prof. G. F. Barker's *Elementary Chemistry*, published by C. C. Chatfield & Co., New Haven, is one of the very few American manuals that represent the present state of chemical science. It has been received with much favor, and is already adopted in several of our leading colleges. The illustrations and the typography are excellent. We regret that the author did not use the nomenclature adopted by Prof. Cooke, Rolfe and Gillet, and Cooley in their text-books — the only other American books that are up with the times in chemistry — as well as by Miller, Williamson, and many other English writers. We cannot learn to like such forms as *potassium iodide*, *sodium nitrate*, etc., and we wonder that authors who write *nitric* and *nitrous*, *mercuric* and *mercurous*, etc., do not prefer *potassic*, *sodic*, etc., even in cases where two sets of adjectives are not needed. We thus get one uniform rule for all these names (instead of a rule and a "modification," as in Prof. Barker's system), and we avoid the awkward and harsh use of nouns as adjectives.

All these books are for sale at Noyes, Holmes, & Co's., 117 Washington St.

OUR SCIENTIFIC AND MEDICAL EXCHANGES.

THE *American Journal of Science and Arts* for March contains the following articles: On the Discovery of Actual Glaciers on the Mountains of the Pacific Slope, by Clarence King; On some Rocks and other Dredgings from the Gulf Stream, by S. P. Sharples; Calorimetric Investigations, by R. Bunsen; On the Porcelain Rock of China, by Baron von Richthofen; Notes on Granitic Rocks, Part II., by T. Sterry Hunt; On the Geology of the Eastern Uintah Mountains, by O. C. Marsh; On the System of the Batrachia Anura of the British Museum Catalogue, by E. D. Cope; On Foraminifera from the Gulf and River St. Lawrence, by G. M. Dawson; Descriptions of New and imperfectly known Ascidians from New England, by A. E. Verrill; with Scientific Intelligence, etc.

The *Journal of the Franklin Institute* (Phila.) has been added to our Clubbing List, and is also advertised in this number of the JOURNAL. This standard Scientific Monthly has entered upon its forty-third year, and the numbers already issued fully sustain the high reputation it has gained in the past. It has long been "the favorite organ of our practical scientists," and in the hands of its present editors it is not likely to lose that honorable distinction. In Europe no American journal of science has more authority and influence.

The *Scientific Press*, of San Francisco, is the largest and handsomest illustrated journal published on the Pacific coast, and in no respect inferior to anything of its class in the country. The subscription price is *four dollars* a year, and we can furnish it *with the* JOURNAL on the same terms. The *Pacific Rural Press* is a new illustrated agricultural paper, issued by the same publishers, in the same style, and at the same price. We commend it to all who are interested in the development of the natural resources of California, which appears to be the El Dorado of the farmer as well as of the gold-seeker.

The School Laboratory of Physical Science is the title of a new quarterly "devoted to the thorough teaching of physical science in schools of all grades," published at one dollar a year, under the editorship of Prof. G. Hinrichs, at Iowa City, Iowa.

The *New York Medical Journal* for March has original communications by Prof. Austin Flint, on the Pathological Relations of the Gastric and Intestinal Tubules; by Prof. Geo. T. Elliot, on Bloodletting; and by Dr. R. H. Derby, on Color-blindness, and its Acquisition through the Abuse of Alcohol and Tobacco. The Clinical Records include Cases of Tracheotomy in Croup, with Recovery; Poisoning by Strychnine, treated successfully with Bromide of Potassium; Injury of the Hip-joint; etc., etc.

The *American Practitioner* has elaborate papers by Prof. W. A. Hammond, on Multiple Cerebral Sclerosis; and by Prof. L. P. Yandell, on Food in Health and Disease; with Reviews, Clinic of the Month, Notes and Queries, etc.

The *Boston Medical and Surgical Journal* for March 2d, has a valuable article by Prof. W. W. Greene, on Some Peculiar Cases of Ovariotomy; with the Description of a New Method of treating the Pedicle (illustrated with several woodcuts).

The price of the *American Journal of Obstetrics* will be $5.00 a year hereafter. The quarterly numbers are now twice as large as they were at first, and the increase in price is small in proportion. The Fourth Volume will begin in May, 1871. Messrs. W. Baldwin & Co. offer the three completed volumes, *bound*, for $12.00 to new subscribers.

We would call attention to the advertisement of the London *Chemist and Druggist*, and the very low terms on which we are enabled to furnish it — $ 2.00 a year, *post free*, or $2.50 *with the* JOURNAL. Each number contains (aside from some forty pages of advertisements) thirty-two royal octavo, double-columned pages of reading matter. It ought to have a large circulation in this country.

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — home science, arts, agriculture, medicine, etc. — will be answered under this head, but *only when the subject is one of general interest to our readers.*

A. E. S., PROVIDENCE, R. I. The lecture of Prof. Chandler before the American Institute was incorrectly reported in the *Tribune*. The Professor is far too sensible, well informed, and careful, to recommend the use of galvanized iron pipes for water conduction. He is quite explicit in his approval of the "tin-lined lead pipes," and entertains views regarding their safety in which we do not coincide. It is possible that further experiment and observation may modify his opinions somewhat. He informs us by letter that his lecture will soon be printed in correct form.

G. J. C., WATERBURY, VT. Zinc evaporators, conductors, stirrers, and the like, should not be employed in the manufacture of maple-sugar, as there is danger in their use. Vessels and implements constructed of iron and tin are better, safer, and quite as cheap. We must learn to discard this metal zinc from household and other uses where food substances are liable to be poisoned by contact with it.

E. S., NILES, MICH. Dr. N. N. Hays, of this city, sends us the following, which he states has remarkable efficacy in relieving tooth-ache and neuralgic pains in the gums and face.

Mix Chloroform, 2 drachms,
Tr. Aconite Root, $1\frac{1}{2}$ do.

For simple tooth-ache, a pellet of cotton wet with the liquid and inserted in the cavity of the tooth is sufficient; for neuralgic pains, paint the parts affected, and relief is afforded. Tincture of Aconite must be used with care, as it is poisonous.

A. D. D., GREENUP, KY. A mixture of equal parts of lime-water and pure sweet oil we have found to be the most efficacious remedy for "burns and scalds." The suffering parts should be covered with the mixture, and over it place clean cotton, and bandage lightly.

B. A., LOWELL, MASS. An English law was passed in 1666, requiring that all shrouds should be constructed of *wool.* This law was amended in 1680, requiring that all persons except those dying of the plague should be buried in shrouds made of pure wool, under a penalty of £5. It was not until 1814 that this most absurd law was repealed.

W. A. P., CATLETTSBURG, KY. The circular you send giving recipes for catarrh, deafness, etc., is one of the vile documents issued by impostors, who are flooding the country with their advertisements. At the present time the mails are carrying an immense amount of very plausible, but deceptive circulars and letters, and the injury and loss sustained by the community through this means is very great. There are thousands of these worthless vagabonds scattered through the country whose whole business is to devise and conduct schemes for fleecing credulous people through the mails. Sometimes they personate women, sometimes clergymen, at other times lawyers. They issue medical circulars, circulars for lotteries, counterfeit money, business chances, etc. Now take our advice; *commit to the flames instantly* everything you receive through the mails coming from strangers, or those who have no right to address you. If you do this, you are safe.

A. B. S., ORONO, ME. We have not read any of Dr. Dio Lewis's books; but if, as you state, he recommends in one of them the use of galvanized iron pipes for the conduction of water, he gives bad advice. It shows that he is not acquainted with the subject he is considering, and his views are not entitled to weight. Dr. Lewis is undoubtedly good authority in calisthenics, but upon points involving chemical knowledge and experience he is less qualified to give advice.

G. O. L., BOSTON, MASS. What are called safety-lamps for burning naphtha we cannot recommend. They may be the cause of accidents of a serious nature in families, as from their supposed safety highly inflammable liquids will be introduced, where they could not otherwise gain entrance. There are no safety-lamps in the market that can protect individuals and families from the dangers of bad kerosene and naphtha. Some of them with wire gauze tubes, and coverings to orifices, may in a measure protect from lamp explosions, but this is comparatively a small matter. The great danger in the use of the light inflammable liquids is in their liability to take fire when a lamp is overturned or broken, or when the liquid is turned from the containing vessel into the lamp. It is the dreadful burning resulting from the inflammable nature of the fluids that renders them so dangerous. No family can introduce a single ounce of benzine, gasolene, "Sunlight Oil," "Danforth's Oil," etc., into their dwellings without great hazard, no matter what vessels they may employ to hold or burn the liquids. Good legal kerosene needs no unusual protection, as it can be burned in any common lamp with safety.

W. B. S., SPRINGFIELD, MASS. Troublesome dandruff may be removed from the head by the use of a weak solution of borax in water, or by a wash made by adding half an ounce of strong ammonia to a pint of water.

N. S., ALBANY, N. Y. Coal-ashes are worth applying to the land when much wood or charcoal has been used for kindling purposes. In many families from half to a whole cord of wood is used during a winter in stoves, furnaces, ranges, etc., in connection with coal, and the resultant ash has considerable value, and should be saved and spread upon grass lands in the spring.

P. R. W., NEENAH, WIS. It is an error to suppose that air, in passing over red-hot iron, is decomposed to any considerable extent. If all the air that comes in contact with the red-hot fire pot of an ordinary stove was chemically changed, the oxygen uniting with the iron, the pot would fall to pieces from being turned into rust, in forty-eight hours. From sanitary considerations, heating surfaces should never be allowed to reach such high temperatures. The air is rendered oppressive, and perhaps its electrical conditions are so changed as to exert an unhealthy influence upon the animal organism.

D. S. B., WILMINGTON, N. C. Kapnophyte is the term applied to a substance alleged to possess fertilizing properties. We think it is prepared in your State, and is made by burning leaves, straw, etc., and allowing the smoke to pass into, and become fixed in earth, sods, and peat. As at present advised regarding this process, we do not have a very high opinion of its value. The volatile products of combustion, under ordinary conditions, have no fertilizing qualities, and smoke is simply the unconsumed minute particles of woody fibre conveyed upward by rarefied air. When wood is distilled or burned at low temperatures, a new class of bodies are formed, such as tar, acetic acid, kreosote, etc., but they are not to be classed as manurial agents. The process does not appear to have much to commend it to the attention of farmers.

L. M. N., NORTHAMPTON, MASS. You can obtain Lakeside seed corn and seed wheat of Messrs. Parker & Gannet, No. 49 North Market Street, Boston. The number of those who applied for seed corn and wheat was so large we could not give them attention, and this has led to placing what we had to spare in the hands of the seedsmen named, who are honorable gentlemen, and will deal fairly by every one.

N. T., MANCHESTER, N. H. We must decline to answer your numerous questions. Please remember that every moment of our time is occupied, that we cannot make investigations and answer inquiries unless they are of interest to our readers. The number of letters that are received, asking questions, is very great, and it is impossible to give attention to all of them.

J. V. C., NEW YORK, N. Y. It should be remembered that the composition of nitric acid was totally unknown in 1784. That most eccentric philosopher, Cavendish, discovered the acid about that time during his experiments upon the composition of air, but he did not know what it was. In exploding mixtures of the gases, hydrogen and oxygen, by the electric spark, the acid was produced, and found in the dew which covered the vessels in which the explosions were made. The great men of the age, Priestley, Watt, Lavoisier, Cavendish, and even La Place, were confused and led astray by this phenomenon.

D. E. O., BURLINGTON, VT. Grapes can be dried so as to form raisins in this part of the country, but it requires great care. During the last autumn, which was unusually dry and warm, we manufactured some most excellent raisins, and with but little trouble. The varieties of grapes used were Black Hamburgs, Grizzly Frontenacs, Israella, and Adirondacks. The grapes to dry must have extraordinary saccharine qualities. Raisins are made in considerable quantities in California.

S. N., JERSEY CITY. Good sound fresh wheat ground in a grist mill forms the best flour for making family bread, but this cannot always be obtained in cities. Millers are quite apt to grind into "Graham meal" their poorest wheat, such as will not make white sweet flour. For the difficulty you mention, bread formed of two parts sweet flour and one part of bran is excellent. A large part of the numerous cases of obstinate constipation can be wholly or in part removed by a free use of bread prepared in this way. The bread is really delicious if well made. Some flour manufacturers prepare a cleaned bran for dietetic purposes which is very nice. That prepared by Davis and Taylor, Lawrence, Mass., and put up in small bags, we have found to be clean and sweet.

"HUXLEY FOR A PENNY." Several correspondents inquire how they can obtain the Series of Lectures mentioned under this head in the last JOURNAL. The five lectures are published for *sixpence*, by Mr. John Heywood, Manchester, Eng., under the title of "Science Lectures for the People." The book would cost twenty-five cents here, and we presume the English publisher would send it post-paid on receipt of that sum in currency. The Appletons (New York) announce "Science Lectures for the People, by Huxley, Roscoe, etc.," which is probably a reprint of this little book.

C. S., BOSTON. Your communication will appear in our next, with a few comments for which we had not space this month.

Medicine.

PHYSICIANS AND APOTHECARIES.

SOME time since Dr. J. H. Hobart Bu[...] President of the King's County (N. Y.) Med[...] Society, sent us a copy of his admirable Add[...] delivered before the society, upon the "Relat[...] subsisting between Physicians and Apothecari[...] This Address abounds in good sense, and i[...] fair, impartial discussion of an important s[...] ject. Regarding unofficinal remedies the do[...] expresses the following views: —

A prominent apothecary has lately told [...] public, through the columns of the press, tha[...] borders on quackery whenever a physician or[...] anything not embraced in the United States Ph[...] macopœia. This, to my mind, is simply ridicul[...] for several reasons: 1. Because the Pharmacop[...] is in no sense an authoritative work, though [...] excellent guide, to which we should largely adh[...] 2. We are bound by the Hippocratic oath, and [...] every principle of humanity, to direct for our [...] tient anything under heaven which will, in [...] opinion, most quickly restore him to health. [...] Common sense will not justify the assumption t[...] the Pharmacopœia contains all the therape[...] agents which are likely to prove of service. E[...] little time ago it is that we had no bromide [...] potassium, no bromide of ammonium, no carb[...] acid! — and does any one here suppose that [...] next decade will be less prolific in discovery th[...] the last? 4. To restrict the physician to the Ph[...] macopœia, is to mistake the very object and des[...] of that work, which is, that it should contain su[...] articles, and *such only*, as have been used, tri[...] and proved; and are we prepared to seal up t[...] record, and to declare to the world that our sea[...] after remedies has ceased forever — though canc[...] and phthisis, and tetanus, and hydrophobia st[...] stand on the list of the incurable? It is, howev[...] a proposition from which scarcely any one will d[...] sent, that a physician should under no circumstanc[...] write for a secret nostrum.

WRITING PRESCRIPTIONS IN LATIN.

Physicians have been accused of pedantry [...] cause they prescribe in Latin, and it has also be[...] said that they do this to keep professional kno[...] edge from the common people. Such criticisms [...] founded in ignorance. If we discard Latin, whi[...] is the language common to scientific men all o[...] the world, what shall we adopt in its stead? Sh[...] it be the English? A German or French apot[...] cary, learned in the art, may read our vernacu[...] expressions so imperfectly as to mistake our mea[...] ing altogether. Besides this, the Latin names [...] remedial agents are generally unmistakable in th[...] reference to the particular article intended, wh[...] the English is exceedingly prolix — the same arti[...] having half a dozen names, and often the sa[...] name applying to two or three different articl[...] Custom sanctions many a misnomer, and the uned[...] cated ask for a glass of soda-water, little dreami[...] that a solution of carbonic-acid gas in water is t[...] thing they want; and the thirsty servant-girl wh[...] drank the *salts of lemon* was greatly surprised [...] being told that she had fatally poisoned hers[...] with oxalic acid.

WHAT HAS THE PHYSICIAN A RIGHT TO DE[...]MAND OF THE APOTHECARY?

"Doctor," said a patient for whom he had ju[...] prescribed, "does it make any difference where [...] get this?"

"Why, yes," said the doctor. "I'd a little rathe[...] you wouldn't go to the corner grocery for it; an[...] yet," continued he, "you might as well go there [...] to some of the so-called apothecaries, for a window[...]ful of bottles of colored water is no more evidenc[...]

, the competency of the proprietor to compound ...t prescription, than the word *Doctor* painted ...n the front of a house is evidence that he who ...s within has a scientific medical education." ...ell, then, in the solution of this question — "Doc..., does it make any difference where I get this?" ...is involved the whole subject before us. We ...d that it makes so much difference, that we are ...duty bound to demand that the proprietor of ...ry pharmacy, and every clerk who is, under any ...cumstances, allowed to dispense medicines, shall ...practical druggists and graduates of some legal ...reliable college of pharmacy. It seems to us ...reasonable that the law should absolutely re...ct the compounding of prescriptions to such ...sons. Such a law, properly enforced, would im...liately divide our apothecaries into two classes, ...ely, pharmaceutists and medicine-vendors — and ...leads me naturally to the subject of the next ...most desirable reform. Medicine-vendors will, ...ourse, make and sell secret nostrums *ad nau...a*; but is it too much to ask that the scientific ...rmaceutist — the physician's help-meet and co...rer — should ignore a traffic so ignoble? Why ...uld our prescriptions be dispensed by the very ...who engage most extensively in the encour...nent of the vilest quackery? It is an incon...ty which ought not to be longer tolerated.

...gain, we have a right to demand that, in each ..., the terms of the prescription shall be rigidly ...ered to.

... teacher in the College of Pharmacy is quoted ...aving said that, if any particular manufacturer's ...aration were written for, the apothecary was ...ified in substituting his own or any other as ..., unless it were an article of unusual importance; ...if he did not his neighbor would, and he would ...ronounced a poor druggist, while the neighbor ...d get the credit of being all right. I only refer ...is to say that it is pernicious teaching, because ...hysician alone must judge of the "importance" ...e article in any given case. Equally pernicious ...to endeavor to throw the responsibility of a sub...ion upon the person presenting the prescription ...ying: "We haven't Skidmore's, but we have ...ins's, which we consider as good, if not better." ...doctor wrote for Skidmore's, and the apothecary ...l be in duty bound to refuse to put up Perkins's ...if the patient *begged* him to do so. The apoth... cannot know, and has no right to assume, that ...octor has not a substantial reason for his pref...e. With the better class of apothecaries no ...nent is needed to show the necessity of comply...ith the exact terms of the prescription, but we ...to restrict the prescription business entirely to ...etter class. Only the day before yesterday, a ...ription of mine, which was designed to be taken ...eber Brothers, was accidentally carried to a ...the proprietors of which are strangers to me. ...writing was plainly, "℞. Pulv. Doveri, gr. x. ... — *Take the powder in a little syrup.*" The ...ecary put the Dover's powder into four or five ...ms of syrup, numbered the vial, put my name ...the label, and sent it to the patient without ...lirections whatever. The patient, not being ...o communicate with me, presumed the dose ...teaspoonful, and not daring to repeat it, had ...t uncomfortable night. I saw the apothecary ...day, and his only excuse was, that he thought ...ld be so much more convenient for the patient ...nixed the powder with the syrup. There is ...thing as answering the letter of the prescrip...vhile sinning against its spirit. To illustrate ...example from real life, a patient whom I had ...ed to use no sugar, took my prescription for ...tic sulphuric acid, ten drops to be taken in a ...assful of cold water. The apothecary offi... remarked, as he handed the vial to the ser... "Tell Mrs. Blank she had better take a little sugar with each dose of that." Idle conversations are occasionally indulged in between the apothecary and the messenger who calls for the medicine, the subjects being the patient, the disease, and the doctor; and I only mention it to suggest that, as erroneous inferences are generally drawn, and such conversations sadly misrepresented, great discretion is necessary.

HYDRATE OF CHLORAL.

A FEW weeks ago Mr. F. Ripley of Avon, Conn., died suddenly from, as was supposed, the effects of a drug administered as hydrate of chloral. Dr. Geo. F. Lewis, of Collinsville, the attending physician, in the following brief communication presents some of the facts connected with the case: —

During the last week in January, 1871, I gave Mr. Ripley, of Avon, a prescription of which the following is an exact copy: —

Hydrate Chloral	℥iij.
Aqua	℥ss.
Syr. Tolu	℥j. Mix.

Sig. Teaspoonful on retiring; repeat in an hour if necessary.

It was filled at the drug store of F. J. Smith, of Collinsville, and was used as directed with the best results. The chloral I supposed to be of your manufacture; and here allow me to say I have thus far used chloral from your laboratory, always with the best success, and without the least unfavorable symptom in any case. The supply being exhausted, Mr. Ripley sent the prescription to New Haven, and on retiring took the usual dose, one teaspoonful, and died within thirty minutes. A post mortem examination, made by Prof. L. J. Sandford, of New Haven, showed no cause for death except slight fatty degeneration of the heart. One half the contents of the vial from which Mr. Ripley took the last dose was sent to Prof. Johnson, of the Sheffield Scientific School, New Haven, for analysis, and found to contain sugar, water, bals. tolu, and hydrate chloral. The chloral was of Liebreich's manufacture, and stronger than that of American make. From the peculiar results obtained from experiments with chloral from other sources, and from the perfectly healthy condition of Mr. Ripley at time of death (except the fatty degeneration of heart), there may be and is some doubt as to the real cause of his death, whether it was from an overdose of the chloral, or perchance from some substance which may have escaped Prof. Johnson's observation.

Remarks. — A mixture of hydrate of chloral of the character described would present some obstacles to exact analysis. Of course the sugar, water, and tolu would be readily recognized, but it is absurd to suppose that Prof. Johnson or any other person could determine whether the chloral hydrate was manufactured by Liebreich or some one else. The important point to learn is, was the chloral *pure* or *impure*? and this ought to be decided if possible. The case demands investigation, and we hope Dr. Lewis and other medical gentlemen will not rest until every means is exhausted for ascertaining the character of the agent administered.

INFLAMMABILITY OF PYROXYLINE.

IT may not be very generally known among dentists what an extremely inflammable substance pyroxyline is, and how easily a set of teeth may be destroyed by coming in contact with anything that is ignited. A short time ago an acquaintance of mine came up to the office in the evening, and I took him into the laboratory and showed him the new kind of base I was using for artificial teeth. We each sat down and smoked a cigar. Just as we had entered the hall, about to leave the office, on turning round we observed the room we had just left brilliantly illuminated, almost equal to that produced by the magnesian light. I rushed back and found my pyroxyline plate in a blaze, and being rapidly consumed. On making an examination, I discovered that when we left the room I happened to lay a lighted cigar in close proximity to the case of teeth, which set it on fire. It will require some degree of care on the part of those using this material not to allow lighted cigars, matches, or anything of that sort, to come in contact with it when out of the mouth. It might prove somewhat hazardous for an individual wearing a set of teeth made of this material to accidentally put *the wrong end* of a lighted cigar in his mouth! — *Canada Journal of Dental Science.*

Remarks. — The substance called *pyroxyline* is a transparent horny material manufactured from gun-cotton by partially dissolving it in a mixture of ether and alcohol. It is essentially *dried collodion*, and the manufacture differs from that substance in using only a sufficient quantity of the solvent to form a pasty mass, which, as it stiffens by the evaporation of the ether, is rolled or pressed out into plates. This, tinted with a pigment, and put in proper form, constitutes a new base for attaching artificial teeth. It is, indeed, very combustible, burning with an ardent, almost explosive flame, and throwing off ignited filaments and sparks. We do not think it liable to spontaneous ignition; but in using it, dentists should be very careful that flame or sparks do not come nigh it. Of its value or usefulness for the new purpose to which it is applied, we are not prepared to speak. It may be regarded as insoluble in the salivary and gastric secretions, and we think it can exert no poisonous influence upon the system.

MEDICAL MEMORANDA.

STATISTICS OF CANCER. — In an article on cancer, in the *Scientific Press*, of San Francisco, Dr. Fraser of that city says that the disease prevails to a much greater extent than most people suppose. "In England, outside the city of London, the deaths from cancer have been known to average 2,332 per year. Estimating London in the same ratio, the deaths from cancer in England alone would amount to nearly 3,000 per year. As the prevalence of the malady does not seem to be determined by local influences, it is quite reasonable to suppose that the English statistics show a fair average. Such being the case, the total number of deaths annually from cancer would amount to more than 150,000.

"The English statistics show that three fourths of the cases are among females. This difference is due to the extraordinary frequency of cancer of the breast and of the reproductive organs. The disease may make its appearance in any organ or tissue of the body, in either sex, and at any period in life, yet it occurs most frequently between the ages of 40 and 55."

INCREASE IN MORTALITY DURING THE SIEGE OF PARIS. — The usual weekly bulletin of deaths shows the number to be between 1,000 and 1,200. In the last weeks of the siege it rose to 3,000 and over. This was not due to the prevalence of any epidemic, but to the scarcity of food and fuel, which told heavily on old persons, invalids, and children. Moral causes, too, had their effect. Lung diseases were very common and mortal among those advanced in years.

POPULAR RECIPES FOR DYSPEPSIA. — Voltaire suggested as a remedy for dyspepsia the taking of no other nourishment than the yolk of eggs beaten up with the flour of potatoes and water.

Sir John Sinclair has the credit of the following

modification of the great Frenchman's recipe: — Beat an egg in a bowl, and add six table-spoonfuls of cold water, mixing the whole well together; then add two table-spoonfuls of the farina of potatoes (or potato starch), to be mixed thoroughly with the liquor in the bowl; then pour as much boiling water as will convert the whole into a jelly, and mix well. It may be taken either alone or with the addition of a little milk and pulverized white sugar, not only for breakfast, but, in cases of great stomach debility or in consumptive disorders, at the other meals. The dish is light, easily digested, extremely wholesome and nourishing. Bread or biscuit can be taken with it, as the stomach gets stronger.

History of Quinine. — In 1803, Dr. Duncan, of Edinburgh, had detected some of the active principles of cinchona bark. The great pharmaceutical discovery of quinia, however, was made in 1820, by Pelletier and Caventou, pharmaceutical chemists, of Paris. In 1823, Henry and Delondre, of the same city, announced the existence of quinidia. As the therapeutical effects of Peruvian bark had already become so well known, it could not be long before quinia must come into general use, and such was really the fact. Magendie and Chomel, of France, were active in introducing the alkaloid into practice in their own country, and Dr. Elliotson and others, in England; and from those two great medical centres its use spread rapidly over the rest of Europe and the Western world.

The Cause of Sleep. — Dr. E. Sommer considers that sleep is the result of a *deoxygenation* of the organism. The blood and the tissues possess the property of storing up the oxygen inhaled, and then supplying it in proportion to the requirements of the economy. When this store of oxygen is exhausted, or even becomes too small, it no longer suffices to sustain the vital activity of the organs, the brain, nervous system, muscles, etc., and the body falls into that particular state which we call sleep. During the continuation of this deep repose, fresh quantities of oxygen are being stored up in the blood, to act as a supply to the awakened vital powers. Rest produces, though in a less degree, the same effect as sleep in reducing the expenditure of oxygen.

Neuralgia. — A correspondent of the *Lancet* says: "A few years ago, when in China, I became acquainted with the fact of the natives, when suffering with facial neuralgia, using oil of peppermint, which they lightly applied to the seat of pain with a camel-hair pencil. Since then, in my own practice, I frequently employ this oil as a local anæsthetic, not only in neuralgia, but also in gout, with remarkably good results."

Thin Sheet Lead instead of Lint in Wounds. — Dr. Burgrease has so employed sheet lead, and states that it feels soft and cool to the wounded parts — its use entirely superseding that of lint. The formation of a very thin layer of sulphuret impedes putrefaction and the development of small organisms.

Cotton Respirators. — Dr. Jouglet, taking the hint thrown out by Prof. Tyndall, has experimented upon the use of cotton respirators, and states that by their application the disease known as miners' anæmia, and also the dangers of the effects of lead, copper, and mercury to those who have to handle these metals, or work in vapors or dust thereof, may be prevented.

"A First-rate Notice." — The *Medical Gazette* gives the following generous "puff" to one of the Smith family: —

"We are in receipt of a modest proposition that we should take two dozen bottles of 'Nature's Hair Restorative' as an equivalent for a six months' advertisement thereof, and the insertion in every issue of an editorial puff, a stereotyped assortment of which is kindly furnished. We are also urged to send a three-cent stamp for a 'Treatise on the Human Hair, which is worth $500.00 to any person.' When we state that the preparation in question is the invention of 'Dr.' (not 'Professor,' for a wonder) G. Smith; that it restores gray hair to pristine darkness, but is 'not a dye;' and that it cures headache, 'humors,' and cutaneous eruptions — we have probably said all that our readers care to hear; unless, perhaps, the members of the Dermatological Society should wish to save $499.97 in the purchase of the $500.00 treatise aforesaid, in which case we shall be happy to transmit their order."

VALUABLE FORMULÆ.

Neuralgia. — M. Bertrand, Paris, has used the following ointment with perfect success, in neuralgia, when other remedies had been tried without effect:

℞ Veratriæ	. . . . . .	grs. v.	
Morph. Sulph.	. . . . . .	grs. iij.	
Adipis	. . . .	℥ i.	M.

Sig. Rub painful parts with the ointment frequently, when the paroxysms of pain are at their height, and as often as they require. Two or three frictions suffice, in a majority of cases.

Local Paralysis. — Dr. Brown-Séquard uses the following formula in local paralysis: —

℞ Strychniæ Sulph.	. . . . .	grs. ij.	
Chloroform	. . . .	℥i.	M.

Apply half, night and morning, by brisk friction to the part.

Substitute for Dover's Powder. — Dr. Chapin (*Medical and Surgical Reporter*) has not used Dover's powder for twenty years, much preferring his substitute as more palatable and effective; which is as follows: —

℞ Opii. pulv.	. . . .	ʒ i.
Ipecac, pulv.	. . . . . .	ʒ ss.
Camph. pulv.	. . . .	ʒ ij.
Saccharum	. . . .	ʒ iv.

Mix thoroughly. This contains one grain of opium in eight grains of the powder. He frequently uses morphia, in due proportion, instead; or omits the opium altogether when contra-indicated.

Treatment for Tape Worm. — Dr. Wm. M. Turner remarks that the following plan for expelling either the tænia lata or tænia solium never fails. First, at bed-time give the following cathartic: —

℞ Pulv. Potass. et Rhei. aa	. . .	grs. x.	
Hydr. Chlo. Mit.	. . . . .	grs. ii.	M.
Chart.	. . . .	No. 1.	

The next morning, after a *decided catharsis*, and on an empty stomach, give —

℞ Kooso, pulv.	. . . . . .	ʒ iv.	
Aquæ	. . . .	f. ʒ ix.	M.

Sig. Take in a quarter of an hour's time, in three doses. The action is speedy, and the danger none.

Turpentine in Infantile Convulsions. — When convulsions continue in colicky children, and are not relieved by the warm bath, injections of warm water, brandy, or chloric ether, with an alkali, Dr. Graves recommends turpentine to be given: ℞. Ol. terebenthi, ʒj.; ol. ricini, ʒiv.; mist. acaciæ, aq. cinnamoni, *aa.* ʒiij. M. ʒj. tertiâ quâque horâ. This acts on the bowels, and produces a copious discharge of urine.

Compound Beeswax Pills. — The *Druggists' Circular* gives the following formula for these pills, which are recommended for improving the voice of public speakers: —

℞ Yellow beeswax	. . . . .	2 drachms.
Balsam copaiva	. . . .	2 "
Fuse, and add liquorice root (powdered)		4 "

Mix, and make 240 pills; two to be taken three times every other day.

EXPLOSIVE PRESCRIPTIONS.

Whether a physician is ever justified in "blowing up" a druggist may possibly be an open question, but he certainly ought not to do it by means of a prescription. An English pharmacist received the following: R. Argenti ox. gr. iss.; ext. nuc. vom. gr. 1-6; morph. mur. gr. 1-32; and the pills prepar by the formula, with confection of roses, soon aft wards exploded with evolution of considerable he Permanganate of potash will sometimes act similarl An analogous case lately occurred at Nottingha England, and excited some interest at the time. T following prescription was made up: R. Arg. ox. g xlviii.; morph. mur. gr. i.; ext. gent. q. s. M. Ft. p xxiv. The lady who received the pills, which we silvered, put the pill-box into her bosom. In thr quarters of an hour a severe explosion took plac her clothes were burnt, her right breast severe scorched, and smoke issued freely from beneath h dress. A troublesome burn on the breast remain for treatment. It has long been known that pil made of oxide of silver and creosote (or carbol acid) are liable to become very hot, or even to i flame, and a dispenser has been astonished by seein the lid of a box which contained such pills sudden blown off, and the pills sent rolling over the counte

The following prescription gave rise to a viole explosion on being made up by trituration in a roug Wedgwood mortar: R. Pot. chlor. oz. iss.; ac. ta nici, ʒ iss.: olei gaultheriæ, gtt. xx. M. Again mixture of chlorate of potassa and catechu, pr scribed as a dentrifice, occasioned a violent expl sion in the mortar in which it was rubbed. Erhard explosive powder for shells is composed of equ proportions of tannin and chlorate of potass Lastly, a "pharmacien" received the following pr scription to dispense, namely: Pot. chlor., 8; hyp phosph. of sodium, 4; syrup, 62; water, 125 part In order to expedite matters, he vigorously triturate the salts in a mortar, and the result naturally wa that he received some wounds on the body, whil the pestle was thrown to a distance. The two salt should, of course, have been dissolved separatel These and similar reactions depend on the facili with which oxide of silver and chlorate of potass part with their oxygen to organic matter, and th consequent elevation of temperature due to the rapid decomposition of the salt.

GOOD ADVICE TO DYSPEPTICS.

If a man wishes to get rid of dyspepsia, he mus give his stomach and brain less to do. It will be o no service to him to follow any particular regime — to live on chaff bread or any such stuff — t weigh his food, etc., so long as the brain is in a con stant state of excitement. Let that have prope rest, and the stomach will perform its functions. Bu if he pass fourteen or fifteen hours a day in his offic or counting-room, and take no exercise, his stomac will inevitably become paralyzed, and if he put nothing into it but a cracker a day, it will not di gest it. In many cases it is the brain that is th primary cause. Give that delicate organ some rest Leave your business behind you when you go t your home. Do not sit down to your dinner wit your brows knit, and your mind absorbed in casting up interest accounts. Never abridge the usua hours of sleep. Take more or less exercise in th open air every day. Allow yourself some innocent recreation. Eat moderately, slowly, and of just what you please — provided it be not the shovel and tongs. If any particular dish disagrees with you, however, never touch it or look at it. Do not imagine that you must live on rye bread nor oatmeal porridge: a reasonable quantity of nutritious food is essential to the mind as well as the body. Above all, banish all thoughts of the subject. If you have any treatises on dyspepsia, domestic medicine, etc., put them directly into the fire. If you are constantly talking and thinking about dyspepsia, you will surely have it. Endeavor to forget that you have a stomach. Keep a clear conscience; live temperately, regularly, cleanly; be industrious too, but be temperate.

Boston Journal of Chemistry.

'olume V. BOSTON, MAY 1871. Number 11.

Familiar Science.

DIAMONDS AND DIAMOND CUTTING.

A NICE little packet, which could be carried in ne compartment of an ordinary wallet, has been pened in our presence, and the contents sub-itted to inspection. All that met the eye was collection of shining pebbles, about fifty in umber, and yet it would require at least twenty ounds of solid gold to purchase the group of ttle crystals. They are diamonds in the ugh, from the newly discovered African dia-ond mines, and thus are objects of curiosity. ' they were brought to the surface in digging our garden, we should suppose them to be agments of glass or perhaps crystallized quartz, id after a brief examination should probably row them back to the dust again. It requires i experienced eye to distinguish an uncut dia-ond from some of the common crystals found on e sides and in the beds of streams flowing from ir hills and mountains, and therefore it is not rprising that the gems remain unrecognized fields which have been many times explored 'y travellers.

The diamonds here spoken of were imported 'y Messrs. Crosby, Morse, & Foss, jewelers, of is city, and in a few weeks or months they will ive been *cut* and placed in their elegant cases, ady to excite the interest and admiration of irchasers. There is no city or town in the nited States where the difficult and interesting ocess of diamond cutting is carried on but in oston, and no other parties but the house med have ever attempted to improve imper-t diamonds, or cut the gems as they come m their native beds.

In company with Mr. Henry D. Morse, the iginator of this peculiar manufacture, we re-ntly visited the factory where the work is ne, and the hour spent in inspecting the pro-ss was full of interest. Diamond cutting has en for years monopolized by Holland, and in e city of Amsterdam some *two thousand men* e constantly employed in the industry. With e long experience, however, of these workmen, me of the finest stones are very unskillfully t, and those brought to this country have been iced in the hands of Mr. Morse to be recut d perfected.

The machinery employed in Holland for pol-ing is ponderous and heavy, the framework lding the wheels being braced and wedged, e the running gear of a country saw-mill. In e establishment in this city a small iron-top ble is used, with solid iron supports and double rings, so that the polishing wheel, being fixed the centre, revolves horizontally on a level h the surface of the table. By this ingenious vice, the work of Mr. Morse, perfect steadiness secured, and without the clumsy machinery of e Dutch manipulators a greater degree of ac-racy is obtained.

To cut a diamond is to form its surfaces so that light in passing through is refracted in a way to produce a maximum of brilliancy. The rough gems are quite dull or lustreless, and it requires consummate skill in cutting and polish-ing to secure the accuracy of angular proportion in the faces necessary to perfect results. There must be principal planes or faces, and around them a considerable number of smaller ones, all placed at correct angles, so that, by refraction, a blaze of light, every ray in harmony, may be the result. The skill of the operator is shown in his ability to bring out the *whole power* of a stone.

The diamond is the hardest of known sub-stances, and hence the inquiry will naturally arise, "How is it possible to produce mechanical effects upon a substance so refractory?" "Dia-mond cut diamond" is an old adage, and it has a practical illustration in the factory. The dust of the gem is employed to wear away the surface of those undergoing the process of polishing, and this is obtained by grinding worthless parti-cles in a steel mortar, and also the minute frag-ments obtained in the progress of the work are saved for the purpose. But these two sources of supply do not afford sufficient material to meet the wants of the industry, and consequently a substance found in association with diamonds, and possessing equal hardness, is to a large extent employed. This pebble, which has no value as a light refractor, is pure carbon, like the diamond, but it is not perfectly crystalline. It is semi-amorphorus in structure; and if it was not used for its mechanical value, it would be as worthless as a bit of charcoal. It is now worth in the market about six dollars a pennyweight.

When two diamonds are rubbed together they are mutually abraded, or worn away, and hence if we have a valuable one which we wish to cut, to develop its brilliancy, we have only to select another which by its shape is worthless, and bring this to bear mechanically upon the other, and the work goes on. The worth-less diamond may be called the tool with which the cutter elaborates the valued gem. Each is placed in cement, conically heaped at one end of two sticks of convenient handling size. The cutter is so placed in soft cement that its cutting angle can be employed to the best advantage upon the clear stone, which is similarly adjusted to present the surface to be abraded. After the cement has hardened, the workman grasps the stick, holding the cutting diamond in his right hand and that with the gem in his left, and the stones are brought together over a double metal-lic box, the inner section of which is provided with a perforated bottom, being half the depth of the outer, into which it closely fits. The parti-cles which become detached from both stones fall into the inner box, the smaller passing through the orifice, to the bottom, being fine enough to perform their functions on the polishing wheel. The coarser grains are afterwards, as we have stated, powdered in a steel mortar. Diamond cutting is slow and tedious work, and requires the utmost care and skill to accomplish the pro-cess successfully. In the Boston factory, the labor is done under the eye or immediate super-vision of Mr. Morse, who originated the industry, and who devised and constructed the machinery.

The diamond has a grain or cleavage plane, the same as most mineral or crystalline sub-stances, and hence it is possible to split or divide one into two or more parts. Sometimes a large piece is removed at once from a gem by splitting, but it is a process attended with much risk. To accomplish this after the stone is carefully stud-ied and its line of cleavage ascertained, it is placed in hardened cement, in the proper posi-tion, and the sharp edge of a steel chisel resem-bling a razor is carefully adjusted so that the division will be at the points desired, and a smart rap with a hammer is given it. Perhaps no more costly blow may be struck in any mechanical work than this, for in manipulating a large diamond, if it is unskillfully given, a gem of several thousand dollars' value may be spoiled.

After a diamond is cut, the work of polishing commences, and it is in this department that the American machinery is seen to be superior to the Dutch. This we have already described. The gem is adjusted in soft lead heaped coni-cally in a copper cup, ten times the capacity of those used upon the cement sticks in cutting. The surface of the wheel is charged with dia-mond dust mixed with oil to the consistency of thin paste. The stone and wheel thus arranged, the latter is made to revolve at the rate of fifteen hundred revolutions a minute, and the stone, placed in a heavy iron clamp, is inverted upon the wheel. Nothing but the diamond touches the wheel, it being pressed down by the weight of the iron clamp. A rather musical tone is produced by the contact, which shows that the wheel is doing its work, and that now a bright surface will be produced upon the "table" ex-posed to its action. When this is satisfactory, the operator melts the lead, releases the gem, and readjusts it so as to polish another of the faces, and in this way the process goes on until the work is completed. To attain this, however, the tables and facets are many times exposed to the wheel, and it is not until the most careful measurements and experiments are made that the gem is pronounced satisfactory. Mr. Morse has been intrusted with the manipulation of some of the most costly diamonds ever brought to this country, and in no instance have his labors re-sulted in loss or failure, a circumstance which reflects much credit upon his ingenuity and skill.

The importation of African diamonds has but just commenced, but doubtless large quantities from the new mines will flow towards this country, as we are large purchasers of the "brilliants." The market in the United States

will not put up with anything but the best. We do not purchase the largest, but the choicest, which are produced in all parts of the world. Stones of from one to five carats are always in good demand here; above that, purchasers are scarce. A seven or ten carat diamond is worth from $6,000 to $10,000, and the number of those who are willing to invest that sum in a single stone is limited. Sporting men, who keep gambling saloons, and drive fast horses, wear the largest and most costly gems; and when we notice an unusually large and brilliant one upon the person of a stranger, we instinctively regard him as belonging to the sporting fraternity.

In what is known as the "shoddy" era, during the war, when petroleum and war contracts elevated men suddenly from poverty to great affluence, large diamonds were in demand, and there were not enough of these in the country to meet it. The price of diamonds of one carat ranges from $165 to $175, but there are some "unexceptionable" ones in the market which command a higher price. Most of those who visit jewelers' stores for the purpose of purchasing diamonds, have no knowledge of the nature of the gems they seek. They do not know that a diamond, like a horse or an oil painting, is sold for its excellence or beauty. If a diamond is "off color," or even has slight flaws, they do not detect the faults. If diamonds are sought, it is important that they should be purchased of honest parties, and those who by experience are fully acquainted with their character and value.

It is certainly singular, that with the immensely increased production the gems continue to increase in price from year to year. The recent convulsions in Europe and our late civil war, in which thousands of diamond owners were reduced to penury, did not result as one would suppose, in throwing upon the market large quantities of diamonds. It is probable a few changed hands, but not enough to influence the price in the slightest degree. Large numbers of the diamonds which have been dug from the earth in the last two thousand years have been hoarded, and are not often brought to the light. They are left to dazzle unseen, in caskets and steel safes, where they are almost forgotten. A diamond worth £30,000, or $150,000, has recently been found in the African mines, and several others of a size and brilliancy which render them nearly as valuable are reported. It is highly probable that diamonds in considerable quantities will be found in the United States at no distant day. In the mountains of South Carolina and Georgia where gold exists, there are geological strata which present striking analogies to those of Brazil, Africa, and Australia where diamonds are found in abundance. A few have already been picked up in those localities, and also in California.

ANTIMONY AND ITS COMPOUNDS.

THERE are not a few metals the compounds of which are in common use, though we rarely see them in their elementary state, and know little about them unless we have studied books of chemistry. Antimony is such a metal, familiar and valuable in its practical uses, and yet quite unknown to most people in its uncombined form. The metallic antimony is an important article of commerce, but how many of our readers can describe it, or would recognize a specimen of it?

The chemical name of antimony is *stibium* (whence the symbol *Sb*, used in chemical formulæ), and *stibium* was the Latin name of a compound of the metal — the sulphide, undoubtedly — which was known to the ancients. The metal itself was not known to them, though we have seen statements to the contrary in some school text-book of chemistry. It was not until the middle of the fifteenth century that antimony was obtained in a metallic state, by Basil Valentine, a German monk and alchemist, but a diligent and enthusiastic student of natural science. There is a story that while experimenting with the new metal and its compounds, he happened to throw some of it into the hog-trough, and found that after purging the swine violently it seemed to improve their condition and to fatten them. This led him to try its effects upon some of his brother monks, but unluckily the dose proved fatal. The reader has probably heard of the quack, one of whose patients, a Frenchman, took a fancy to molasses and salt herring, and on eating them recovered from his fever; hence he ordered the same diet for his next patient, who happened to be a Dutchman, but with a very different result. The man died; and the quack made a note in his memorandum book to this effect: "Molasses and salt herring are good for a Frenchman in fever, but death to a Dutchman." In like manner, our worthy Basil Valentine concluded that his metal was good for hogs, but death to monks, and therefore named it *antimony*, or monk's-bane, from *anti*, against, and *monachus* (French *moine*), a monk. But the story was probably suggested by the name, and not the name by the circumstance given in the story, and it is therefore rejected by the best etymologists. Another derivation of *antimony* makes it from *anti* and *monos* (alone), because the metal is rarely found alone, or uncombined. But, on the whole, it is more likely that the word is nothing but a corruption of *al-ithmidun*, or *al-uthmudun*, the Arabic name for the metal.

Antimony is a brittle metal, of a bluish-white color, with a brilliant lustre. It is highly crystalline in its structure, and really beautiful to the eye; so that when we first see a specimen of it we cannot help feeling disappointed that it is practically useless in its pure state. It melts at about 830° F., and when heated to full redness takes fire and burns brilliantly, producing white fumes of teroxide. It is a pretty experiment to melt a bit of it on a piece of charcoal with a blowpipe, and then to throw the glowing globule down upon a board or a large sheet of brown paper: it bursts into myriad little beads, which roll in all directions, each leaving a line of white oxide, like the trail of a meteor, to mark its path.

Some of the alloys of antimony are of great practical value, especially the one by whose aid we are enabled to give you this account of the substance. *Type-metal* is an alloy of lead and antimony, in the proportion of about one part of the latter to four of the former. This combination is so admirably adapted to the purpose, that it is hardly probable that it will ever be superseded or materially modified. Antimony enters also into most of the common white metallic alloys used for cheap teapots, spoons, forks, and the like. The best pewter contains it, and so does *Britannia metal* in all its varieties. The office it serves in these compounds is to give hardness to the lead and tin (which are usually the chief ingredients, though bismuth, copper, and other metals a often added in smaller quantities) without re dering them too brittle.

In medicine, antimony has been employ more or less from the day when Basil Valenti is said to have given his fellow monks too "h roic" a dose of it. *Tartar emetic* is a tartrate antimony and potash, or what is called a "doub salt." It has had a somewhat varied fortune an item in the materia medica. In France for time it was illegal to use it internally, and least one physician lost his diploma for admi istering it; but it was subsequently (in 1637, believe) authorized to be used again. At th present day, many of our best physicians do n hold it in very high favor, but others contin to employ it freely, and it will doubtless be use to "serve an ejectment" upon the human stom ach for many a generation yet.

The tersulphide of antimony (or *antimonio sulphide*, according to the new nomenclature) used in pyrotechny as an ingredient in vario colored fires. The *blue* or *Bengal light*, for e ample, is made by mixing finely pulverized sal petre (6 parts), sulphur (2 parts), and antimon ous sulphide (1 part).

A detonating powder can be made by heatin strongly for several hours a mixture of 100 par of tartar emetic and 3 parts of lamp-black. Th crucible should be left to cool under a bell-glas The powder will explode on being moistene with a drop of water, and great care is necessar to prevent its exploding spontaneously.

THE LAST OF THE ALCHEMISTS.

IN the latter part of the last century, Jame Price was a distinguished amateur chemist i England, and a Fellow of the Royal Society He had a private laboratory at his residence i Guildford, where he devoted much of his time t alchemy, which still found an occasional devote even among scientific men. In 1782, Mr. Pric imagined that he had discovered a powder tha would transmute mercury and other of the base metals into gold and silver. He appears t have hesitated about giving the results of his ex periments to the public, but the chemists soon got wind of the matter through some of hi intimate friends whom he had made his confi dants. This led to a lively discussion of hi pretensions in scientific circles, and many wer disposed to accuse him of deliberate imposture To prove that he was no charlatan, Price offered to repeat his experiments in presence of a selec company of men, competent to pass judgmen upon them and above the suspicion of being i collusion with him, and arrangements were made for the ordeal. The experiments, seven in number, began at Guildford on the 6th of May, 1782, and were completed on the 25th. In all of them gold and silver were apparently obtained from mercury, and this transmutation was attested by the peers, clergymen, lawyers, and chemists who had watched the process. Some of the gold was presented to the King (George III.), who graciously consented to accept the marvelous gift. The University of Oxford hastened to do honor to the successful alchemist by conferring upon him the degree of M. D.; and a book in which he published an account of his experiments ran through two editions in a few months.

If all this were not matter of sober history, we could hardly believe that it occurred less

:han ninety years ago; but it must be borne in nind that alchemy, after its many centuries of enown as an occult science, was dying a lingering leath, and chemistry, the infant daughter of the venerable juggler, was still in its cradle. But hough the king had recognized Price as a public benefactor, and Oxford had honored him as a scientific discoverer, there were men wise enough to ee that he must be either a deceiver or selfleceived. His position and standing were decidedly against the former view. He was no needy and nameless adventurer, like most of the professed alchemists of that day, but a man of wealth and good family, who had devoted himself to chemistry out of pure love of science, and whose private character was above reproach. The case was a peculiar and perplexing one, and even now it remains somewhat of a mystery. At the time, it became the subject of controversy so earnest and bitter, that at length the Royal Society felt obliged to call upon Price to repeat his experiments in their presence, and thus prove to the satisfaction of his brother fellows the truth of his pretensions. Up to this time, we may doubt whether he was honest or not, but now it s quite evident that if he had deceived himself, he delusion is at an end, but he hopes to evade he mortification of acknowledging it. He declines to repeat his experiments, on the ground that the preparation of the mysterious powder is difficult and dangerous to health. He has found also, he says, that this method of making the precious metals, though interesting for its scientific bearings, cannot become practically useful, as he amount obtained will not cover the cost of production. In one case, as he states, it cost him about seventeen pounds sterling to prepare gold to the value of four pounds. He urged, moreover, that the experiments had already been performed before honorable and competent witnesses, and nothing could be gained by repeating hem; "for, as the spectators of a fact must always be less numerous than those who hear it related, so the majority must at last believe, if hey believe at all, on the credit of attestation." He claimed further that his character and his scientific reputation ought to be a sufficient assurance o his friends that he had not deceived them. The Royal Society nevertheless insisted that his own honor and theirs required that the experiments should be repeated, and he finally left London for Guildford in January, 1783, promising to return in a month fully prepared for the trial.

At Guildford Price shut himself up in his laboratory, distilled a quantity of laurel-water, the quickest and deadliest poison then known, and made his will. He then went to work to prepare the powder of transmutation. Six months passed away, and even his best friends began to think that he had deceived them, when he suddenly appeared in London and formally invited he Royal Society to meet him at his laboratory Guildford, on the 3d of August. A year earlier the *élite* of England had assembled to witness his wonderful alchemy, but on this occasion only three members of the Royal Society came o Guildford in response to his invitation. After receiving them with a cordial welcome, Price stepped aside for a moment, and hastily drank a flask of laurel-water. His visitors, observing a sudden change in his appearance, though they did not then suspect the cause, sent in haste for medical assistance; but in a few minutes the unfortunate man was dead.

As we have intimated, there are many who believe that the experiments of Price were an imposture from the outset; but it seems to us more probable that he was at first the victim of some unaccountable delusion, and that he had recourse to deception afterwards, simply because he had not the moral courage to confess his error after having published it to the world as a great discovery. This explanation of his conduct is not without its difficulties, but the same may be said of every view that can be taken of it, and on the whole this is the most plausible solution of the enigma.

"Thus it was," to quote the words of another, "that alchemy, among scientific men at least, in England, came to an end with the last act of a tragedy." In Germany, on the other hand, its final appearance on the stage was rather as a comedy; but that tale we must postpone to another day.

NATURAL HISTORY NOTES.

Concerning Snakes. — It is a popular error that a snake cannot kill a snake. Dr. Fayrer, in India, has been making some experiments to settle the question. He took a young and lively cobra, and allowed it to be bitten in the muscular part of the body by a krait. In ten minutes the cobra was sluggish, and in thirty-two minutes after the bite it died. The same Dr. Fayrer has found that the water-snakes of India are deadly poisonous. It was recently proposed to erect a sea-bathing establishment in the Bay of Bengal at a place where it was certain there were no sharks, but it was found that the locality swarmed with these water-snakes, which would have been quite as bad as the sharks.

At Madras the Commissioner of Police has forbidden the dancing girls to dance in the Hindu temples with cobras twined round their necks, one of the girls having died from the bite of such an animated necklace. This will be a great disappointment to the pious votary, but it is suggested that it will tend to lessen the reverence for the cobra, and thus render his extermination more probable.

The Lower Animals and their Lord. — Man may be the lord of creation, but he has some very rebellious subjects in his domain, and they give him a good deal of trouble. We read in an English paper that Major Daires, in India, has been lucky enough to shoot a tigress which in seven years had killed 140 persons in a few villages. The beast had become such a terror to the vicinage that many families had left, and a great part of the land had ceased to be cultivated.

But the insects are the most unmanageable of all the creatures not yet fully subdued by their appointed master. There is no part of the world where he is not more or less at their mercy; but in tropical regions they sometimes fairly put him to flight and reign in his stead. The United States Consul at St. Helena, in a recent communication to the State Department, reports that the white ants which have invaded the island are fast destroying everything upon it. No wood but teak, and sometimes not even that, can stand against them. Many houses in Jamestown have been fairly gutted by them; doors, windows, floors, and roofs all being eaten up, leaving nothing but the bare walls.

We forget what naturalist it was that suggested, years ago, that if man wants to get rid of insects, he must set to and *eat* them, as some savages *do* in the case of certain species of ants, worms, and spiders. But it is doubtful whether he could keep their numbers within reasonable limits in that way. The great difficulty is that we know less about them than about any other branch of the animal creation, and therefore we fight with them at a great disadvantage.

A White Elephant Captured. — This is important state news in Siam, where the chief white elephant ranks next to the queen and above the heir apparent to the throne. The papers there report that a new white elephant has just been captured, and that he has been conducted with due pomp and ceremony to the capital, where he will receive the honors and dignities to which his color entitles him.

EXPERIMENTS FOR THE SCHOOL-ROOM.

A German scientific journal gives the following experiments for the use of the teacher or lecturer: —

Combustion of Oxygen with a Sooty Flame. — Into a long-necked flask pour some benzole or oil of turpentine. Close the flask with a cork, through which two short glass tubes are passed, one of which should be of about one centimeter internal diameter, the other narrower and somewhat bent sidewards. Let the liquid in the flask be boiled, and, as soon as the vapors issue from the wider tube, ignite them; and, this having been done, pass through that tube another narrower glass tube connected with a suitable gas-holder, or other vessel, containing oxygen. This tube should be provided with a platinum burner bent upwards and fitted with a cork, which closes the opening of the wider tube. This oxygen-carrying tube is made to pass deep into the flask; and immediately after the closing of the wider tube, the oxygen begins to burn with a sooty flame, while the excess of the vapors of the boiling liquid are discharged by the narrower glass tube first mentioned.

Oxidation and Reduction, and the Resultant Change of Weight. — Take oxide of copper; make it, by means of weak gum-water, into a paste, and shape that into a cylindrical form one centimeter in diameter by three centimeters in height; dry it; ignite it gently; next reduce it by means of hydrogen to the metallic state at as low a temperature as possible; cool it in the current of the hydrogen gas; and, next, wind round the cylinder a platinum wire, the free end of which should be molten into a glass rod, so as to be used as a handle. This having been done, have ready two tubulated bell-jars — one turned with its wide opening downwards, to hold hydrogen gas, to be carried into it by a flexible tube through the tubulature; the other jar, with its wide opening turned upwards to hold oxygen. Now heat the copper cylinder (which, although very porous and spongy, has sufficient cohesion for the experiment) gently, taking care not to make it red-hot, and immerse it in the oxygen, whereupon it will become suddenly red-hot, and continue so until the oxidation is finished. After having sufficiently cooled, the cylinder is transferred to the jar containing hydrogen, when again it begins to ignite, throwing off a strong light, while water condenses on the sides of the jar. Since the change of weight, by the alternate process of oxidation and deoxidation, of a cylinder of the above dimensions is nearly one gramme, it may be exhibited in a lecture room by an ordinarily good balance.

Another Experiment to Illustrate Reduction and Oxidation. — A well-polished small copper bell is placed in a ring on a triangle, and then heated by causing a strong gas flame to play upon it, so as to render the metal red-hot, and, consequently, very soon black. As soon as this is the case, a strong current of hydrogen gas is directed upon the metal, by means of a flexible tube fastened to the neck of a glass funnel large enough to cover the bell. As soon as the hydrogen comes into contact with the red-hot metal, the layer of black oxide of copper is removed, and the metal appears as before it was heated. By

removing the current of hydrogen, the oxygen of the air again acts upon the hot metal; and thus the alternate oxidation and reduction may be continued, provided the metal was made thoroughly red-hot to begin with. The hydrogen should be pure, and free even from traces of sulphur or arsenic, in order that the experiment be successful.

HOUSEHOLD RECIPES.

To Take Bruises out of Furniture. — Wet the part with warm water; double a piece of brown paper five or six times, soak it in the warm water, and lay it on the place; apply on that a warm, but not hot flat-iron till the moisture is evaporated. If the bruise be not gone, repeat the process. After two or three applications, the dent or bruise will be raised to the surface. If the bruise be small, merely soak it with warm water, and hold a red-hot iron near the surface, keeping the surface continually wet — the bruise will soon disappear.

Spots on Mahogany. — Stains and spots may be taken out of mahogany with a little aquafortis or oxalic acid and water, rubbing the part by means of cork, till the color is restored, observing afterwards to wash the wood well with water, and to dry and polish as usual.

To Polish Marble, etc. — Marble of any kind, alabaster, any hard stone, or glass may be repolished by rubbing it with a linen cloth dressed with oxide of tin (sold under the name of putty powder). For this purpose a couple or more folds of linen should be fastened tight over a piece of wood, mat or otherwise, according to the form of the stone. To repolish a mantel-piece it should be first perfectly cleaned. This is best done by making a paste of lime, soda, and water, well wetting the marble, and applying the paste. Then let it remain a day or so, keeping it moist during the interval. When this paste has been removed the polishing may begin. The linen and putty powder must be kept constantly wet. Glass, such as jewelers' show-counter cases, which becomes scratched, may be polished in the same way.

To Cook Birds for Convalescents. — Lay them upon the gridiron; broil until they have a light brown color; then put them in a stewpan; pour over hot water enough to cover them. Let them stew until tender. Season with a little fresh butter, pepper, and salt. Chicken, birds, and squirrels, stewed in a double kettle, are very delicate for invalids. If permitted, stuff the fowls and birds with minced oysters.

How to Cook Beets. — Beets should be carefully washed, but not cut before boiling, as cutting them allows the juice to escape, leaving them white and hard. In summer boil them an hour in salted water, and in winter boil them four hours. After boiling, scrape off their skins, and cut off the threads hanging from them.

How to Broil without Burning. — In broiling a beef-steak, whenever the coals blaze up from the drippings, a pinch of fine salt thrown upon them will instantly extinguish the flames. By carefully attending to this matter, you may have your broiled steak or chicken crisp, but not scorched, and juicy, yet well done.

Iron Obtained by Electrolysis. — Professor Jacobi, of St. Petersburg, has ascertained that the iron obtained by electrolysis is not, as has been often thought, the pure metal, but, on the contrary, a compound or mixture of iron and hydrogen, which, when heated to redness, gives off an enormous amount of that gas, and becomes, while greatly increasing in bulk, a silver white, very soft, ductile, and malleable metal, which decomposes water readily below its boiling point, and oxidizes most rapidly.

The Arts.

A NUISANCE MADE USEFUL.

"Commercial nothings" is a term we once saw applied to waste products that cannot be utilized. They are worse than worthless, for in many cases they are produced in enormous quantities, and it costs a good deal to get them out of the way. If they are offensive in their nature, an additional expense may be necessary for deodorizing or disinfecting them. "Gas lime," or lime spoiled in the purification of coal gas, has long been a notable instance of such a product, and it is said that nothing but the expense and trouble of its removal drove the London gas companies to the use of ferric hydrates in its stead. But now this nasty residuum is employed in England in the manufacture of what is known as the "Prideaux cement." This bids fair to become a very important industry. In Sheffield upwards of 700 tons of gas lime have been worked up. The larger part has been applied to walls and floors, hearths and mantel-pieces. Of the latter about 200 have been moulded and sent out. In four of the busiest parts of the town, causeways have been paved by laying the cement with a certain proportion of broken slags from the neighboring furnaces. These have stood the heavy rains very well, and are likely to come into close competition with the asphalte usually employed. The cement is also an excellent material for floors and roofs. Old boarded floors of warehouses have been covered with it about an inch thick; and even in workshops, where polishing machinery keeps everything in vibration, it stands intact. For the roof of a shed the cement was laid on a light frame of wood and troweled to a smooth face, and in the space of twelve hours it was hard enough to bear standing upon.

With regard to the composition of this new cement, the London *Builder* says: —

"It is not a Portland or a Roman cement, although some hydraulic characters are very distinct. It does not set so quickly, but allows more time for finishing up the faces of moulded work. It is far from common mortar; for without any sand it can be formed into blocks which set hard throughout. A piece of a mantel-piece which had been made some six months, gave the following results upon analysis:

Carbonate of lime	69.08
Sulphate of lime (hydrated)	22.63
Hydrate of lime	1.36
Sulphide of calcium	*trace*
Insoluble matter	6.50
Alumina and oxide of iron	.45

"It is obvious, from the above, that the setting must at first be due to the combination of water with the dehydrated sulphate of lime, or, in other words, the plaster of Paris formed by the calcination of the cement. The quantity of caustic lime which is present in the cement keeps the plaster of Paris always fresh, that is, dehydrated, until mixed with excess of water employed at the moment of using it. This will account for the fact that the cement does not lose its quality by keeping, as the hydraulic cements do. After the plaster of Paris is set, the caustic lime goes on absorbing carbonic acid, and thus indurating the mass in the ordinary manner of lime mortars."

Strength of New Zealand Flax. — The strongest vegetable fibre known is the New Zealand flax. It has long, sword-like leaves, ten or twelve feet in length. It is used by the settlers for binding sheaves, fastening gates, and tying up horses.

MEMORANDA IN THE ARTS.

A Starch Factory. — The magnitude of th starch manufacture may be inferred from the exte of a single establishment. The "Oswego Star Works," located at Oswego, N. Y., cover about t acres, and consume 750,000 bushels of corn year in making 8,250 tons of starch, or 16,500,0 pounds, equal to 26 1-2 tons per day. To pack th amount of starch, 250,000 pounds of wrapping-pap are required, and four million feet of lumber f boxes. Over 500 operatives are employed in the e tablishment. The dimensions of the factory buildin are about 615 feet front, partly seven stories hig with 521,000 square feet of flooring, or more th sufficient to cover twelve acres. The factory h about six hundred cisterns or vats, capable of holdi 2,200,000 gallons of water for cleansing the starc from all impurities. There are forty-one forc pumps, capable of raising 523,000 gallons of wat per hour. The length of gutters for distributi the starch is more than three miles. For grindi the corn there are twenty pair of burr-stones, ar six pair of large, heavy iron rollers. There a over three miles of shafting, over twenty miles steam pipes for drying, and twelve turbine wate wheels of 50 horse-power each.

New Signal-light for Railway Trains. — A signal-light, to be attached to the rear car of train, invented by two officers of the Little Mian Railroad, has lately been tested on that road. I the centre of the roof of the rear car of the trai over the rear axle, is placed a square lantern, wit alternate panes of red and white glass. The la tern is connected, by means of a shaft, with one o the axles in such a manner that eight revolution of the axle produce one of the lantern. When th car stops, the lantern, of course, ceases to revolve Upon each side of this main lantern are two others also connected with the axle in such a way tha when the train is moving forward a solid red light is displayed, and, if backing, a solid green light. The engineer of a train coming up in the rear can thus tell, by observing these lights, whether the train before him is moving or at a standstill, and, i moving, in which direction.

Artificial Stone in California. — The *Sci entific Press* describes a visit to the Pacific Stone Company's works, where they are now turning ou daily two tons of stone made by Mr. Ransome's process, and under his own supervision. He has engaged to spend several years in San Fransisco in order to superintend the business. The new church for Rev. Dr. A. L. Stone's society is to be built of stone furnished by this company. A great variety of ornamental work, vases, baptismal fonts, tombstones, etc., are made, and any desired shade of color is given to the material. The stone withstands the effects of heat and cold, moisture and dryness, and other climatic influences. It is a perfect imitation of natural sandstone, and is, in fact, a stone, not plaster, nor concrete. It can be shaped after any design, however intricate, at a comparatively low cost; and the more complicated the design, the less the expense compared with that of natural rock.

The Wear of Wood-cuts. — There seems to be hardly any limit to the number of impressions a wood-cut will yield. The elasticity of wood gives it a great advantage over metal in press printing. Many thousands of impressions may be taken by a moderately careful printer without injuring a wood-cut. To show with what impunity a bad printer may use a coarse wood-cut, may be mentioned the fact that the ballad printers of the middle of the last century occasionally used cuts that had been engraved in the reign of Charles I., and had headed popular ballads for more than a hundred years.

Anaconda Skin Leather. — Prescott tells us that the Aztecs made their war-drums of serpent

skin, but we were not aware until very recently that any of our modern leather had such a snaky origin. An exchange states that a single establishment in Boston, last year, tanned fifty anaconda skins for boot leather. The boots are valued at $50 a pair. The largest of these skins was forty feet in length. The tanning processes were similar to those in the manufacture of alligator leather, the product being a very beautiful and highly finished quality of leather, glossy, mottled, pliable, and exceedingly durable.

CONSUMING SMOKE. — According to the *Iron Age*, a number of experiments made in Ohio show that nothing is so simple and effective in preventing the escape of smoke as the introduction of sufficient oxygen into the furnace to effect complete combustion of the fuel.

COPPER MINING IN CORNWALL. — This business, which has been steadily declining — in 1860, the product was 145,359 tons, but in 1869 it had fallen to 71,790 tons — is now suffering from a new form of competition. Iron pyrites is now imported in enormous quantities from Spain and Norway, for the manufacture of sulphuric acid on the Tyne and in Lancashire. After the extraction of the sulphur from the Spanish ores, the residue is operated on for the 2 per cent. of copper which it contains; and in 1869 no less than 4,000 tons of the metal were thus obtained, the entire yield from native ore being given that year as only 8,291 tons. The importation of pyritic ore increases daily.

ARTIFICIAL INDIA RUBBER. — According to Sonnenschein, if tungstic acid or tungstate of soda be added to glue, and afterwards muriatic acid, a compound of tungstic acid and glue is precipitated which is so elastic at 85–105° F., that it can be drawn out in very thin fibres. On cooling, the mass becomes very solid and brittle; but it may be rendered elastic again by warming. It is proposed to employ this substance in place of the costly albumen as a mordant for cotton, especially for aniline colors. The same material has been used in tanning leather; but this became hard as a stone, and consequently unsuitable for ordinary purposes.

THE OCEAN TELEGRAPH.

HERE is a man sitting in a darkened room at Heart's Content. The ocean cable terminates here. A fine wire attached thereto is made to surround two small cores of soft iron. As the electric wave, produced by a few pieces of copper and zinc at Valentia, passes through the wire, these cores become magnetic enough to attract a light iron bar. A looking-glass, half an inch in diameter, is fixed on a bar of iron one-tenth of an inch square and half an inch long. On this tiny glass a lamp is made to glare so that its light is reflected on a tablet on the wall. The language of the cable is denoted by the shifting of this reflected light from side to side. Letter by letter is thus expressed in this flitting idiom in utter silence on the wall. There is no record made by the machinery except as the patient watcher calls out to a comrade the translated flashes as they come, and which he records. It seems a miracle of patience. Something of awe creeps over us as we see the evidences of a human touch three thousand miles away swaying that line of light.

An English journal gives the following curious statistics concerning the submerged wire that unites the two continents: —

"The Atlantic cable, although it is only about an inch in diameter, covers an area of over a million square feet of the earth's surface, that is to say, about 23 acres of ground at the bottom of the Atlantic Ocean, the area, indeed, of a small farm.

"The inductive surface of the conductor of the Atlantic (1865) cable is about 481,000 square feet, or 11 acres of area. The exterior inductive surface of the gutta-percha is 1,526,845 square feet, or 35 acres.

"The conductor of this cable contains 263 tons of copper, drawn into 13,250 nautical miles of No. 18 wire, a length which, laid over the surface, would more than suffice to join the north and south poles of the earth.

"The insulation contains 338 tons of gutta-percha and compound.

"A No. 16 copper wire, of the same resistance as a mile of the insulator of the (1865) Atlantic cable, would be over 8,000 millions of miles long, that is to say, long enough to be laid round the orbit of the planet Neptune."

PRACTICAL RECIPES.

WASHING FOR ROOFS AND BUILDINGS. — Slake lime in a close box to prevent the escape of steam, and when slaked, pass it through a sieve. To every six quarts of this lime, add one quart of rock salt and one gallon of water. After this boil and skim clean. To every five gallons of this, add, by slow degrees, three quarters of a pound of potash and four quarts of fine sand. Coloring matter may be added if desired. Apply with a paint or whitewash brush.

This wash looks as well as paint, and is almost as durable as slate. It will stop small leaks in a roof prevent the moss from growing over, and render it incombustible from sparks falling on it. When applied to brick work it renders the bricks utterly impervious to rain; it endures as long as paint, and the expense is a mere trifle.

A CEMENT FOR IRON. — Mix sixty parts of pulverized cast-iron turnings with two parts of sal ammoniac and one part of flour of sulphur; and add water until a paste is formed. A cement is thus obtained which grows hot spontaneously, evolving sulphuretted hydrogen, and soon becoming very hard. Of course it must be prepared immediately before using.

TO PREVENT THE CRACKING OF WOODEN FAUCETS, ETC. — Put the articles in melting paraffine, and heat them there at a temperature of 212° F., until bubbles of air cease to escape from the wood. The whole is then allowed to cool to about 120° F., when the wood is taken from the bath and cleaned from the adhering paraffine by rubbing with a dry coarse piece of cloth.

TO BEND MAHOGANY OR WALNUT MOULDING. — Take two pieces of lumber, one to fit the inside, the other the outside of the moulding (the lumber of course cut to the curves required); soak the moulding in boiling water for ten minutes; then put it between the pieces of lumber; then clamp them together, slowly bending the moulding; let it stand for three days; and it will be fit for use.

GOLD LIQUID. — Mix bronze powder with gum water; a little spirits of wine will make it keep better. The proportions are easily ascertained by trial. Pieces of glass may be put in the bottle to assist in shaking up the heavy powder, which settles at the bottom.

TO FASTEN RUBBER TO WOOD AND METAL. — As rubber plates and rings are now-a-days almost exclusively used for making connections between steam and other pipes and apparatus, much difficulty is often experienced in making an air-tight connection. This is obviated entirely by employing a cement which fastens alike well to the rubber and to the metal or wood. Such cement is prepared by a solution of shellac in ammonia. Soak pulverized gum shellac in ten times its weight of strong ammonia, when a slimy mass is obtained, which in three to four weeks will become liquid without the use of hot water. This softens the rubber, and becomes, after volatilization of ammonia, hard and impermeable to gases and fluids.

Agriculture.

A MINERAL FERTILIZER.

THE Nashua (N. H.) *Telegraph* of March 4th contained a letter from Levi Bartlett, Esq., of Warner, in which he speaks in commendation of what is known as the "Grafton Fertilizer." There are few more sensible, intelligent farmers, or careful observers, in New England, than Mr. Bartlett, and his views are always entitled to respectful consideration. The fertilizer alluded to by Mr. B. has been made the subject of comment in the JOURNAL, and from the analysis presented we learned that the powder could have but little value, and this fact was clearly stated. It probably has *some* value, but how much? It contains *thirty per cent.* of *sand*, six of iron, and sixty-three of magnesian and common limestone. The sand and iron can be of but little account, as both are plenty enough for all practical purposes in nearly all soils. The common lime rock is not worth as much for agricultural purposes as commercial lime, as it is in the form of a *carbonate*, and the carbonate of lime is the hard, insoluble, and worthless powder found in the yards of marble cutters. The magnesian carbonate is the most valuable ingredient, but this is in an insoluble condition, locked up in association with the lime. It is cheaper and better to procure the magnesian element needed in our soils, by the use of the soluble sulphate which can be bought for less than two cents the pound. Now, what is this rock powder worth, which contains but about fourteen hundred pounds in the ton of substances which can have any agricultural value? Is it worth the price asked for it, $30 the ton? Is it worth half or a quarter part of that sum? Is our friend Mr. B. willing to recommend this powder to his brother farmers at anything like these prices? We think not. A *carbonate* of lime must not be confounded with the *sulphate* of lime, which is *gypsum*. Gypsum gives rise to an entirely different class of reactions when placed in the soil. Sulphuric acid and carbonic acid, agriculturally considered, have far different values. Carbonic acid *has no value*, as the air and the earth supply it to plants in abundance.

We must not allow ourselves to be perplexed or deceived in these matters. We are not yet quite ready to burn our books upon scientific agriculture, and throw ourselves into the arms of advertising fertilizer makers who offer no other guarantees than the cheap certificates of those who are too willing to sign them.

CORN AND WHEAT CROPS AT LAKESIDE.

[*From Dr. Nichols's Address.*]

A CROP of corn has been raised each season since 1864, and also a crop of spring wheat until the present year. Rye, oats, roots, and potatoes, with the various grasses, complete the list. From careful records of expenses and results I find the corn crop to have been the most remunerative, and the wheat comes next. During the seven consecutive seasons, closing in 1870, we have passed through great vicissitudes of meteorological changes. We have had seasons characterized by extreme wet, and unparalleled heat and drought; some have been quite extended, and others have been very brief. That of 1869 gave us only about one hundred days in which to plant and harvest our corn; the past has been of extraordinary length, the warm, growing weather lasting from early in April to November.

It has been a period of great value to those who wish to gain by experiment and observation a knowledge of the best methods of farming under the extremes of heat and cold, wet and dry, and of the crops best suited to our capricious climate. The farmer who, by imperfect tillage and lazy habits, has reached the conclusion that we in New England have no certain crops, is indulging in grievous error. All our cereal and grass crops are certain enough, if our fields are in perfect condition, but corn may be said never to fail if a reasonable amount of attention is given it. My crop has never fallen below seventy bushels of shelled corn to the acre, and in 1869 I grew, in about one hundred days, a crop of 106 bushels to the acre. So late was this season, that I was able to walk across the ice-bound lake upon which my fields border on the 10th of April, and snow rested on my potato patch the 2d day of May. Corn among crops with us in Massachusetts is like a Bronsonian democrat; it "rises superior to its accidents." The crop at Lakeside the present season, hot and parched as it has been, has reached seventy-five bushels to the acre. The cost of the corn in the aggregate raised during the seven seasons does not exceed 45 cents per bushel. In this estimate we include one half the cost of the fertilizers, and all the labor from the time of planting to shelling, but it does not take into account the fodder which has proved in my experience to have a high value. This has been fed to milch cows in association with wheat straw, in the long and cut condition, and careful observation and experiment show that it is worth nearly as much, as a milk-producing agent, as upland hay. Corn, gentlemen, is the cereal to which we should give special attention. To grow it profitably, we must grow large quantities on small parcels of ground. It requires no greater expense for labor to raise seventy-five or one hundred bushels to the acre, than to raise twenty-five. Corn can be grown in good quantity for several consecutive years upon the same field, by the use of agents which hold those great essentials to plant growth, phosphoric acid, potash, and lime; but to attain to the highest success, substances capable of affording the nitrogenous element must be added. The first three years of my experiments with the corn crop, I depended solely upon dressings composed of lime, potash, or ashes, and flour of bone, and my crops were excellent; but I now use in association four cords of good, fresh farm dung to the acre, spread over the ploughed field, and harrowed in with a Geddes harrow. Into the hills at the time of planting, I place a handful of a mixture of fine bone and ashes, and under this treatment I have learned to anticipate heavy crops with full confidence. For corn, or indeed for any crop, I prefer to plough in the autumn. One of the most important items to be taken into account in the cultivation of the soil is the fineness of the mould in which the seed is placed. A hard, lumpy, imperfectly pulverized field, holding equal amounts of the elements of plant nutrition with one that is fine will fall short usually twenty per cent. in product under the same meteorological conditions. In autumn ploughing we secure the disintegrating influence of frost upon our furrows, and this is a costless aid in soil cultivation. There are other advantages which I will not stop to enumerate.

For five consecutive years I have not failed, under what I regard as proper soil treatment, to secure good crops of wheat. In one season, that of 1869, it fell to twenty-one bushels to the acre, but the others have not gone below thirty. It was indeed singular to find what a strong prejudice existed among farmers against attempts to raise this noble grain. It was urged that it could not be grown on our soils, — they were worn out, — did not hold lime or something else necessary to its development, — and further, if it did g ow, rust, mildew, or insects would destroy the crop before maturity. The first year, I startled a neighbor by growing a crop of plump wheat, thirty-one bushels to the acre, while over the fence he grew a crop of barley fifteen bushels to the acre. I sold my wheat at $3.50, while his barley went for $1.40 per bushel. The plan of soil treatment has been to sow broadcast, early in the spring, 500 lbs. of farm superphosphate to the acre, mixed with 100 lbs. of crude nitrate of potassa, or 150 lbs. of nitrate of soda and 59 lbs. of sulphate of magnesia. The importance of magnesia in the ash of wheat has been strangely overlooked by chemists and by experimenters, and I regard the employment of a salt holding this element in dressings for wheat land as of great utility. Nearly one eighth of the ash of wheat is made up of magnesia, and as our granitic New England soils cannot well supply it, we must furnish it in our manures. As regards the evil influence of rust upon wheat, I am inclined to the opinion that a well-fed, vigorous plant possesses a power of resistance to parasitic growths which is, in a considerable degree, protective. I do not mean to say that the farmer can positively and always place himself beyond the reach of disasters resulting from fungoid plants or destructive weather influences, but I do say that a good, vigorous well-fed stalk of wheat, corn, or other grain will bear up under and resist adverse influences better than one that is half starved and weakly. The battle is in favor of the strong and against the weak, among plants as well as among men and animals.

WHAT SOUTHERN FARMERS NEED.

At a late meeting of the Vicksburg Chamber of Commerce, W. J. Sykes, Esq., of Memphis, Tenn., spoke upon the matter of the development of Southern resources, and in the course of his remarks used the following language: —

"I will tell you what we Southern people need; we want Yankee enterprise. Do you know the commercial difference between a Northern and Southern man? The Southern man sells all he can't eat, and the Northern man eats all he can't sell. He gets our money, and then we go to him to borrow. He gets our three hundred millions, and then loans us the money. Did you ever see a Southern planter who didn't want to borrow money? The more cotton he makes, the more money he must borrow. The cotton mania is our curse."

The *Banner of the South* (Augusta, Ga.), one of the ablest agricultural journals of that section, after quoting the above, proceeds as follows: —

"The only remedy for our misfortunes has been over and often urged — diversity of crops: cease concentrating everything on cotton, raise provisions enough at home to be independent of merchants and bank rates of interest. But to urge such a course seems to have a contrary effect, for every individual thinks his neighbors will all follow the suggestion, and that he himself will do better by planting all in cotton, as before. And so again everything we produce is cotton.

"While the credit system obtains, and men may spend crops before they are made, this will likely be the case. If credit were withdrawn, then the matter would be brought home to every man on every farm. Let it be fully known that next year there shall be positively *no credit* for corn and meat, and each one would then feel himself forced to look to his own resources for supply. Both the planter and the merchant would be soon on a safer footing than now prevails."

They are beginning to raise Cashmere goats in California. It is said that it costs no more to raise a goat than a chicken.

SEEDS AND CUTTINGS.

Salt Water for Strawberries. — The Norfolk *Virginian* is informed by a practical horticulturist that during an overflow from an extraordinary storm a strawberry bed was partially covered with brackish water at the time when fruit was forming, and also that the occurrence stimulated the vines to greater perfection of fruit and general vigor. This discovery may prove of advantage to fruit raisers in the vicinity of salt water.

Tender Lettuce and a Tough Story. — It is said, in *Harper's Magazine*, that lettuce may be produced in winter, in from twenty-four to forty-eight hours, by taking a box filled with rich earth in which one-third part of slaked lime has been mixed, and watering with lukewarm water. Sow the seed in the usual way, after they have been previously soaked in brandy for twenty-four hours.

Melon Sugar. — In Italy and Hungary there are several large manufactories of *melon sugar*, and it is believed that the culture of melons for this purpose could be made profitable in this country. The proportion of saccharine material in the juice is about seven per cent., while in beets it is only one per cent. more, and the cost of expressing the juice is much greater than from the melons.

The editor of the *Rural Carolinian* says that he once made a very fine article of syrup from melon juice, but did not carry the experiment further.

Changing the Colors of Flowers. — An English paper describes a case of a yellow primrose which, when planted in a rich soil, had the flowers changed to a brilliant purple. It also says that charcoal adds great brilliancy to the colors of dahlias, roses, and petunias; carbonate of soda reddens pink hyacinths, and phosphate of soda changes the colors of many plants.

Southern Phosphate Manufacture. — The Charleston (S. C.) *News* says: "We have now twelve phosphate mining and manufacturing companies, representing a capital of *three millions of dollars*. Eight of these companies are now mining and manipulating phosphates; a fleet of vessels carry the crude rock abroad and to the North; long trains of cars bear the quickening fertilizer to all the States of the South. And the basis of all this business — the phosphatic deposit — lies in inexhaustible quantities in the broad bosom of South Carolina. Several of the companies manufacture the acid required for their work."

Fun and Farming. — The editor of the Trenton (N. J.) *Sentinel* is telling what *he* "knows about farming," *à la* Greeley. The following is a part of his first essay on the subject: —

Castor-oil beans succeed best in the bowels of the earth. They will soon work their way out.

The best preparation for hops is a toad or two in each hill. They will make the vines fairly jump.

The usual time to put in rye is early in the morning. Some husbandmen, especially those of the city, continue to run it in at intervals of half an hour, until bed-time. The practice is only allowable in case of a dry season.

In reaping wheat, never take it by the beard. It is found to go against the grain.

Corn in the ear is apt to affect the hearing. If eaten green, it will make the voice husky. When dealt out as army rations, the kernel should always be served first, and then the men, private-ly.

Never plant your potatoes early. It is the early potato that gets the worm. It is up-hill work with them after that.

In making cider out of apples, I found it a pretty tight squeeze, nowithstanding my long connection with the press. Never drink cider made from crab apples. It is pretty certain to go "back on you." If you would lay in a supply of old wine, be sure to make it of elder-berries.

IRON FOR PEAR TREES. — A correspondent of the *Rural Messenger* writes as follows: "I had a very fine pear tree (Flemish Beauty) that became affected, first by blight in one limb, which I removed, and then another and another was affected in the same way, until I had removed a considerable portion of the top of the tree. Early next spring I resolved to try the application of scrap iron to the roots. I procured my iron, removed the soil from the roots carefully, deposited the iron between them, and replaced the earth. There was no further progress in the blight, the tree continued to grow that season, and the next leaves and blossoms came out vigorously; no black spots appeared on the leaves, and the tree bore finely; and no appearance of disease was seen in the tree afterward. In subsequent conversations with friends I found that some of them had become informed on the same subject, and had tried the remedy with perfect success. Some told me they had procured turning and drilling chips from the machine-shops, and had used them, as they thought, with much advantage to their trees."

TO GET RID OF ANTS IN GARDENS. — Entrap them by means of narrow sheets of stiff paper, or strips of board, covered with some sweet sticky substance. They will thus be attracted and get stuck fast, and when you have caught a goodly number you can kill them, and set your trap again.

Or lay fresh bones around their haunts. They will leave everything else to attack these, and when the bones are well covered with them, you can dip them in boiling water, or otherwise "murder the innocents."

If you wish merely to drive them away (with the prospect of having them settle elsewhere within your borders) a few spoonfuls of coal oil poured into their holes, or a few slices of raw onion buried there, will be taken by them as a *strong* hint to migrate.

VICK'S ILLUSTRATED CATALOGUE. — We have received a copy of this catalogue, advertised in a former number of the JOURNAL. It is a handsome pamphlet of 96 pages, with two colored plates and numerous wood-cut illustrations. The 150,000 copies circulated annually are printed at Mr. Vick's own establishment in Rochester, N. Y., where he also makes the million paper boxes he uses each year. Although he has seventy-five acres devoted to the raising of his seeds, he purchases large quantities of other producers, besides importing foreign seeds and plants to a large extent. He has a large building, four stories high, in which he employs 106 hands, including 76 girls. This enormous business has grown up from a very humble beginning, and is so admirably managed that it is likely to keep on growing.

THE London *Cottage Gardener* relates an experiment which shows the advantage of keeping the leaves of plants free from dust. Two orange trees, weighing respectively eighteen and twenty ounces, were allowed to vegetate without having their leaves cleaned, for a year; and two others, weighing respectively nineteen and twenty and a half ounces, had their leaves sponged with tepid water once a week. The first two increased in weight less than half an ounce each, while of the two latter, one had increased two, and the other nearly three ounces.

THE toad is a great destroyer of insects, and has been found very useful in gardens for exterminating the striped bug, squash bug, flea-beetle, etc. It devours the potato bug with great avidity, and suffers no inconvenience from feeding on this poisonous insect.

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, MAY 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

TO ADVERTISERS.

Advertisers are hereby informed that the Boston Journal of Chemistry circulates more copies monthly than any other periodical of its class in this country. It goes into every State and Territory of the United States, and to the British Provinces, England, Scotland, Germany, Australia, etc. It is the best medium for advertising drugs, medicines, chemical substances, chemical and philosophical apparatus, telescopes, microscopes, educational institutions, lectures, books, musical instruments, articles of food, furniture, agricultural implements, seeds, fertilizers, wines, soda-water apparatus, surgical instruments, the business of physicians and druggists, etc., etc., that the country affords.

A SECOND "REPORT" FROM DR. WINSOR.

THE second report on galvanized iron pipes by Dr. F. Winsor, so long anticipated, has appeared in one of the April numbers of the *Boston Medical and Surgical Journal.* The Doctor has made "further inquiries of *skilled analytical chemists*, of experts in materia medica, of *manufacturers of galvanized iron pipes, house painters*, etc.," and is satisfied that the pipes are "all right," and that his views as first expressed are correct. It is gratifying to find that he has extended his field of inquiry; his former one was entirely too narrow, — "Appleton's Cyclopædia, and the pipe makers." The only "skilled analytical chemist" he has consulted is the writer of the following remarkable certificate, recommending some "Bitters" which have recently appeared in the market: —

"20 STATE STREET, BOSTON.

"J. A. BRODHEAD, ESQ., *State Commiss., Mass.*

"Sir, — A sample of 'Old Dr. Warren's Root and Herb or Quaker Bitters,' from Flint & Co., Providence, R. I., has been analyzed with the following results: This is not a beverage nor an intoxicating liquor, but is an official medicinal preparation containing extracts of roots and herbs.

"It is free from injurious substances, and may be used as directed by persons requiring a medicine of this kind. Very respectfully,

"S. DANA HAYES,
"*State Assayer and Chemist.*"

He informs us that this State Assayer has made "more than one hundred analyses of water drawn through galvanized iron pipes," every one of which confirmed his notions of their safety. The wonder is that the gentleman could find time to make such extensive researches on the galvanized iron pipes, as he has to make about *thirty thousand analyses* yearly of liquors at the State Agency, and this labor, added to the assays of bitters, pills, teething rings, rubber nipples, etc. etc., certificates regarding which are constantly appearing in the newspapers, must keep him pretty busy.

There is a bit of clever irony manifested by the editor of the *Medical and Surgical Journal* in placing the "Bitters" certificate and the Report of Dr. Winsor in close contiguity in his columns. We hardly know which document to admire most, or which is entitled to the highest confidence. They both come from distinguished sources; one recommends "Old Dr. Warren's Root and Herb Bitters," the other the galvanized iron pipes. Both parties seem to be involved together in important researches, although we do not suppose the Doctor has anything to do with the Bitters of the Assayer. Seriously, we dislike that the ten thousand intelligent physicians and chemists of the country who read our JOURNAL should know that such documents are published in Massachusetts by parties who ought to be far removed from charlatanry in any form. But the facts are of such a nature as to demand notice.

It should be remarked that Dr. Winsor in a very contemptuous way dismisses the cases of poisoning by zinc reported in the JOURNAL as unworthy of *his* notice, and he also ignores the reports of zinc poisoning in England and elsewhere. We regret that he has placed himself in such a position.

THE LESSONS OF THE ECLIPSE.

OUR readers have seen ere this, in the papers of the day, the accounts of the good and bad fortune that attended the various expeditions sent out to watch the great eclipse of December 22d. The scientific results have not been so important as it was hoped they might be, but they are far from insignificant, and are amply worth all they have cost. Mr. Lockyer considers that the chief gain is the additional evidence of the compound nature of the corona, which must be viewed as partly a true solar appendage, and partly due to our own atmosphere. The following is the conclusion (somewhat condensed) of his article on the subject in *Nature*: —

"From what has preceded, then, we seem justified in suggesting as working hypotheses the following, which, however, more accurate information may alter, and which I offer as suggestions only, *bien entendu.* 1. The solar chromosphere extends some 5′ or 6′ from the sun, its last layers consisting of cool hydrogen, and possibly a new element with a green line in its spectrum; which line, if it be identical with the auroral line as stated by Gould, may possibly be present in the higher regions of our own atmosphere. 2. Outside this stratum the rays, etc., are, for the most part, due partly to our own atmosphere, partly to our eyes, for their shape varies; they are seen by some at rest, by others in motion, and their spectrum is the same as that of the dark moon. 3. The white light of the chromosphere above the prominences, as seen in an eclipse, is due to its strong reflection of solar light, as shown by the polariscopic observations. 4. The rosy tinge of the corona proper, that is of the region more than 5′ or 6′ from the sun, is due to our atmosphere containing light which comes from the higher and lower strata of the chromosphere."

One of the most interesting results of the observations is the confirmation of the American observations of 1869. The *Cornhill Magazine* has given a very clear statement of the results obtained previous to 1869, the discoveries made in this country in 1869, and the way in which these were viewed by English astronomers before and after the eclipse of 1870. We quote a portion of the article: —

"In 1868 Tennant had found that the spectrum of the corona is a continuous rainbow-tinted streak, without either dark lines or bright. Such a spectrum is given by solid and liquid bodies glowing with intensity of heat. And the inference, therefore, was that the corona consists of minute bodies travelling close by the sun, and owing the greater part of their light to the great heat with which they are transfused. But the American observers in 1869, or at least some of them, found that besides the ribbon of rainbow-tinted light, the spectrum of the corona shows bright lines. Some observers saw only one bright line, others saw three. This observation would indicate that a portion of the coronal light comes from a gaseous source, and from the position of one of the bright lines Professor Harkness was led to the strange conclusion that the glowing vapor of *iron* is a constituent of the solar corona! Yet further, because the position of these coronal lines corresponded with the position of the bright lines seen in the spectrum of the aurora, Professor Young, one of the most skillful of the American spectroscopists, came to the conclusion that the corona is a *perpetual solar aurora!*

"The observations of the American astronomers and physicists were not accepted by all. No valid reasons were given, indeed, for rejecting them, but they are pronounced, in general terms, to be '*bizarre* and perplexing in the extreme.' Possibly, too, some of our English physicists had not formed a duly high opinion of the skill of their American fellow-workers. But, be this as it may, certainly the American astronomers were somewhat cavalierly treated, and the acceptance of their observations was postponed until such time as European astronomers should have been able to confirm those perplexing results.

"The chief interest of the eclipse of last December undoubtedly attaches to this special question. . . . . The question whether the American observations would be confirmed or not, was one on which grave doubts prevailed in many quarters. For ourselves, we must admit that these doubts had seemed to us to involve an unjust disparagement of the skill of American men of science, who have again and again proved themselves the equals of the best European observers in judgment and acumen, and often their superiors in energy. A careful study of the accounts given by the heads of the different observing parties had convinced us that future observations would confirm the statements made by the spectroscopic observers of the American eclipse.

"This has in effect happened. The first fruits of the eclipse expeditions of 1870 may be said to consist in this important fact — that the observations made in 1869, *bizarre* and perplexing though they seemed, have been shown to be exact and trustworthy."

After discussing at considerable length the significance of these results, the writer comes to the conclusion (which, on the whole, appears to us the most satisfactory one to be reached in the present state of our knowledge) that Prof. Young's theory that "the corona is a perpetual solar aurora" is likely to be the correct explanation of the matter; and that the corona, the zodiacal light, and the terrestrial aurora are probably to be viewed as related phenomena. "When we remember that the zodiacal light — a phenomenon which holds a position midway between the terrestrial aurora and the solar corona — has been shown to give a spectrum closely resembling both the auroral and the coronal spectra, the idea does seem certainly encouraged that all three phenomena are intimately associated."

DARWIN AND HIS DOCTRINES.

One of our leading American critics, in an elaborate review of Mr. Darwin's last book, has the following remarks: —

"Whatever judgment may be pronounced as to the tendency of Mr. Darwin's views of the origin of man to humble the natural pride of ancestry, we ought not to lose sight of the fact that no philosophical writer of the present day sets forth a more exalted conception of the actual faculties and endowments of the race as developed under the highest forms of moral and religious culture in the progress of civilization. He almost goes out of his way to do justice to the ideas and beliefs which have been regarded by the wisest thinkers in every age as the crowning glory of humanity. In this respect his system presents a favorable contrast to the shallow, sensualistic, French philosophy of the eighteenth century, which resolves the most refined sentiments of our nature into fleshly illusions. 'The question,' says Mr. Darwin, 'whether there exists a Creator and Ruler of the Universe has been answered in the affirmative by the highest intellects that have ever lived. I fully subscribe to the judgment of those writers who maintain that of all the differences between man and the lower animals, the moral sense or conscience is by far the most important. This sense, as Mackintosh remarks, "has a rightful supremacy over every other principle of human action;" it is summed up in that short but imperious word *ought*, so full of high significance. It is the most noble of all the attributes of man, leading him, without a moment's hesitation, to risk his life for that of a fellow-creature; or after due deliberation, impelled simply by the deep feeling of right or duty, to sacrifice it in some great cause.'"

Another critic speaks as follows: —

"We cannot but pay a just regard to the fact that Mr. Darwin, while advancing views that are often startling, never uses an expression likely to cast a doubt upon the divine attributes of man, or to lower the respect for the Christian religion. He is an iconoclast who breaks only the idols of false gods."

The most effective reply to Darwin that has yet appeared is "The Genesis of Species," the book just put forth by Mr. St. George Mivart. The author fully appreciates Darwin's merits as a scientific man, and admits the plausibility of the doctrine of "natural selection," which he himself was disposed to adopt until careful examination convinced him that it was inadequate to explain all the facts involved. He then proceeds to show wherein the theory fails, and the objections he brings forward seem to us unanswerable. We shall be curious to see how Darwin replies to them. Mivart does not deny that natural selection acts to some extent in the organic world, but he maintains that if we would account for the production of existing species of animals and plants, it must be supplemented by the action of some other natural law or laws as yet undiscovered. His aim, as stated by himself in the closing sentence of the book, "has been to support the doctrine that species have been evolved by ordinary *natural laws* (for the most part unknown) controlled by the *subordinate* action of 'natural selection,' and at the same time to remind some that there is and can be absolutely nothing in physical science which forbids them to regard those natural laws as acting with the Divine concurrence and in obedience to a creative fiat originally imposed on the primeval Cosmos 'in the beginning,' by its Creator, its Upholder, and its Lord."

EDITORIAL NOTES.

A Chip of the Old Block. — A "Petrified Indian Boy" has lately been on exhibition in Boston. The history of this fossil youth (except that he was "found near Turner's Falls, Mass.") is not given in the handbills, but we happen to know some interesting particulars concerning him and his family, gleaned from a copy of the *Paleontological Times* of April 1st, 49,387 B. C., dug up not long ago in the Onondaga Valley. The boy was the youngest son of the well-known Cardiff Giant. He ran away from the paternal mansion, and wandered eastward as far as Turner's Falls, where he "curled up and died" in the posture in which he now appears. Old Cardiff for many years stood high in the estimation of his fellow-citizens; he was, in fact, looked up to as one of the "solid men" of that section. But later in life he fell into bad ways, became a hard drinker, and abused his wife and children. This was doubtless the reason why the interesting youth mentioned above ran away from home. Mrs. Cardiff herself finally left the hardened old reprobate, and went to Indiana, where she got a divorce, and subsequently married a gentleman named Smith. Nothing further is known of her, nor have we any information of the seventeen other Cardiff children, the brothers and sisters of our petrified juvenile; but the reappearance of the old gentleman on the stage has proved so profitable to his friends of this generation, that they have hunted up this boy, and we doubt not that the rest of the family will yet be found and "carted round as a show." When they get to Springfield, we trust they will be "sot on" by the local scientific association which pronounced the paternal giant to be a "genuine antique," and have their genealogy duly authenticated by that sapient conclave.

American Greek Architecture. — Under the head of "American Wonders," one of our exchanges, after boasting of Niagara, the Mammoth Cave, Lake Superior, the Natural Bridge, and other things in which the Yankee nation "can't be beat," proceeds to say that "the best specimen of Grecian architecture in the world is the Girard College for Orphans, Philadelphia." It is very true that the edifice in question is a notable instance of an immense expenditure of money to produce a structure wholly unsuited to its purpose. Nowhere else in the world probably can one find so much white marble put together so unwisely. But aside from its being one of the most unfortunate examples of the misapplication of Grecian architecture which was the fashion forty or fifty years ago, it is a miserably incomplete reproduction of the old Greek temple. Compared with the Madeleine at Paris, and other modern "specimens of Grecian architecture" in Europe, it is like a frame without the picture it ought to enclose. It is as bare of ornamental sculpture as a country meeting-house; while in the Parthenon and the Madeleine, as in all genuine Greek work of the kind, architecture and sculpture seem to compete with each other for our admiration, or rather they combine to form a harmonious whole, to whose perfection each is essential.

"Pigeon English" on the Wires. — In California, the Chinese residents make a liberal use of the telegraph, and though they do not trouble themselves with an investigation of its workings, they fully appreciate its importance. John, in California, is at liberty to send his messages in "pigeon English," and very funny work he makes of it occasionally. Chin Lung, in Sacramento, telegraphs to Ming Yup, in San Francisco, "You me send one piecee me trunk," which means, in plain language, "Send me my trunk." Mr. Yup complies with the request, and responds by telegraph, "Me you trunkee you sendee."

At Table. — The custom of frog-eating in France seems to date from the end of the fifteenth

century. Champier, writing in 1504, complains of the strange taste of people who eat frogs, and cannot conceive how persons of delicacy can eat "insects" bred in marshes and stagnant ponds. "I have seen the time in which people ate only frogs' thighs, but now they actually eat the whole body, except the head, and, moreover, serve them fried with a little parsley." Yet that the practice was not universal we gather from Palissy, who, in his "Treatise on Stones," says, "It is a thing that one sees every day now, that men eat articles which formerly no one would have eaten for anything in the world. In my time I have known when you could have found very few men who could have eaten either tortoises or frogs." The custom, like that of eating beavers, and that great delicacy, their big, flat tails, probably took its rise in the desire of the fasting or non-flesh-eating monks to get something as like flesh as possible; and they therefore always reckoned amphibious animals as fish, not flesh. In like manner, though certain monks would not eat pork, they flavored their vegetables with lard, and many monasteries kept pigs for this purpose. Other monasteries got so far as to eat hashed meat, saying that when meat was so disguised, it was no longer meat. Gregory the Ninth condemned this artifice in the Constitution he gave to the Benedictines, and declared that not only was meat forbidden to them, but also hashes and stuffing made of meat.

ATOMS.

Out of ninety million passengers conveyed on French railways in 1869 only two were killed, and of the persons employed on the roads only four score; 112 passengers and 61 employees were injured. — In response to a correspondent who wants a recipe for "fluid extract of lemon," the *Druggists' Circular* suggests that "to take ten lemons and squeeze out the juice with a good 'lemon-squeezer' would prove the readiest way to get a pure fluid extract." — As evidences of the "progress of civilization" in China, it is stated that beer is made at Shanghae, and a whiskey distillery is building at Canton. — It is said that the average yearly consumption of coffee for each Californian is sixteen and three fifths pounds, while the average for the whole country is only seven pounds. — Up on the borders of Lake Superior they boast of 350 bushels of potatoes to the acre. — The production of chewing tobacco in Richmond, last year, was more than fifteen million pounds, and of smoking tobacco over one million pounds; and the tax paid on both amounted to more than five millions of dollars. — The *Book Worm* is a new monthly, intended to be of interest to every one who loves books, and to every one else," published at the College Bookstore, New Haven, Conn., for one dollar a year; and the first number is a capital one. — The consumption of oysters in this country is enormous, as may be inferred from the fact that in Chesapeake Bay alone there are three thousand acres of oyster beds, yielding annually twenty-five million bushels of the bivalves. — It is said that nearly every South American seaport has a horse railroad. — Bismuth has been discovered in Texas. — Some of the French cannon captured by the Prussians were made of brass cylinders from the calico print-works of Alsace. — A locomotive factory in Philadelphia employs 1,900 men, and turns out a locomotive daily. — The narrow-guage railway is attracting much attention at the West and South, and also in California. — A new hammer in the Bessemer steel works at Harrisburg, Pa., weighs thirty-five thousand pounds. — Two hundred woolen factories have been started in the Western States in the last ten years. — The cotton crop of 1870 is estimated at 3,000,000 bales. — The manufacturers of cheap confectionery out West will be gratified to learn that a deposit of kaolin has been discovered near Omaha. — A thousand millions of pounds of sugar are required annually to satisfy the "sweet tooth" of the Yankee nation. — The State of New York has now twelve hundred cheese factories, and the business is rapidly extending. — Dolomite is coming into use as a substitute for lime in the calcium light, as it can be used for hours without showing anything more than a slight wear on the sides exposed to the flame. — Darwin's "Descent of Man" will be the "sensation" of the season in scientific literature. — Aluminium does not at present seem likely to become the familiar household metal that writers ten years ago predicted it would. — That charming "juvenile" of the last holiday season, "The Children's Week," is from the same pen that has given us the full and elaborate work on "American Mines and Mining," to which we referred in the last number of our paper. — The *Scientific Press* mentions a California device for economizing coal, by lining the front and bottom of the grate with a wire screen (of No. 16 wire, with half-inch meshes), so that the small pieces of coal which usually drop through the grate are consumed. — An iron canal-boat was built in England as early as 1787. — The *Rhode Island Schoolmaster* is the best of all the State educational journals, and ought to issue a "national edition." — In London there is a steam-engine still running which was built by Boulton and Watt in 1811, and has been in regular use ever since, except when the works were interrupted for a time on account of a fire. — In South America a railroad is planned to connect the Argentine Republic with Chili, a distance of a thousand miles; and the estimated cost is thirty millions of dollars. — Many tons of laurel roots are used in making *briar*-root tobacco pipes.

The Literary World. — We have already commended this excellent monthly, and we cordially endorse what is said of it by the N. Y. *Evening Post* and the Springfield *Republican*, as quoted in the advertisement in this number. Even at the increased price, it will be the cheapest literary journal in the country.

The Food Journal. — By special arrangement with the publishers, we are now able to offer this unique and valuable magazine on even lower terms than previously announced in our *Clubbing List*. We can furnish it, mailed *post-paid* from London, at $2.25 a year, or $3.00 *with the* Journal. We are unable at present to send specimen numbers of this and other foreign journals on our list.

☞ We would call special attention to our advertisement of the *Title-page and Index* to Vol. V. Our arrangements are such that we can send it with our June number far more conveniently than at any other time, and we therefore offer it free to all who renew their subscriptions before June 1. The *ten cents* charged for it after that date will not more than repay us for the extra trouble of sending it.

After some delay on the part of the printer, Dr. Nichols's *Address on Manures* is now ready, and will be mailed at once to all who are entitled to it. If any who ought to receive it fail to get it, they will please inform us of the fact. The pamphlet will be sent, post-paid, to any address on receipt of *twenty cents*. As the edition is limited, early application will be necessary to secure copies.

The "Answers to Correspondents," as well as several articles in type, are unavoidably laid over to the next month.

LITERARY NOTES.

Messrs. Hurd and Houghton have just added to their uniform edition of Hans Andersen's Works *The Story of My Life*, the delightful autobiography of the author, now first translated into English in its enlarged and revised form. The opening sentence of the book is a perfect description of it: "My life is a lovely story, happy and full of incident." And the "moral" follows in the same paragraph: "The history of my life will say to the world what it says to me, — There is a loving God, who directs all things for the best."

The same house has published *Hesperia*, by Cora L. V. Tappan, which appears to be an attempt to put the history of the United States into the form of an allegorical poem; and *Three Successful Girls*, by Julia Crouch, a novel of American life, better than most of its class. It introduces its trio of heroines at the wash-tub, which is a novelty in a novel, but those who believe in the old-fashioned domestic education of girls will consider it the key to their "successful" career.

A popular history of the art of printing ought to have been written long ago, and it was a "happy thought" of Mrs. E. C. Pearson's to furnish us one in so pleasing a form as that of *Gutenberg, and the Art of Printing*. It reads almost like a romance, while it keeps closely to the historical facts. A sketch of the modern improvements in printing is added, to bring the narrative down to our own day; and the book itself is an admirable specimen of the typographic art. It is printed at Riverside, and published by Messrs. Noyes, Holmes, & Co., of Boston.

A new volume in Messrs. Barnes & Co.'s "Teacher's Library" is Mr. H. Barnard's *Oral Training*, or "Lessons in Natural Science and General Knowledge, embracing the subjects of Astronomy, Anatomy, Physiology, Chemistry, Mathematical Geography, Natural Philosophy, the Arts, History, Development of Words, etc."

The Harpers, who are bound to furnish the latest and best dictionaries and works of reference, even if these supersede others already on their list, have reprinted Smith's *English-Latin Dictionary*, which is a great improvement on Riddle's, hitherto the standard in our classical schools. It is more copious than that work, and is especially superior in its full citation of authorities. It represents the most advanced scholarship of the times, and it will probably be many years before a better work will displace it, as it displaces its best predecessor.

The University Publishing Company (New York) are issuing a full series of educational works, with especial reference to the wants of Southern schools. They have now ready a complete set of *Readers*, edited by Prof. Holmes of the University of Virginia, a *History of the United States* (in which, by the way, we see scarcely a line to which any Northern man could object), by the same author, and a *Manual of Geography* by Prof. Maury. All the books, in illustrations, typography, paper, etc., are up to the highest standard, and well deserve the attention of teachers.

Dr. Jas. E. Reeves sends us the second edition of his *Health and Wealth of the City of Wheeling*. In its enlarged form it has increased claims to be called a model sanitary report. The health officers of our cities and towns, and all others interested in sanitary science, will find it very suggestive.

We are indebted to Geo. W. Bull, Esq., Editor of the Buffalo *Commercial Advertiser* for the *Transactions of the New York State Eclectic Medical Society*, for 1869–70, the *Report of the State Commissioners of Public Charities*, and other valuable documents of the New York legislature.

Dr. J. H. Rauch, of Chicago, sends us the *Report of the Board of Health* of that city, for 1867, 1868, and 1869, which includes a Sanitary History of Chicago from 1833 to 1870 — a work replete with interest for every student of social science.

OUR SCIENTIFIC AND MEDICAL EXCHANGES.

The *New York Medical Journal* for April has the following original communications: I. E. R. Squibb, M. D. — Anæsthetics; II. A. Kessler, M. D. — On the Education of Deaf-Mutes; III. O. W. Holmes, M. D. — Valedictory Address, delivered to the Graduating Class of the Bellevue Hospital College, March 2, 1871; IV. Wm. C. Roberts, M. D. — On the Influences of Non-specific Emanations on the Public Health: Are they deleterious?

The *Journal of Psychological Medicine* has the following original papers: The Relation between Lesion of the Nervous System and Muscular Atrophy, by S. G. Webber, M. D.; On the Medical Relations of Insanity, by L. A. Tourtellot, M. D.; On some Recent Contributions to Mental Science, Medical Jurisprudence, and Anthropology, by G. E. Day, M. D.; Clinical Lectures delivered at the Bellevue Hospital Medical College, by W. A. Hammond, M. D.: Inaugural Address on assuming the Presidency of the New York Medico-Legal Society, by S. Rogers, M. D.; The Medico-Legal Value of Confession as an Evidence of Guilt, by Wm. A. Hammond, M. D.; with the usual variety of briefer articles and items.

The American Practitioner contains the following leading articles: A Case of Labor in connection with a Large Ovarian Cyst, by J. C. Reeve, M. D.; On Acute Rheumatism, by C. Rogers, M. D.; Treatment of Gonorrhea by Warm-water Injections, by J. O'Reilly, M. D.; Restoration of Everted Lower Lip, by D. Prince, M. D.; The Therapeutical Value of Veratrum Viride, by W. W. Dougherty, M. D.; Sulphate of Beberia in Chronic Inflammation of the Uterus.

The American Journal of the Medical Sciences (Phila.) has a table of Contents filling six pages, and including thirty-three original communications, with fifty-three briefer articles in the "Quarterly Summary of Improvements and Discoveries in Medical Science," etc., etc.

The Indiana Journal of Medicine, which has come to hand since our article on Propylamine was in type, contains a communication on "Propylamine in Rheumatism," by Dr. J. M. Gaston, in which he gives the results of several years' experience with this agent, which he thinks is "not sufficiently known and appreciated by the profession at large."

The *Boston Medical and Surgical Journal*, of April 6, has a valuable article on the Prognosis of Cataract, and the Rules by which it is Formed, by Hasket Derby, M. D.

The *Georgia Medical Companion* is a new medical monthly, edited by Drs. T. S. Powell and W. T. Goldsmith, and published at Atlanta, at \$2.00 a year. The editors appear to have the tact of condensing a large amount of valuable matter into their "Abridged Extracts and Gleanings," and all their work is well done.

The first number of Prof. Hinrichs's *School Laboratory of Physical Science* (Iowa City) is out. Teachers should send for a specimen copy of it.

Medicine.

PROPYLAMINE.

The following note regarding propylamine was written by the editor of this Journal and published in the *Boston Medical and Surgical Journal* in April, 1859. The remedy has continued to grow in favor during the past twelve years, and some physicians regard it as almost or quite a specific in acute or chronic rheumatism. It would seem that it must possess merit, else it would have dropped into disuse and been forgotten. To procure the agent, nearly *one hundred barrels* of old herring pickle are manipulated in the laboratory of J. R. Nichols & Co. every year. This is utilizing a liquid which may fairly be called a *waste product.*

Propylamine belongs to a most remarkable series of homologous bodies, of which ammonia is the starting point. Propyl, found in the first or methylic series of homologous compound radicals, is an oily liquid, boiling at a temperature of about 130° F., having the formula C_3H_7. Propylamine is formed by the addition of one equivalent of propyl to amide (NH_2), which is ammonia (NH_3) minus one atom of hydrogen. The propyl takes the place of the hydrogen atom, in ammonia, and propylamine is formed. The whole series in which it is found bear a striking resemblance to ammonia, and yet they are widely different in chemical constitution.

The first in the list, methylamine (CH_5N), is a gaseous body, largely absorbed by water, has a pungent smell like ammonia, and can hardly be distinguished from it. The next, ethylamine (C_2H_7N), is only a degree less like ammonia, being highly volatile, with a similar pungent odor. The next in order, propylamine (C_3H_9N), in physical characteristics and behavior varies still wider from ammonia; but the resemblance is still so striking, that physicians may regard the liquid as made up in part of that body, while, in fact, it is not; and, as has been remarked, its chemical constitution differs from it in a most remarkable degree. Thus the formula for ammonia is NH_3; for propylamine, C_3H_9N.

There is no department of chemistry more interesting and wonderful than that relating to these homologous compounds, and the almost infinite series to which they give rise. Their therapeutic value is imperfectly understood, and its study offers a rich field for experiment and research.

Propylamine is a clear, transparent liquid, having a pungent, ammoniacal, alkaline taste and smell. A feeling of causticity is produced when a portion is rubbed between the thumb and finger. It may be derived from a variety of sources, — from ergot, cod-liver oil, bone oil, human urine, etc.; but most properly, for medicinal purposes, from herring pickle. When a quantity of old pickle is treated with a strong solution of potassa, a pungent odor like ammonia is evolved, which is propylamine liberated from its combination with an acid in the liquid. The neutral solution must be quickly distilled, and the process continued so long as the fishy odor is observed. The distillate is then saturated with hydrochloric acid, evaporated with much care to a dry crystalline mass, then treated with absolute alcohol, until the whole of the propylamine salt is dissolved out. A second careful distillation with hydrate of lime affords a small portion of pure propylamine. I have found that nearly all that should be used for medicinal purposes comes over without the application of heat, or from slight warming. Imperfectly or unskillfully prepared, the remedy will prove worthless, while fresh specimens of *true* propylamine may possess great medicinal value.

The virtues ascribed to propylamine, in the cure of rheumatism and affections of a rheumatic origin, are extraordinary. Dr. Awenarius, of St. Petersburg, treated 250 patients in the hospitals of Kaulinkin, at St. Petersburg, between March, 1854, and June, 1856; and in acute cases the pain and fever *always disappeared the next day.* He regards it "as a true specific for the various affections of rheumatic origin." The diagnosis of these diseases being very often obscure, one can succeed (says M. Awenarius), by the use of propylamine, in bringing to light in a few days the true nature of the malady. It is stated to have been employed in outside practice with equal success.

Although the claims for the new agent may be, and probably are extravagant, still, should it be found to have, in any measure, control over the specific disease for which it is recommended, it will indeed be a blessing to a suffering class of patients, and therefore merits a trial at the hands of the profession.

The remedy is described in the following manner: ℞ Propylamine, gtts. xxv.; distilled water, fl. oz. vi.; and, when necessary, add aqua sacch. peppermint, dr. ij. *Dose*, a table-spoonful every two hours.

THE INTERNAL ADMINISTRATION OF CHLOROFORM.

Dr. G. W. Murdock, in the *Journal of Pharmacy*, after alluding to the difficulty physicians have had in finding a good vehicle for the internal administration of chloroform, recommends *pure glycerine* as one "which answers the purpose so completely as to leave little to be desired." He adds the following suggestions: —

"By a little care in rubbing it up, one part of chloroform by bulk can be dissolved in three of glycerine. This solution is perfectly clear, is bland to the taste, and has but a slight odor of chloroform.

"As glycerine is acceptable to almost every stomach, it admits of a wide range of application. It can be taken readily as it is, or can be diluted with water to any extent, without disturbing the solution. Curiously enough, the addition of water immediately increases the smell of chloroform without any precipitation of it. In preparing it, it is best to take one part of chloroform with two parts of glycerine, add the chloroform very slowly, and rub up carefully. Then put it in a bottle, and let it stand twenty-four hours. A little chloroform will have deposited at the bottom. Separate this, and rub it up with the third part of glycerine, then mix it with the rest, and the solution is complete. No further separation will take place. Six ounces of glycerine with two of chloroform will give seven fluid ounces of the solution, so that each fluidrachm contains about seventeen M. of chloroform.

"From the faint odor of the prepared solution I judge that the glycerine protects it almost entirely from evaporation, although some slight loss may occur while preparing it, which it is well to make allowance for."

GOOD LIVING IN THE TREATMENT O NERVOUS DISORDERS.

We believe that starvation in the midst of plen is no uncommon thing in our day, not only in th case of infants, but with adults also. Dr. G. Blandford has some sensible remarks on this subje in a recent number of the London *Practitione* He says: —

"If we inquire into the past history of nervou patients, and have the opportunity of learning ac curately the facts thereof, we often find that for considerable time the supply of daily food has bee in no degree adequate to the necessities of the in dividual. Here is a common case. A man som what past middle life, but whose years do not im ply senile decay, becomes unfit for business, fidget irritable, depressed, or even melancholic to the ex tent of insanity. We hear that he has been a hard working man of business, always nervous, and ver probably an indifferent sleeper. Being most heav for sleep in the morning, he has risen at the late moment, and, snatching a mouthful of breakfast, ha hurried off to catch the train or omnibus, worrie and anxious lest he fail to reach his office at th hour appointed. At lunch-time, if he be reall hard-worked, he takes, not a meal, but a sandwic or biscuit, eaten perhaps standing, and often bolte in so great a hurry that digestion is difficult he tells us that he dare not take more of a meal i the middle of the day, for he would be rendere unfit for the remainder of his work. In the even ing, with what appetite he may, he eats his dinne perhaps not before half past seven o'clock. Nov granting that his dinner is amply sufficient, such man lives on one meal a day with very little b sides. These are the persons who cannot go o without frequent holidays; nervous by inheritanc they break down because they are insufficiently fe A holiday, during which they live better, build them up again for a time, again to break down often to fall into the condition above mentioned Another class among whom we may frequently wit ness the same result and corresponding symptom are the clergymen, who for various reasons den themselves an adequate amount of food. Eithe they fast rigidly, according to the rule and doctrin of the day, often allowing some hours to elaps before they break their fast, or they think tha hearty eating is a snare and a carnal enjoyment, c they hold it sinful to eat their fill while others ar in want. Whatever the cause, certain it is tha many of the clergy break down in one or other o the forms of nervous disorder already enumerate and an enlarged dietary is to them a necessity A vast number of women, for one reason or othe take a very small supply of food; some think unladylike to eat heartily; some eat on the sly, an when this is not practicable go without. Many fro the lives they lead are doubtless correct in sayin they cannot eat because they have no appetit These stay in the house from month to month, c never venture beyond the door except in a carriag because ladies do not walk in the streets. Other have misgivings on the score of their digestio Like many women who lead sedentary lives, an habituate themselves to passing long periods with out action of the bowels, they suffer greatly fro constipation, which is looked upon as an indicatio and a warning that they ought not to eat. So the starve themselves, and fancy that if they abstai from food it is of little consequence whether the pass a motion once a week or once a fortnight."

In low nervous depression, or melancholia, Dr Blandford particularly urges the importance of full feeding. "It is not necessary," he thinks, "t adhere to a sick diet — to beef-tea or boiled mut ton, to essence of beef or Liebig's food, or any othe of the concentrations so loudly recommended. Th ordinary diet-list of the individual in health may b

ven without hesitation — fish, game, poultry, meat, ddings, and the rest. His appetite should be mulated by variety, and his dishes may be savory well as wholesome; but the supply must be large. ich patients for the most part have accustomed emselves to eat during the day a scanty and in-fficient amount, and we shall be told that latterly ey have not taken half their usual quantity. It is t to much to say that they require double that hich they have so long taken; and as we shall t be able to induce them to eat double the quan-y at a single meal, it will be necessary to multiply e number of the meals. Instead of breakfast, ich, and dinner, two of which have probably en but the semblance of a meal, we may institute a ies of feedings after this kind: first, something may given early in the morning, before the patient ts up, as rum and milk, egg and milk, chocolate, café au lait. This will be useful in allaying the ling of extreme depression, and dispelling the omy and suicidal thoughts so constantly present first waking. Next, breakfast may be taken, er dressing, and between it and the two-o'clock ich something else, as beef-tea or a sandwich. e dinner-hour should not be later than six, and bed-time some light kind of supper should not omitted. By this kind of division food may administered six times in the day; and if the ient wakes in the night, and is restless and vous, and disinclined to sleep again, food, taken en in small quantity, will often bring back sleep. th all this food may be given a reasonable ount of wine, or wine and stout, and this not way of curing the disorder by stimulants, but ause in conjunction with them less food appears be required, and also because the addition of the wine or beer often renders the taking of the d more easy to the patient.

"Now the latter, and it may be the friends, will otest loudly that it is impossible to take this quan-t: he will assign every conceivable reason for oiding it; but if we are firm and insist, and, if essary, cause him to be fed with a spoon, he will ain and thrive on it, and in a few weeks, or even s, will show very marked signs of its good effect. ients have recovered under this treatment in a gularly rapid manner."

n hysteria and neuralgia he considers the same tment required. Believing that neuralgia is one nifestation of impaired sensibility, as other neu-es may be displayed in mental symptoms, and in se alone, he thinks that the radical cure, and not mere alleviation, is to be found in many cases he supply of a large amount of nutriment to the vous system.

OFFENSIVE BREATH.

THE popular term "bad breath" is a very sig-nant expression for this unpleasant condition. at is more offensive to the acute olfactory sense n a fetid breath? It engenders a feeling of aver-sion and disgust, which is not readily overcome.

Great care should be exercised in keeping the mouth free from all extraneous substances. After each meal, a quill or ivory tooth-pick should be used to remove any aliment that may have become lodged in the teeth during the process of mastication, and the mouth rinsed with tepid soft water. Every night, previous to retiring, the teeth should be cleansed with a soft tooth-brush and water. As a rule, tooth pastes and powders should be eschewed as harmful agents. If a dentifrice is desired, a little fine toilet soap, or charcoal reduced to an impalpable powder, may be used. This is all that will be required. Decayed teeth are a very prolific source of mephitic breath. As soon as it is ascertained that a tooth is affected, it should have immediate attention from some competent dentist.

Carious teeth are often the source of serious functional and general disturbance. It sometimes occurs that persons with a number of defective teeth are constantly ailing with either gastric or nervous troubles, when, upon a removal of these unsound members, all the unpleasant symptoms promptly disappear.

It may be well to give a word of caution in regard to diet; by irregularities in eating, the digestive functions become impaired, and for want of proper digestion, the aliment undergoes zymotic change, during which process noxious gases are evolved, and cause a foul breath. When cases arise from disease, it is either of the stomach, lungs, or the respiratory passages. In these cases a physician should be consulted at once.

Many substances are in vogue to sweeten the breath, and to disguise any unpleasant scent, as of spirits, tobacco, etc. With the vulgar it is customary to use some pungent aromatic, as cloves, etc., but this savors too strongly of the drinking bar to be used by any but tipplers. The following, used as an occasional mouth-wash, will be found excellent. Take chlorate of potash, three drachms, and dissolve in eight ounces of rose or other medicated water. As an article with which to flavor the breath, there is probably nothing equal to the Wild Ginger (*Asarum Canadensis*). It is used by chewing a small portion of the root, or if in powder, it can be made into a lozenge. It imparts to the breath an agreeable, spicy aroma. — *Dental Register.*

TO PREVENT SYRUPS FROM CRYSTALLIZING.

IN reply to complaints that syrups made in the ordinary way (especially Syr. Scillæ Comp. and Syr. Senegæ) soon begin to crystallize, a correspondent of the *Druggists' Circular* recommends making them by the cold way, or by percolation. As a general rule he gives the following: "Take two (2) parts of sugar to one of menstruum (or water, if simple syrup is prepared); introduce the sugar into a percolator, into the neck of which previously has been introduced a piece of lint or sponge, and then gradually pour on the liquid so as to cause the percolate (syrup) to pass, drop by drop. If the liquid (syrup) pass too rapidly, the neck of the percolator should be obstructed by means of cork, until the requisite slowness has been obtained. (See U. S. Dispensatory, article *Percolation.*) Syrup done thus will keep for many years, and will *neither crystallize nor ferment.*"

After making most of the syrups for several years by percolation, he is satisfied that it is the best process. He adds: —

"In many syrups heat injures the medicinal property of the drug, and often the syrup is not as clear as it should be. It frequently requires purification with carbo animalis or albumen, while by percolation (if properly conducted) the syrup will be always pure, clear, and better could not be desired.

"Sometimes heat is necessary to separate the albumen of a menstruum or to evaporate the alcohol; but if that is done the residue may be mixed with water (if it can be mixed), and filtered if turbid; afterwards follow the process of percolation.

"To make the Syr. Scillæ Comp. I use the following process: Take the Squills and Senega, according to the U. S. D., macerate for 24 hours in sufficient diluted alcohol, strain and transfer it to a percolator, and pour diluted alcohol upon it until sufficient tincture shall have passed to make the measure of three pints. Boil this for a few minutes, filter while cool, and evaporate it by means of the pharmaceutical still, to the consistency of a syrup; then dissolve the tartar emetic in half an ounce of hot water, add sufficient simple syrup (prepared by percolation) to make the measure three pints. This syrup will stand any temperature and not crystallize."

COD-LIVER OIL.

DR. J. M. WINN, senior physician to St. George's and St. James' Dispensary, says in the *British Medical Journal*: —

"The following example is a remarkable illustration of the value of cod-liver oil in a case that appeared, at first sight, an unpromising one for its use.

"A child, six years and a half old, was brought to me dreadfully disfigured by an eruption of eczema impetiginodes over the forehead, nose, lips, and left cheek. She was one of the largest and most robust looking children I ever saw, and her muscles were firm and well developed. She was the daughter of Jewish parents; and I was informed that her brothers and sisters were all on the same large scale. Attributing the disease in a great measure to a plethoric condition, I prescribed aperients and alkalies; and as she was in the habit of eating very heartily of animal food, I reduced her allowance of meat. After continuing this plan for a fortnight, there was no amendment; I then changed the treatment, and ordered one small tea-spoonful of cod-liver oil three times a day. The effect was immediate, and in about a fortnight the eruption had disappeared, and the child was quite well in every respect.

"A case which I am now attending will serve to show that all the beneficial effects of cod-liver oil may be produced by the use of very small quantities, even on full-grown persons of very large proportions. The patient is an ex-Life-Guardsman, above six feet in height, suffering from tubercular disease. He appeared to be in a sinking state, but has now rallied far beyond my expectation from the use only of one drachm of the oil three times a day.

"From these and similar instances of constant occurrence, I infer that cod-liver oil does not act as a mere article of food; neither is it a simple tonic, like iron or gentian; but that it has a specific virtue of its own — in short, I would suggest that cod-liver oil is to hereditary affections what quinine is to zymotic diseases."

MEDICAL MEMORANDA.

SPONGIO-PILINE. — This is the name of an ingenious contrivance, recently introduced abroad, which may be used either as a poultice or as the means of fomentation. It consists of wool and small particles of sponge, apparently felted together, and attached to a skin of india-rubber. It is about half an inch in thickness. It retains heat for a considerable time, and by means of it vinegar, laudanum, camphor, hartshorn, etc., can be placed on the skin, accompanied by heat and moisture, much more readily, and with greater cleanliness, than by the use of ordinary poultices.

GUNSHOT WOUNDS OF THE HEART. — "Shot through the heart" is a familiar expression in connection with war and battles, but it appears from statistics to be a rhetorical rather than a literal account of the way soldiers are usually killed. Of 87,822 wounded in our late war, among which are 7,062 gunshot wounds of the thorax, 4,759 wounds of the thoracic walls, and 2,303 penetrating wounds of the chest, there were recorded only four cases of gunshot wounds of the heart.

POISON IN THE SNUFF-BOX. — There seems to be no end to the ways in which we may be poisoned with lead. Dr. Garrod, at King's College, Dublin, lately described a case in which the mineral was taken in snuff. It was rappee that the patient habitually took, and the damp snuff packed in the usual lead cases converted some of the metal into carbonate. The symptoms were serious, and with difficulty traced to their real source. Then several packages were purchased, and found to be contaminated with the poison. Snuff-takers would do well to take this important lesson to heart.

To Spread Plasters. — In spreading plasters extemporaneously, says the *Pharmacist*, convenience requires and neatness demands an uncoated marginal edge. This is usually secured by pasting strips of paper along the edges of the skin, and removing them after the spreading of the plaster is effected. It is just here that a practical difficulty frequently arises. The paper edges are liable, from drying of the paste, to adhere so strongly that either paper or skin will give way upon an attempt at their removal; the application of water will then be necessary to soften the attachment, and the final results may be expected to present a daubed and uncleanly aspect. This difficulty may be entirely avoided by applying to the paste brush a little glycerine before the adjustment of the marginal strips.

Calendula Officinalis. — Dr. A. Livezey asserts that a tincture of the flowers of marigold is vastly superior to that of arnica. He has used it for many years for all kinds of wounds, by saturating a piece of lint, and applying it to the part.

Hypophosphite of Soda. — Dr. J. C. Thorowgood thinks this salt answers all the purposes of pure phosphorus as an internal remedy, and as a gradual tonic and restorer of nerve force. In cases of nervous depression and torpor, with, at times, shooting neuralgic pains, or in other cases, numbness and deadness of the limbs, as from feeble circulation, the hypophosphites prove useful, and the lime or soda salt can be given according to the way in which the stomach may seem to bear the one better than the other. When anæmia is present, the citrate of iron can be added, or else the syrup of the hypophosphites of iron, or iron with quinine, can be employed. Either of these syrups will prove an active tonic, removing neuralgic pains, chest oppression, and languor of circulation in a very evident way.

How to Administer Raw Meat. — The *Lancet* says: "The fillet should be preferred, as being the most delicate and the richest in muscular fibrin. It should be freed with the utmost care from fat and tendon. It should be finely minced, and then brayed in a mortar of wood or stone. When reduced to a paste it should be covered with sugar, gluten, or vegetable gelatine, to overcome the repugnance with which it is at first naturally regarded. Some prefer to squeeze out the juice, and swallow it mixed with a little rum or orange-flower water; whilst others again make it into boluses, and take it in slightly warmed beef-tea or soup."

Sea-sickness. — Dr. O. Rapin, of Switzerland, says that he has found that the nausea and vomiting produced by swinging and sea-sickness can be arrested by applying to the epigastrium a layer of wadding dipped in collodion. It should extend from the xiphoid cartilage to the umbilicus, and be left until it falls off. If the adhesion should be imperfect, the application should be renewed. Several persons, he says, have tried this plan with benefit. The explanation which he gives of it is, that the action of the peripheral nerves is interrupted just in the same way as the pain of calculi in the bile-passages or ureters is sometimes mitigated by the application of castor oil and collodion.

The Title of "Doctor." — The title of "doctor" was invented in the twelfth century. Irnerius, a learned professor of law at the University of Bologna, induced the Emperor Lothaire II., whose chancellor he was, to create the title, and he himself was the first recipient of it. He was made doctor of laws by that university. Subsequently the title was borrowed by the faculty of theology, and first conferred by the University of Paris on Peter Lombard. William Gordenio was the first person upon whom the title of doctor of medicine was bestowed; he received it from the College of Asti, in 1329.

Castor Oil in California. — Though the castor bean has been cultivated in the middle and lower counties of the State for fifteen or sixteen years, it is only during the last four years that its cultivation has been conducted with a view to profit. The quantity of oil produced in 1869 was 10,000 gallons. The San Francisco Oil Works expect to produce the present year 15,000 gallons; various manufacturers in Marysville, 8,000 gallons; and others in Santa Barbara, some 4,000 gallons more, or in the aggregate 27,000 gallons, — an amount not more than sufficient to supply the home demand, which was near 25,000 gallons in 1869. The imported oils have been held at $2.25 per gallon, while that manufactured here can be furnished for $1.00 per gallon, and leave a handsome profit.

Knowledge versus Pestilence. — "The people perish for lack of knowledge," might have been the text of the "Lay Sermon" in which Huxley discourses as follows: —

"We have learned that pestilences will only take their abode among those who have prepared unswept and ungarnished residences for them. Their cities must have narrow, unwatered streets, foul with accumulated garbage. Their houses must be ill-drained, ill-lighted, ill-ventilated. Their subjects must be ill-washed, ill-fed, ill-clothed. The London of 1665 was such a city. The cities of the East, where plague has an enduring dwelling, are such cities. We, in later times, have learned somewhat of Nature, and partly obey her. Because of this partial improvement of our natural knowledge and of that fractional obedience, we have no plague; because that knowledge is still very imperfect, and that obedience yet incomplete, typhus is our companion, and cholera our visitor. But it is not presumptuous to express the belief that, when our knowledge is more complete and our obedience the expression of our knowledge, London will count her centuries of freedom from typhus and cholera, as she now gratefully reckons her two hundred years of ignorance of that plague which swooped upon her thrice in the first half of the seventeenth century."

VALUABLE FORMULÆ.

Carbolic Acid in Rubeola. — Dr. T. J. Williamson has found much advantage from the use of Carbolic Acid in malignant form of measles. In one case his prescription was as follows: —

℞	Syrp. Scillæ, c.	f. ℥i.
	Syrp. Ipecac	
	Tinct. Lobelia Inf. āā	f. ʒi.
	Carbolic Acid	gtt. xvj. M.

S. Teaspoonful every hour.

And as a wash for mouth —

℞	Carbolic Acid	℈ii.
	Chlo. Potass.	℈i.
	Mellis desp.	℥ss.
	Aq. Camph.	f. ℥ii. M.

S. Gargle the mouth every three or four hours.

Eye Salve for Granular Lids and Chronic Ophthalmia. — Dr. John Williams, in the *Dublin Quarterly Journal of Medical Science*, writes thus: "After long experience I can speak most confidently of this ointment, for the composition of which I now publish the following formula: ℞ Arsenici Sulphureti, 2 gr.; Unguenti Citrini, 2 ʒ; Axungiæ Preparat., 6 ʒ. M. Bene. In cases of 'granular lids,' accompanied with most inveterate 'pannus,' and in almost all cases of chronic ophthalmia, in which the conjunctiva has become almost cuticular, I have found this ointment particularly useful. Ophthalmia is well known to be very prevalent in the city and county of Cork, so that I had very many opportunities of proving the efficacy of this ointment. The upper eyelids should be everted in cases of 'granular lids,' and about the size of a hemp-seed of this ointment should be applied with a camel-hair pencil, which must be introduced into the superior palpebral sinus, to the diseased conjunctiva."

Glycerine in Phthisis. — In the early st[age] of Phthisis the following is highly recommended —

℞	Glycerine	℥ii.
	Iodid. Potass.	ʒi.
	Sulph. Morphiæ	grs. ii. M.

S. A teaspoonful before each meal, and at [be]d time. In the advanced stages, the following is [pre]ferred: —

℞	Glycerine	℥ii.
	Syrp. Iodidi Ferri	℥ss.
	Sulph. Morphiæ	grs. ii. M.

S. Teaspoonful every four or six hours.

Glycerine will be found to be the best solv[ent] when prescribing medicines in liquid form. [It] should always be used in place of syrup, w[hen] medicines are to be given in this way to child[ren]. It never ferments. The best article should be u[sed].

Prescription for Chronic Bronchitis.

℞	Ammoniaci	ʒi.
	Pulv. Ipecac	gr. x.
	Mur. Morphiæ	gr. iv.
	Carb. Ammoniæ	ʒii.
	Mucilaginis Acaciæ	q. s.
	Misce et divide in pilulas	xxx.

Sig. — Give one pill, three times a day, in c[as]e attended with viscid bronchial secretion.

Prof. Van Buren's Pill for Constipati[on].

℞	Extracti Aloes	ʒss.
	Extracti Nucis Vomicæ	gr. vi.
	Extracti Hyosciami	℈i.
	Pulv. Ipecacuanhæ	gr. l. M.

Make pills xx. S. One to be taken at n[ig]ht. This pill is of especial value in the constipatio[n] of females.

APPROVED COSMETICS.

GLYCERINE BALSAM.

This is designed to whiten and soften the s[kin], remove roughness, chaps, chilblains, and irrita[tions] from common causes.

Take white wax (pure)	1 ounce.
Spermaceti	2 ounces.
Oil of almonds	9 "

Melt together by a moderate heat in a glazed ea[rth]enware vessel, and add

Glycerine (best)	3 ounces.
Balsam of Peru	½ ounce.

The mixture is to be stirred until nearly cold, a[nd] then poured into pots. [Instead of balsam of P[eru], 12 or 15 drops of ottar of rose may be employed.]

BALSAM OF HONEY.

Take fine pale honey	4 ounces.
Glycerine	1 ounce.

Mix by a gentle heat; when cold add

Alcohol	1 ounce.
Essence of ambergris	6 drops.
Citric acid	3 drachm[s].

This is intended to remove freckles and discolo[ra]tions, as well as to improve the general appear[an]ce of the skin.

COLD CREAM.

Take white wax, Spermaceti, of each	1 ounce.
Oil of almonds	¼ pint.

Melt, pour the mixture into a Wedgewood mo[rtar] which has been heated by being immersed in [hot] water; add gradually

Rose water	4 fl. ou[nces].

and stir until an emulsion is formed, and afterw[ar]d until the whole is nearly cold. Put in pots. It may be perfumed with bergamot or lavender. — *Druggists' Circular.*

Counter Practice. — The *Boston Medical* [an]d *Surgical Journal* calls the attention of apotheca[ries] to an excellent example afforded by one of t[he]ir own number, in whose shop is conspicuously pla[ce]d the notice: "We are pharmacists, but not phy[si]cians; we dispense medicines, but do not presc[ribe] for diseases."

Boston Journal of Chemistry.

VOLUME V. BOSTON, JUNE, 1871. NUMBER 12.

Familiar Science.

CHEMISTRY OF A HEN'S EGG.

IT is presumed that but few of those who break the shells of the cooked eggs of our common domestic fowls, at the breakfast table, ever think of the wonderful nature of the structure they crush, or of the complex chemical nature of the contents consumed as food. To a large majority of people, an egg is an egg, and nothing more. If the multitude were inclined to inquire into the composition of this curious embryotic substance, the impatience of hunger which universally prevails at the commencement of the morning meal, would render the hour quite unpropitious, and therefore we hardly expect to secure the reader's attention until the time arrives for lighting the evening lamp.

Before proceeding to inquire into the interior composition of the egg, we will consider the exterior covering, or the shell, the physical and chemical structure of which is exceedingly interesting and wonderful. The white, fragile cortex called the shell, composed of mineral matter, is not the tight, compact covering which it appears to be, for it is everywhere perforated with a multitude of holes, too small to be discerned by the naked eye, but which with the aid of a microscope are distinctly revealed. Under the microscope the shell appears like a sieve, or it more closely resembles the white perforated paper sold by stationers. Through these holes there is constant evaporation going on, so that an egg, from the day that it is dropped by the hen to the moment when it is consumed, is losing weight, and diminishing in volume. This process goes on much more rapidly in hot weather than in cold, and consequently perfect eggs are not so readily procured in summer as in winter. If by any means we stop this evaporative process, the egg remains sound and good for a great length of time. Covering the shell with an impervious varnish, or with mutton suet, or lard, aids greatly in their preservation. The substance used to stop transpiration must not be soluble in watery fluids, or liable to be readily removed. By chemical agencies, that is, by actually filling up the little holes in the shell by lime placed in contact in solution (the solution holding the proper chemical substances to form an impervious coating of carbonate of lime over the entire surface), we have preserved eggs for months and even years in a sweet condition. Not long ago, eggs broken in our laboratory were found to be quite fresh, which according to the memorandum made upon the vessel, were placed in the solution in May, 1867.

The shell of the egg is lined upon its interior everywhere, with a very thin but pretty tough membrane, which, dividing at or very near the obtuse end, forms a small bag which is filled with air. In new-laid eggs, this follicle appears very little, but it becomes larger when the egg is kept. In breaking an egg this membrane is removed with the shell, to which it adheres and therefore is regarded as a part of it, which it is not.

The shell proper is made up mostly of earthy materials, of which 97 per cent. is carbonate of lime. The remainder is composed of two per cent. of animal matter, and one of phosphate of lime and magnesia. Carbonate of lime is the same material of which our marble quarries and chalk beds are composed; it is lime, or oxide of calcium, combined with carbonic acid, and is a hard insoluble mineral substance, which does not appear to form any portion of the food of fowls. Now, where does the hen procure this substance with which to form the shell? If we confine fowls in a room, and feed them with any of the cereal grains, excluding all sand, dust, or earthy matter, they will go on for a time and lay eggs, each one having a perfect shell, made up of the same calcareous elements. Vauquelin, the distinguished chemist, shut up a hen ten days, and fed her exclusively upon oats, of which she consumed 7,474 grains in weight. During this time four eggs were laid, the shells of which weighed nearly 409 grains; of this amount 276 grains was carbonate of lime, $17\frac{1}{2}$ phosphate of lime, and 10 gluten. But there is only a little carbonate of lime in oats, and from whence could this 409 grains of the rocky material have been derived? The answer to this question opens up some of the most curious and wonderful facts connected with animal chemistry, and affords glimpses of many of the operations of organic life, which, to the common mind, seem in the highest degree paradoxical and perplexing. The body of a bird, like that of a man, is but a piece of chemical apparatus, made capable of transforming hard and fixed substances into others of a very unlike nature. In oats there is contained phosphate of lime, with an abundance of silica, and the stomach and assimilating organs of the bird are made capable of decomposing or rending asunder the lime salt, and forming with the silica a silicate of lime. This new body is itself made to undergo decomposition, and the base is combined with carbonic acid, forming carbonate of lime. The carbonic acid is probably derived from the atmosphere, or more directly perhaps from the blood. These chemical changes among hard inorganic bodies are certainly wonderful when we reflect that they are brought about in the delicate organs of a comparatively feeble bird, under the influence of animal heat and the vital forces. They embrace a series of decomposing and recomposing operations which it is difficult to imitate in the laboratory. In the experiment to which allusion has been made, the amount of earthy material found in the eggs and the excrement of the hen exceeded that contained in the food she consumed. This seems paradoxical, and can only be explained upon the ground that birds as well as animals have the power in times of exigency, of drawing upon their own bodies for material which is required to perform necessary functions.

The shell of an ordinary sized hen's egg weighs about 106 grains, that is, the inorganic portion of it; and if a bird lays 100 eggs in a year, she produces about 22 ounces of nearly pure carbonate of lime in that period of time, which would afford chalk enough to meet the wants of a farmer, or perhaps even of a house carpenter of moderate business, for a twelvemonth.

If a farmer has a flock of one hundred hens, they produce in egg-shells about 137 pounds of chalk annually; and yet not a pound of the substance, or perhaps not even an ounce, exists around the farm-house within the circuit of their feeding grounds. This is a source of lime production not usually recognized by farmers or hen fanciers, and it is by no means insignificant. The materials of the manufacture are found in the food consumed, and in the sand, pebble-stones, brick-dust, bits of bones, etc., which hens and other birds are continually picking from the earth. The instinct is keen for these apparently innutritious and refractory substances, and they are devoured with as eager a relish as the cereal grains or insects. If hens are confined to barns or outbuildings, it is obvious that the egg-producing machinery cannot be kept long in action, unless the materials for the shell are supplied in ample abundance.

Within the shell the animal portion of the egg is found, which consists of a viscous colorless liquid called albumen, or the *white*, and a yellow globular mass called the vitellus, or *yolk*. The white of the egg consists of two parts, each of which is enveloped in distinct membranes. The outer bag of albumen, next the shell, is quite a thin watery body, while the next which invests the yolk, is heavy and thick. But few housekeepers who break eggs ever distinguish between the *two whites*, or know of their existence even. Each has its appropriate office to fulfil during the process of incubation or hatching, and one acts, in the mysterious process, as important a part as the other. If we remove this glairy fluid from the shell and place it in a glass and plunge into it a strip of reddened litmus paper, a blue tinge is immediately produced, which indicates the presence of an alkali. The alkali is soda in a free condition, and its presence is of the highest consequence, for without it the liquid would be *insoluble*. A portion of the white of egg when diluted with water, and a few drops of vinegar or acetic acid added to it, undergoes a rapid change. The liquid becomes cloudy and flocculent, and small bits of shreddy matter fall to the bottom of the vessel. This is pure albumen, made so by removing the soda held in combination by the use of the acid. A pinch of soda added to the solid precipitate redissolves it, and it is again liquid. There is another way by which the albumen is rendered solid, and that

is by the application of heat. Eggs placed in boiling-hot water pass from the soluble to the insoluble state quite rapidly, or in other words, the albumen both of the white and the yolk becomes "coagulated." No contrast can be greater than that between a boiled and unboiled egg. Not only is it changed physically, but there is a change in chemical properties, and yet no chemist can tell in what the change consists. It is true, the water extracts a little alkali, and a trace of sulphide of sodium, but the abstraction of these bodies is hardly sufficient to account for the change in question.

The hardening of the albumen of egg by heat constitutes the cooking process, and this deserves a moment's consideration. Great as is the physical and chemical difference between a fully cooked and an uncooked egg, it is no less remarkable in the degree of digestibility conferred upon it by the process. Uncooked, it passes by the most simple processes of assimilation from the digestive to the nutritive and circulatory organs, and is at once employed in nourishing or sustaining the bodily functions. Unduly cooked, the egg resists the action of the gastric juices for a long time, and becomes unsuited to the stomachs of the weak and dyspeptic. A raw or soft-boiled egg is of all varieties of food the most concentrated and nourishing; a hard-boiled egg is apt to trouble the digestion of the strong and healthful, and its nutrient properties are sensibly impaired.

The yolk contains water and albumen, but associated with these is quite a large number of mineral and other substances which render it very complex in composition. The bright yellow color is due to a peculiar fat or oil, which is capable of reflecting the yellow rays of light, and this oil holds the sulphur and phosphorus which abound in the egg. If the yolk be removed and dried, and the yellow oil separated, it will be found to form two thirds of the substance. The whole weight in its natural state is about 300 grains, of which three fifths is water; of the white, more than three quarters is water.

The yolk and albumen of a fecundated egg remains as sweet and free from corruption during the whole time of incubation as it is in new-laid eggs, and there is but little loss of water, whereas an unfecundated egg passes rapidly into putrefactive decay and perishes.

Any one who eats three or four eggs at breakfast, consumes that number of embryo chicks. All the materials which enter into the legs, bones, feathers, bill, etc., of the new-born chick exist in the egg, as nothing is derived from outside. The little creature which has just pecked his way out of his calcareous prison-house, has lime and phosphorus in his bones, sulphur in his feathers, iron, potash, soda, and manganese in his blood, all of which mineral constituents came from the egg, and are taken into the stomach when it is eaten as food. The valuable or important salts are contained in the yolk, and hence this portion of the egg is the most useful in some forms of disease. A weakly person, in whom nerve force is deficient and the blood impoverished, may take the yolks of eggs with advantage. The iron and phosphoric compounds are in a condition to be readily assimilated, and although homeopathic in quantity, nevertheless exert a marked influence upon the system. The yolks of eggs, containing as they do less albumen, are not so injuriously affected by heat as the white, and a hard-boiled yolk may be usually eaten by invalids without inconvenience. The composition of a fresh egg, exclusive of the shell, may be presented as follows: —

Water	74	parts
Albumen	14	"
Oil or fat	10.5	"
Mineral salts	1.5	"
	100	

The whole usually weighs about a thousand grains, of which the shell makes a tenth part. The chick-making materials, exclusive of water, form only one quarter of the weight of the liquid contents, or only about 200 grains. This seems to be a small beginning upon which to rear the full-grown rooster. The bulk or quantity, as found in hens' eggs, and indeed in the eggs of all birds, is wonderfully disproportionate to the size of the mother bird. The laying of eggs must be regarded as a particularly exhausting process, and yet fowls will keep it up for a long time and not lose much in flesh. We have a hen of the *game* variety, which has this spring laid 22 eggs in 22 consecutive days, and they average in weight 1,000 grains each. This gives in amount 22,000 grains, or rather more than three pounds avoirdupois, of which about two and a quarter pounds is water. The dozen or more ounces of rich nutritive material, parted with in 22 days, would seem to be a prodigious draught upon the small physical structure of the bird, but there were no indications of exhaustion.

Whilst it is true that the quickening of an egg which results in the birth of a chick, is no more marvelous a process or result than the embryotic development of any creature endowed with the mysterious principle of life, yet there are some circumstances connected with it which make it a matter of greater perplexity and wonder. Here is an oval white body consisting of a calcareous shell, within which there are some semi-fluid substances, consisting mainly of albumen and water, without any signs of life. In fact there is no life; it is simply a mass of dead inanimate matter. Talk as much as we will about the germinal principle involved in the structure of the egg, we are totally unable to recognize it, or form any conception of its nature. There is no evidence of the presence of any germ, or principle of life whatever. The egg left to itself decays like other organized substances, but with our assistance in simply transferring it to a place where the temperature is kept in a certain uniform condition, in a few weeks the albumen, water, oil, and mineral salts are transformed into a living chick, which thrusts its little beak through the shell, and in ten minutes is running about almost able to take care of itself. Here is the development of life apparently without the agency of the mother, and what a marvel! The chemist may place together in a body, in a warm place, just such elements or substances; he may carefully weigh the water, the albumen, the phosphatic compounds, the sulphur, the iron, soda, etc., and construct a very accurate egg mixture, but out of it all there will never come a living chick. In this we obtain some idea how little we actually know about *life*, how dark is the region where the life principle begins, or where the vital forces originate. The indefatigable man of science has pushed his inquiries close up to the boundary between the inanimate and the animate, but he has never been able to obtain the least glimpse of anything upon the *life* side of the line. However great may be our curiosity, our skill, or knowledge in this state of existence, there is not the least probability that we shall ever be able to endow matter with life, or know much more than we do at present of its origin or nature.

THE LAST DAYS OF ALCHEMY IN GERMANY.

In the last number of the Journal we gave some account of James Price, whose strange story with its tragical ending forms the concluding chapter in the history of alchemy in England. We intimated that in Germany the career of the occult science was terminated in rather a farcical way, and we will try to tell the story briefly in the present article.

At the very time when Price was making his experiments in the transmutation of metals, there lived at Halle a learned professor of theology, by the name of Semler. He had heard of the marvels of alchemy in his youth, from a friend of his father, and the subject never ceased to interest him. His favorite recreation, after the labors of his professorship in the University, was working in a chemical laboratory that he had fitted up in his house. But after a time he became disgusted with the unprofitable pursuit, and gave it up wholly. Some years later, a Baron Hirschen made a great sensation in Germany with what he called the "salt of life," one of those "universal medicines" such as are not unknown even in this enlightened age, when thousands who wonder that people were ever deceived by the pretensions of alchemy become the ready victims of the latest quack with his infallible cure-all. Semler tried some of the salt of life, and feeling better for the dosing, sat down and wrote three ponderous treatises on its marvelous properties; even as grave divines sometimes indite extravagant "puffs" of the panaceas most in vogue in these latter days.

So wonderful did the medicinal salt appear to Semler, that he imagined it might prove to be the veritable philosopher's stone for which the alchemists had vainly sought. He determined to test its possibilities in that direction, and fitted up his long-neglected laboratory for the investigation. Meanwhile he dissolved some of the salt in pure water, and set the earthen vessel containing the solution near a stove, to see what effect a moderate heat would have upon it. On looking into the vessel a day or two later, he was surprised to see a few thin scales of a yellowish metal lying at the bottom. Eagerly testing them, he found them to be pure gold! There could be no doubt about it: here was the precious substance, obtained, not, as the alchemists had predicted, by the transmutation of the baser metals, but rather according to the theories of Hermes Trismegistus, by generation. But Semler was a cautious man, and was not satisfied that he had made a great discovery, until he had repeated the experiment several times, which he did with the same remarkable result. Convinced at last that gold was actually generated in a solution of the salt of life, and being no less conscientious than cautious, he wrote a minute account of his experiments to Hirschen, to whom he considered that the advantages of the discovery rightfully belonged. But Hirschen, though a quack, was evidently no fool, and wrote

back to Semler that he had better attend to his theological duties, and not meddle with matters that he did not understand.

Thus ungratefully snubbed, Semler thought it his duty to publish his discovery to the world. He did so, and the salt of life became more than ever in demand throughout all Germany. In nearly every house a pot of it might be seen beside the fire. In vain, however, did these household alchemists look for gold to appear in the simmering solution. That lucrative result was manifested in Semler's earthen pot again and again, but nowhere else.

What could be the cause of this? A German professor never confesses a problem to be insoluble, and Semler wrote a lengthy and learned treatise to prove that he obtained gold, while others did not, because he had maintained in the experiment that perfect regularity of temperature which was requisite, by fecundating the salt, to generate the precious metal. But Klaproth, the most eminent chemist of the day, having analyzed the salt of life, found it to be nothing but a mixture of sulphate of soda and sulphate of magnesia (Glauber's salt and Epsom salt), which of course could not produce gold under any circumstances whatever. Thereupon Semler sent Klaproth some of his salt of life, in powder and in solution, and in both of these gold was found upon analysis. Here was a mystery; for Semler's character was such that no reasonable man could suspect him of wilfully deceiving others, while, on the other hand, it did not seem possible that he could have deceived himself. A bitter controversy ensued between the friends and partisans of the theologian on the one hand, and those of the chemist on the other; and, to settle it, Klaproth at last consented to analyze Semler's solution at Berlin in presence of the King's ministers and other distinguished persons.

The result developed a new mystery. Klaproth found no gold in the solution, but he did find a kind of brass, or "Dutch metal," as it is now called. This new offspring of Semler's "fecundated" liquid was laughed at as a good joke; but the government was not inclined to let it pass in that way. An investigation was made by the police, and the enigma was soon disentangled. Semler had an old servant, who, for the sole purpose of gratifying his beloved master, used to drop bits of gold-leaf slily into the pot by the fire. Having to be away from home for a few days, he entrusted the secret to his wife, and gave her money to buy the gold-leaf that would be needed to keep up the alchemy in his absence. But the worthy *frau* had a weakness for brandy, and thinking that tinsel would do as well for the professor's solution as gold-leaf, bought the former instead of the latter, and so saved an honest penny for her private potations. In Shakespeare's day, as the reader may know, wine was sometimes facetiously called the "grand elixir" of the alchemists; and "gilded" (as you may see by reference to the last scene of *The Tempest*) was another name for *drunk*. Now, just at the time when the good woman was "gilding" herself, instead of putting the gold into her master's mixture, the public analysis by Klaproth took place, and the pinchbeck was therefore found in place of the pure metal.

Semler had the good sense to join in the laugh when the real nature of his alchemy was exposed, instead of writing another heavy disquisition to justify himself, or drinking laurel-water, like Price, to escape the humiliation that would be connected with a frank confession of his error. Alchemy never recovered from the effects of the blow, being fairly laughed out of its feeble remnant of life; but the excellent theological professor, though he may have shut up his laboratory again in disgust, did not probably suffer materially in reputation, — that is, as a theologian and as a man.

GOLD AND GEOLOGY.

That theory may sometimes prove only a blind guide, and that a joker may sometimes have the laugh turned against himself, is the double "moral" of the following good story, told by a writer in *Lippincott's Magazine* for May: —

"In the earliest days of gold-mining we established certain auriferous geological laws. It was legitimate that gold should be found only in certain locations on the river bank, in the bed, in gulches or flats, on riffles and bars. But gold was no respecter of these laws. There is near Columbia, Tuolumne County, a very large flat, over a mile in diameter, and perhaps four in circumference. It has been immensely rich. It is surrounded on all sides by hills. One day, some nineteen or twenty years ago, a negro walked over this flat. He had just arrived in the country: he had come to dig for gold. He approached a party of miners at work, and asked them where he had better dig. These were geological miners. They held that gold should be found only in flats and low places. They were also white miners. White miners some nineteen years ago felt themselves at full liberty to expend their rough humor over a solitary inquiring negro: so they told him that good diggings might be found up on yonder hill, pointing to one of the highest in the neighborhood, as yet untouched by pick or shovel. It was a good joke thus to send Ethiopia up the barren hill that hot summer's day, the mercury standing at one hundred in the shade. Ethiopia confidingly went, dug, perspired, and opened one of the richest claims in Tuolumne.

Caucasia heard of it. The grin faded from her features. She dropped her picks and shovels, ran from the plain, ran up that hill, and in twenty-four hours it was entirely staked out in claims. Ethiopia had some trouble in preserving the integrity of his own legitimate mining boundaries. Caucasia ever after that was careful how she joked with inquiring negroes as to the locality of 'diggins.' She also lost confidence in her geology."

A SPIDER'S ENGINEERING.

In 1830, at Newcastle-on-Tyne, England, a gentleman boasted to a friend that he could introduce to him an engineer of more wonderful skill than Robert Stephenson, who had just made himself famous by perfecting the railway locomotive. In fulfillment of the boast he brought out a glass tumbler containing a little scarlet-colored spider, whose beauty, with its bright yellow nest on a sprig of laurustinus, had induced a young lady to pluck it from the bush where it was growing. When brought into the house, it was placed on the mantel-piece, and secured by placing a glass over it.

In a very short time, this wonderful little engineer contrived to accomplish the herculean task of raising the sprig of laurustinus, a weight several hundred times greater than itself, to the upper part of the glass, and attaching it there so firmly that, after forty years, it is still suspended where it was hung by the spider.

In the Bible we read: "The spider layeth hold with her hands, and is in kings' palaces;" but in its glass prison there was nothing for it to lay hold of — no peg, or nail, or beam, on which to fasten its threads; yet in a short time the little insect had nearly filled the interior of the glass with minute, almost invisible threads, by means of which it had accomplished its task.

It is believed that this kind of spider always deposits its nest upon trees, and never upon the ground; and this may account for its wonderful effort to raise the branch to the upper part of the glass.

It may still be seen, dead and dry, hanging by one of its threads from the top of its prison house, with its little nest upon a leaf of the laurustinus.

HINTS FOR THE LECTURE-ROOM.

Fluorescence. — Professor Fluckiger, of Berne, has discovered a liquid that shows the phenomena of fluorescence in a very remarkable manner. If about 70 drops of the essential oil of peppermint be shaken with one drop of nitric acid, sp. gr. 1.2, the fluid turns faintly yellow; it then becomes brownish, and after an hour or two exhibits a most beautiful blue violet, or greenish blue color when examined in transmitted light. When observed in reflected light, the liquid is of a copper color, and not transparent.

To Solidify Carbonic Disulphide. — A German chemical journal describes a very simple method of solidifying bisulphide of carbon, which usually requires a temperature of —90° C. This is effected by sending a rapid current of very dry air over the surface of the pure liquid contained in a glass vessel. If, to water contained in a capsule, a little bisulphide of carbon is added, it may be rapidly converted into ice by driving a current of dry air over it.

To Show the Reaction of Ozone. — A Russian chemist has devised a simple experiment for this purpose. Invert a Hofmann eudiometer, and after connecting the platinum wires with an induction apparatus pass oxygen gas slowly through the tube, and then through Liebig's potash bulbs, in which is a solution of iodide of potassium and starch. The presence of the ozone will presently be shown by the liberation of the iodine and the bluing of the starch.

USEFUL RECIPES.

Gall-Soap. — Gall-soap, for washing fine silk and ribbons, is prepared in the following manner: In a vessel of copper one pound of cocoa-nut oil is heated to 60° Fahr., and half a pound of caustic soda is added with constant stirring. In another vessel, half a pound of white Venetian turpentine is heated, and when quite hot, stirred into the copper kettle. This kettle is then covered and left for four hours, being gently heated, after which the fire is increased until the contents are perfectly clear, when one pound of ox-gall is added. After this, good, perfectly dry Castile soap is stirred into the mixture until the whole will yield but little under the pressure of the fingers; for which purpose, from one to two pounds of soap are required for the above quantity. After cooling, the soap is cut into pieces. It is excellent, and will not injure the finest colors.

Lacquering Varnish. — A varnish recommended as well adapted for lacquering pictures and engravings, as well as for preserving dried plants and flowers, is prepared by pounding up ten ounces of gum sandarac, four ounces of mastic, and half an ounce of camphor, and adding three quarts of strong alcohol. The mass is to be frequently shaken up, and finally placed in a warm situation until it settles. Plants coated with this varnish will, it is said, be protected from destruction by insects, and will retain their colors fresh and unchanged. This

varnish does not peel off, and, therefore, can be applied very thin.

To Keep Butter Sweet. — No better plan has ever been devised than to put it in clean *jars* and cover it with strong brine. No kind of vessel, cask, or tub, will answer as well as the jar. In this way it can be kept fresh and sweet for twelve months.

CULINARY HINTS FROM FOREIGN SOURCES.

Norwegian Oatmeal Porridge. — Take two or three handfuls of meal, mixed, coarse and fine, in proportion of one third latter to two of the former. Mix in a basin of cold water and pour into a pan containing about a quart of boiling water, adding a small portion of salt. Set on the fire, and keep stirring, adding from time to time small doses of meal until it boils and has acquired a proper consistency; which may be known by its glutinous state, as it drops from the spoon. Let it simmer ten minutes, then pour into common dinner plates. Spoon out portions, and float in new milk, adding sugar to taste.

Fish Macaroni. — *Land and Water* gives the following, to be made from the fish left from the day before, or from fresh fish of any kind: Take equal quantities of cold or freshly cooked fish, free from bones, and boiled macaroni; mix them well together, with a good quantity of grated cheese, and pepper and salt; put the whole in a flat dish, and smooth it over, put on the top a few small pieces of butter, and grate some more cheese over it; brown it well before the fire, and serve it up very hot.

A Diabolical Dish. — The same journal gives the subjoined receipe for what is known among British epicures as "the Devil": "Roast a leg of mutton until it is three parts done; then take it from the fire, and score it to the bone in slices about half an inch thick, but do not detach them from the bone. Mix together some cayenne pepper, salt, nutmeg, mace, and dried herbs (such as thyme, marjoram, etc.), all pounded. Season the mutton well between each two slices with this mixture; then put it in the oven for half an hour, and baste it well with butter, at first. When you take it out of the oven, lift it off the dish, and put it on another one. Take the gravy that has run from the meat whilst in the oven, add to it four glasses of good port wine, half a pint of good gravy, a little mushroom ketchup and Harvey sauce, and boil all together for two or three minutes. Pour this over the leg of mutton, and you will say it is indeed *un bon diable*." A dyspeptic, we fancy, would find it *un diable* without the *bon*.

An Excellent Turkish Pillau. — Under this head, the *Food Journal*, which gives only the most approved formulæ of the kind, furnishes the following: "Chop up 1 lb. of good mutton, put it in a saucepan, with ½ lb. of fresh butter; set it on the fire and let the meat stew a nice brown; add 1 lb. of the best rice (well washed), 2 pints of hot water, sufficient salt, and a pinch or two of cinnamon, and let it boil slowly till there is no liquor remaining; then take it off and place on the hob with the cover on it, for 20 or 30 minutes; dish it up in a dome shape, and serve hot."

Lettuce Dressing. — This is also from the *Food Journal:* "For a family of six, boil three eggs for ten minutes, throw them into cold water for a minute, peel off the shells, cut and mash them fine, and mix with them two tablespoonfuls of melted butter or sweet oil, two teaspoonfuls of mustard prepared as for meats, a dash of pepper, and a little salt. Cut the lettuce fine, pour over it vinegar, and sprinkle sugar to taste, then mix with it the prepared egg. This dish is as appetizing as it is nutritious and delightful."

While gold is worth seventeen dollars per ounce, fine blonde hair readily commands twenty-five.

The Arts.

COMPRESSED AIR AS A MOTOR.

In a former number of our paper, we referred to the proposition for transmitting the water-power of Niagara Falls to a distance through the medium of compressed air. This comparatively new form of motive power, which was tested with such satisfactory results in the operations at the Mont Cenis tunnel, appears to be attracting attention in England. At the Holmes Colliery, near Rotherham, both the pumping and the coal hauling are now done by means of it. The pumping apparatus is thus described in an English journal: —

"The air is compressed on the surface by a double-cylindered steam engine, with 18 inch cylinder and 3 feet stroke, with two air-compressing pumps, 20 inches in diameter and 3 feet stroke, worked direct from the steam engine. Near this steam engine is placed a large air receiver, while corresponding with this in the mine, at a distance of nearly one mile, are three receivers connected by short cast-iron pipes, so as to form one, this plan being found necessary in order that the receivers could be made on the surface, and connected in the pit without riveting, as safety-lamps are exclusively used at the colliery. At this part of the mine also is an air engine with two cylinders, each 14 inches in diameter, with a 12 inch stroke, working two double-acting force pumps 5 inches in diameter, with a 12 inch stroke. The compressed air is conveyed from the compressing engine on the surface to the air engine in the mine in 7 inch cast-iron pipes. The discharge pipes of the pumping apparatus worked by this compressed air are 5 inches in diameter and nearly 1,000 yards long, having a vertical lift of nearly 100 yards. The apparatus was first worked on the 6th of January last, and the steam engine was worked at the rate of fifty strokes per minute, a uniform pressure of 25 lbs. per inch being maintained for eight hours at the surface and at the underground receiver. The air engine was worked during that time at the rate of fifty strokes per minute, 260 gallons of water per minute being raised."

THE PERFECTION OF MODERN TOOLS.

Smiles, in his "Iron Workers and Tool Makers," after referring to the fact that, fifty years ago, it was a matter of great difficulty to set a new steam engine to work, and to keep it going after it was started up, the foreman of the factory at which it was made having "almost to live beside the engine for a month or more," proceeds to speak as follows of the machinery of our day: —

"Now, the case is altogether different. The perfection of modern machine tools is such that the utmost possible precision is secured, and the mechanical engineer can calculate on a degree of exactitude that does not admit of a deviation beyond a thousandth part of an inch. When the powerful oscillating engines of the *Warrior* were put on board that ship, the parts, consisting of some 5,000 separate pieces, were brought from the different workshops of the Messrs. Penn & Sons, where they had been made by workmen who knew not the places they were to occupy, and fitted together with such precision that so soon as the steam was raised and let into the cylinders the immense machine began as if to breathe and move like a living creature, stretching its huge arms like a new born giant; and then, after practicing its strength a little, and proving its soundness in body and limb, it started off with the power of above a thousand horses to try its strength in breasting the billows of the North Sea."

MEMORANDA IN THE ARTS.

A New Source of Commercial Albumen. — The *Manufacturers' Review* (whose original translations from foreign journals are always interesting and valuable) gives an account of Grüne's process for obtaining albumen from a new source; namely, the roes of fishes, which, like the eggs of birds, are rich in this important compound. The roe is cut open and the eggs squeezed out; when a sufficient number of the latter have accumulated they are thrown upon a wire sieve, and are rubbed down with a hard brush. The liquid albumen runs through the sieve, while the cellular tissue remains behind. The latter is washed slightly with water, to which 0.3 per cent. of ammonia has been added. The coagulated solution is permitted to stand a few days in tall vessels, which are provided with wooden stop-cocks at different heights; by that time the solution will have settled, when it is poured into shallow pans and evaporated in well ventilated specially constructed drying chambers. Sometimes the solution will have to be filtered through coarse sand or powdered glass in order to clear it. Albumen, obtained in this manner from fresh water fish, is very fine, clear, and devoid of smell, if prepared with due care; but salt water fish must be worked up when still fresh, as otherwise it will have a slight disagreeable odor.

Iron Telegraph Posts. — These have been introduced with great success in Switzerland, and are now being extended daily. They have been already put up on Swiss railways a distance of 350 miles. In Prussia they have been placed experimentally on the railway from Weissenfels to Gera, and on the line between Berlin and Potsdam. As iron is now so cheap, it is considered that in a short time they will altogether replace the old wooden poles in Germany, that cause so frequent interruptions to telegraphic communication from rotting or being blown down by every high wind, especially in exposed situations.

Test for Silver in the Plating of Metal. — According to Dr. Boettger, a cold saturated solution of bichromate of potassa in nitric acid (sp. gr. 1.2) is applied to the metallic surface (which must be perfectly clean) by means of a glass rod, and immediately washed off with some cold water. If pure silver is present, there will appear clearly a blood-red colored mark (chromate of silver). Upon German silver the test liquid appears brown, but after washing with water the blood-red colored mark does not appear; the so-called Britannia-metal is colored black; on platinum no action is visible; metallic surfaces coated with an amalgam of mercury yield a reddish speck, which, however, is entirely washed off by water; on lead and bismuth the test liquid forms a yellow-colored precipitate; zinc and tin are both strongly affected by this test liquid, which, as regards the former metal, is entirely removed by water, while, as regards the latter, the test liquid is colored brownish, and the addition of water produces a yellow precipitate which slightly adheres to the tin.

To Dissolve Shellac Quickly. — White shellac may be readily dissolved in the following manner: Put the shellac with some naphtha or spirits of wine into a wide-mouthed bottle, and fix the bottle in a lathe. By keeping it continually but slowly revolving, it will dissolve in about six hours. White shellac, mixed with brown, makes a liquid glue impervious to moisture, while the former alone makes a good cement for mending glass or porcelain.

An Alloy that will adhere to Iron and Steel. — It is often desirable to combine steel or iron with brass, and thus obviate the necessity of using bolts or screws for fastening them. The unequal expansion of the metals is the great obstacle to such a combination, as it overcomes the adhesion

of the surfaces and thus prevents a permanent union. The following alloy, however, adheres firmly to iron and steel, and can be recommended: 3 parts of tin, 39½ parts of copper, and 7½ of zinc.

AMERICAN ICE MANUFACTURE. — The New Orleans ice-factory runs six machines, each costing $25,000 in gold, and freezes sixteen tons of ice daily. The water is pumped from the Mississippi, purified, and frozen into blocks three inches thick, and twelve by twenty-four inches in area.

PRACTICAL RECIPES.

GILDERS' COMPOSITION FOR FRAMES. — The composition at present in use is composed of best black glue, common resin, and linseed oil. Some use resin oil, others boiled linseed oil. Nearly every manufacturer has a little change in the proportions. It is a useful material for many other purposes, to which it might be applied were its mode of manufacture known. Take 10 lbs. of best black glue, boil it in the usual manner, but with very little water. It should be at least four times as thick as the glue used for general purposes. Take 6 lbs. of common resin, and pound to dust; add linseed oil, or resin oil, to form a thick paste with the dust; dissolve with heat, allow it to cool to about 212°, then add the hot glue; combine it well. Have sifted whiting prepared, and combine the whole as in making bread; form it into cakes, and allow it to cool; at any time by the application of steam or heat, this composition may be brought into use.

TO PREPARE PURE OXYGEN. — Prof. Boettger states that when a mixture is made of equal weights of the peroxides of lead and of barium, and dilute nitric acid of a strength of nine degrees Beaumé is poured thereon, a current of pure oxygen gas, free from ozone and antozone, is given off abundantly. This mixture of the two peroxides may be kept dry in a stoppered bottle for any length of time.

WHITE POLISH FOR LIGHT WOODS. — Take white (bleached) shellac, 3 oz.; white gum benzoin, 1 oz.; gum sandarac, ½oz.; spirits of wine or naphtha, 1 pint, in which to dissolve.

REFINED OIL. — Oil for fine mechanism is prepared by putting zinc and lead shavings, in equal parts, into good Florence olive-oil, and placing it in a cool place till the oil becomes colorless.

METEOROLOGICAL MONOPOLY.—The *Telegrapher* has the following good-natured hit at the pretensions of the holders of the Page patent: —

"Admirers of the sublime in nature will be sorry to learn that we are likely to be deprived of the pleasure of witnessing any thunder-storms during the ensuing year. The electrician of the Western Union Company, after a protracted investigation, has discovered that thunder and lightning result from the inductive action of short clouds upon long ones, and are therefore a direct infringement of the Page patent. It is understood that President Orton offered to make liberal arrangements with the Clerk of the Weather if he would come forward voluntarily and take out a license. The latter having neglected to do so, and the season for such exhibitions being near at hand, the Western Union Company now propose to charge a royalty of ten dollars per flash on chain and five dollars on sheet lightning. Ball lightning and the aurora borealis are exempt for the present, as the company's electrician has not yet fully decided whether they are covered by the claims of the patent. It is reported, however, that a temporary injunction will be obtained, restraining the defendant from giving any exhibitions until the electrician has concluded his investigations."

AN INFERNAL MACHINE. — A gigantic steam scoop, called "Beelzebub's Spoon," is dredging in Devil's Lake, Baraboo, Wis.

Agriculture.

ABOUT THE POTATO.

OUR common potato belongs botanically to a very suspicious order of plants, and it is well for the admirers of the tubers not to inquire very closely into its family relations. The knowledge that the potato is first cousin to such plants as tobacco, belladonna, henbane, nightshade, etc., all of them deadly narcotics, might trouble the sensitive nerves of some lovers of the delicious vegetable. Is the potato plant poisonous? Certainly it is. The stem, foliage, and fruit contain the same poisonous principles as henbane, and cannot be consumed as food without disastrous consequences. Fortunately the *underground branches* are free from injurious substances, if they are entirely covered with earth. But what is meant by underground branches? We mean the tubers themselves, for they are nothing but subterranean portions of the plant structure, and are not roots. A potato is a vegetable monstrosity, an abnormal production, which is extraordinary in every particular. The tuber is a branch of the plant which takes to the ground, and its growth becomes arrested and thickened, forming a knot or bunch which consists largely of pure starch. If a portion of this underground branch pushes its way out of the soil, the epidermis assumes a green color, and then it becomes, like the above-ground branches, poisonous. The *green* potatoes which are found growing half exposed to air and sunlight in our fields should be rejected, as they are totally unfit for human food. The potato has true leaf-buds, or scars (the parts called the *eyes*), and in this respect resembles the stem. We can cut out these eyes or leaf-buds, and from them propagate the plant, each eye growing and producing an independent structure. These facts should lead us to understand that the subterranean portions of plants are not always roots.

The potato in its early cultivation met with strange vicissitudes, and great opposition. The stern old Puritans opposed its cultivation, and denied its lawfulness as an article of food, because the plant was not mentioned in the Bible! Sir Walter Raleigh carried the plants to England from this country in 1586, and put them in his garden. His gardener thought the green potato apples were the potatoes, and expressed his disgust to his master at such products. He was told to pull up the weeds and throw them away. In doing so he found the true potatoes, more than a bushel in quantity, and he hurried back to Sir Walter in a very happy humor, to show him the sample and make known his discovery. So late as 1725 it was only cultivated in gardens in England and Scotland. During a period of more than one hundred and fifty years after Sir Walter introduced it into Ireland, it failed to rise superior to the prejudices of English cultivators. This is a singular history indeed.

A plant so nutritious, whose culture is adapted to almost every soil and climate, must be regarded as among the choicest gifts of Providence, and one that is destined to hold its place in the estimation of millions of people so long as time continues.

No plantyields so great an amount of nutriment from the same extent of soil as the banana. Humboldt estimated that it returns twenty times as much as the potato, and 133 times as much as wheat.

FARMERS' CERTIFICATES.

WE wish that farmers would reflect a moment before signing their names to certificates recommending fertilizers, agricultural implements, seeds, plants, etc. A great moral wrong is often committed in this regard, and evil is involved in it of no ordinary magnitude. Farmers who would be horrified at the idea of signing a note or a subscription paper, are easily persuaded to place their names to a document lauding some new fertilizer, or machine, which is a cheat, or entirely valueless. It is often done to get rid of importunity, or it is extorted by flattery, or by some gift or peculiar attentions which designing men know so well how to bestow. It is certain that in the history of new projects or new deceptions, whether connected with agriculture, medicine, invention, or art, nothing has ever been devised so worthless, that a multitude of names could not be procured recommending the imposture. Millions of dollars have been taken from the hard earnings of industrious, honest men through the powerful agency of such names. A fertilizer man leaves a bag of his stuff at the door of a farmer in the spring, desiring him to "try it," as the phrase is. It is applied to a few hills of potatoes, or corn, or vines, and if it does not positively kill the plants, the farmer will care but little about it, and the experiment be almost or quite forgotten. In the summer or early autumn the fertilizer man again makes his appearance, and this time he is provided with a written document highly recommending the powder, which he very politely requests the farmer to sign. A sense of obligation, or a desire to please, or the idea of having one's name in the newspapers and upon circulars, leads to the easy procurement of the name, and the enterprising manufacturer "laughs in his sleeve," and carries the document to the next "experimenter." He probably will sign it because his neighbor has done it, and so the names roll up, and the fraud is fully endorsed. This is no untruthful or fancy sketch of proceedings which are quite too common. It should be one of the most difficult things in the world to procure a name endorsing any substance or thing, and when a name is given it should be conscientiously, carefully considered, and there should be positive, known truth in every statement made.

THE MASSACHUSETTS AGRICULTURAL COLLEGE.

THE Eighth Annual Report of the Trustees of this institution has been published, and we have given it a pretty thorough examination. The practical working of our so-called Agricultural Colleges is worthy the attention of every friend of scientific husbandry, and we must not allow them to escape observation, and if need be criticism, as they are costing the people a great deal of money, and this money should not be squandered in any impracticable schemes or foolish experiments. We are gratified to be able to say that the condition of our own State institution, as shown in the Report before us, appears to be promising. As yet, comparatively little has been accomplished, but the plans of the future appear to be judicious, sensible, and correct in most particulars. There is a crowd of students connected with the College, more than the dormitories can accommodate, and we are glad to know that so many of our young men are anxious to learn the "farmer's trade." We expect to see them within the next ten years

in the fields, the hay-lofts, and manure-pits connected with our farms, with hoe, pitchfork, and shovel in hand, hard at work, regardless of sunshine, storms, or bad odors. President Clark appears to be the right man in the right place. He is energetic, practical, and entirely devoted to the interests of the College.

THE AGRICULTURAL RESOURCES OF FRANCE.

It is not often that professed politicians, when invited to address farmers, say anything that is in the least degree useful or profitable. They care more for the farmer's vote than they do for his crops, and their talk is usually that of the demagogue and selfish partisan. We presume a considerable number of our readers have heard of "Ben Butler." If the newspapers are to be relied upon, the gentleman has been, or is, a member of Congress, and during the last session made a "few remarks" in the House, now and then. He was invited last year to give the Annual Address before the Essex Agricultural Society, and strange as it may seem, he had not a word to say upon war or politics, but, with rare good sense, devoted the hour to a consideration of our agricultural resources in contrast with those of other nations, especially France. We are led to present to our readers copious extracts from this address, as we are convinced that the facts will be new to many of them, and may serve to dissipate the idea that we are the greatest agricultural nation in the world, as well as to show that "poor France" is not so very poor after all, if the demon of war could be banished from her soil:—

Let us direct our attention to a land where all eyes are now turned for a wholly other and different reason. Let us examine the agriculture of France, and compare its productions with our own, and compare the habits of its people, as farmers, with ours, and see, if we can, what it is that tends to show differences in their favor. Here we may find facts which will teach the statesman and farmer both, lessons in agriculture, and quite possibly facts which will arouse the attention, as surprising in themselves and containing not a little of rebuke to our general self-gratulation. One of our vices as Americans is self-gratulation, a little vain-gloriousness, a little boast. We speak of our teeming West. We speak flippantly of our capability of supplying all the world with breadstuffs. True, we have the capability so to do; but it is equally lamentably true that we do not do it. The boastful Western man upon his prairies or the Californian upon his ranche will, not a little astonished, learn the fact that the Empire of France, with not so much area as the State of Texas, raises more wheat, in quantity, than the United States of America all told, reckoning from Alaska to Florida and from Texas to Maine; the area of France being only 207,480 square miles, or 132 million acres, while Texas contains 237,321 square miles, or 154 million acres. And yet the product of wheat in France, in the year 1868, was 350 million bushels; the total product of wheat in the United States for the same year was only about 240 million.

So far from our supplying the markets of the world with wheat, in the year 1867 we sent to England only four million hundred weight of wheat, or about nine million of dollars in value, while France exported to England eleven million dollars' worth of butter alone, to spread on the bread made from our wheat, or, to speak less lightly, France sent more value in butter to England than we did all kinds of breadstuffs.

Again, to go back to the year 1860, where only we can get accurate statistics of the products of the United States and the products of France, let me call your attention to the following remarkable but reliable statistics of French agriculture. France then produced 230 million bushels of oats against our 170 million: 70 million bushels of rye against our 20 million; 60 million bushels of barley against our 12 million; and 32 million bushels of buckwheat against our 12 million. Nor was she without the products of grazing and pasture land, which are supposed to be the necessity requiring our extended farms. She had 4 million horses and mules against our 4 million and a quarter: 12 million of neat cattle against our 13 million; 30 million of sheep against our 24 million, and 6 million of swine against our 16 million.

As an example of what may be the profits of the smaller industries of farming, which, by the farmers of the United States, are reckoned almost valueless, it is an astonishing fact that in the year 1866 France exported as much in value of eggs to England alone as we exported of bacon and hams, one of our chief exports of provisions in 1868, to all the world; that is to say, in round numbers, rising of five million of dollars, while we exported eggs last year to the paltry number of 412 dozen.

No man who has not had these figures brought to his consideration and who has not examined the agricultural productions of France, both in variety and amount, can believe that the 38 million of her inhabitants on a territory so small as to give only three and a half acres to an inhabitant, could vie, in agricultural productions, of all that goes to make up the necessaries of living and national wealth, save cotton and tobacco, with a nation like ours of about the same number of inhabitants, whose territory gives more than 50 acres to each inhabitant, or nearly seventeen times as much land for cultivation, and from this estimate we exclude Alaska, of which none know the extent save the walrus and polar bears. Of course, a very large portion of our lands, say three fourths, are substantially uninhabited; but these are always reckoned when we make up our national resources.

Nor is the common idea a true one that the people of France are poor, or that our people are drawn away from farming into other and more profitable occupation, so that France does not more than equal us in the value and amount of her industries — all her industries as compared with ours; for in the year 1868 her imports amounted to 679 million, and her exports to 581 million, while in the same period the imports of the United States were only 381 million and the exports were 441 million, of which exportation 72 million were gold and silver and 163 million of unmanufactured cotton, neither of which, to any extent, was exported by France, leaving only 206 million as the product of our agricultural and manufacturing industry for export, after what is consumed by our people, against 581 million, which is the surplus of her agricultural and manufacturing industry exported after maintaining her own people. And although we boast of our cotton and tobacco as sources of wealth, yet she has her wines, brandies and sugars, of which latter France exported in 1868, six million dollars, and we imported sixty millions.

The common idea in this country that wealth is not diffused in France as with us, but is only in the hands of a few rich nobles, is another mistake quite as illusory as any of the misunderstandings of the agricultural and industrial condition of our ancient ally. While the national debt of France at the beginning of the present year was almost precisely the same as ours — being 2,700 million; yet, instead of being as ours is, 1,500 million owed to foreigners, to say nothing of state and county debts, which are things unheard of in the departments of France, it is divided among and held by more than *eleven hundred thousand Frenchmen*, giving a share of about 2,500 dollars to each. The actual diffusion of wealth among the middling and industrial classes is evident because when a loan of 90 million of dollars was offered by the Emperor to the people, an actual subscription of 3,152 million, or more than 35 times the sum asked for, was made by 781 thousand different persons (all Frenchmen, and generally in small sums because the providence of their government, differing from ours, gives to the man who desires to invest ten dollars in the national fund the preference over him who desires to invest ten million, the small subscription being first received, and first filled.

It may be interesting, although not exactly in consonance with the purpose we have in this analysis to compare the division of the debt of France among the people, showing the diffusion of wealth in the middling classes, with the national debt of Great Britain. Her debt amounts to 3,800 million, which is held by 126 thousand persons only, giving an average share of 30 thousand dollars to each individual as against less than one tenth as much to each holder of the French debt.

Nor are the French people burdened with taxation more than we are. They have nothing of the taxation known with us as State taxes, but their entire taxation is a national one, and amounted, with the revenues, which are another form of taxation in the aggregate, in the year 1868, to 403 million of dollars, while our taxation and revenues for the same year, paid to the national government alone, was 405 millions. But it will be observed that this taxation, while nominally about the same as ours, yet being with us based on a much less product of trade and industry than in France — almost 50 per cent. less in fact — is really a taxation nearly 50 per cent. greater on the industry of this country than is imposed upon the industries of the French people.

But another and more certain test of the distribution of wealth in France is seen in this: the population being divided into 9 millions of families, allowing four to the family, which is nearly the ratio, 1 million of those families, or 4 million of people, are in easy circumstances, that is, able to live without work or business. Of the remaining 8 million, which may be said to be composed of the industrial and working classes, 3 million only are inhabitants of the towns. That is, of the whole population, two fifths of the people in France live in the cities, and three fifths live in the country. This gives a very surprising result as compared with England, where four fifths of the whole people live in town and one fifth only in the country. We have yet no data with which I am acquainted, to make a like comparison with this country.

All property is then very equally distributed among the bulk of the population. There are six million of houses in France, the greater part of them cottages with small plots of land. Nearly the whole of this number are small freeholds belonging to their occupants. In other words, more than two thirds of the entire population own their own houses.

After hearing these statistics, the question, I have no doubt, arises to the lips of each one of my auditors, as it came to me, — how are these very great results possible? What is the secret? This may be told in a word. It is the thorough cultivation of the soil. Of her 132 million of acres, 64 million are arable; 12 millions only are in meadows, or, as we say, fields and grass; 5 million in vineyards; $1\frac{1}{2}$ millions in orchards and gardens; 2 million in miscellaneous crops; 20 million in wood and forest; a half million in ponds: 20 million only may be called heath or waste lands, the remainder being for roads, public squares, canals and pleasure grounds — about 7 millions of acres. Thus it will appear that two thirds of the entire area of France is under actual cultivation every year.

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, JUNE 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

END OF VOLUME FIFTH.

THE present number of the JOURNAL completes Vol. V., and the next issue commences a new year. It is perhaps a slight disadvantage to begin the Journal year in July, but it would cause confusion in our arrangement of volumes to change to January, and so it will continue as it has been. As we now receive subscriptions to commence at any time during the year, it may be well to remind our friends that we can supply full volumes or separate numbers of the past two years, and shall be happy to execute their orders promptly. Every number of the JOURNAL is *electrotyped*, and copies can be supplied to any extent. In our next number, under the heading of "How We Stand," we shall present some statements regarding the success and the future prospects of the JOURNAL.

The INDEX to Vol. V., will be sent with this number to all who have paid for the volume. It will be sent, postpaid, to any address on receipt of *ten cents*. This Index includes not only the headings given in our Table of Contents from month to month, but all the sub-headings that have appeared under "Household Recipes," "Memoranda in the Arts," "Editorial Notes," "Medical Memoranda," "Valuable Formulæ," etc., etc. The latter are far more numerous than the former, and will enable one to find readily any item he seeks. A glance at the Index will show what a multiplicity and variety of topics are discussed in a single volume of the JOURNAL, and what a *popular cyclopædia* of scientific and other information we furnish for *one dollar*.

LEAD AND GALVANIZED IRON WATER-PIPES.

A NOTE appeared in the *Boston Medical and Surgical Journal*, a few weeks ago, signed by Dr. Winsor, of Winchester, in which he stated that we had recommended the use of lead water-pipes in a report made to the Spot Pond Water Board of Melrose. He also took occasion to reassert his opinion of the safety of the galvanized iron pipes. The following communication was published in the *B. M. and S. Journal*, of May 4th, as a reply to his statements :—

MESSRS. EDITORS,—The communication of Dr. Winsor, found in your JOURNAL of April 13, conveys, whether intended or not, an unfair and erroneous impression, and I hope you will allow me space to correct it. Whatever construction may be put upon the language of the Spot Pond Water Commissioners as presented in their circular, it is certain they did not intend to recommend unqualifiedly or "virtually" lead pipes for water conduction. They speak of them as "comparatively safe," that is, compared with the "galvanized" iron pipes, and express a desire that the citizens of Melrose would remove such from their premises, even if lead has to be substituted. The chemists employed by the Board (J. R. Nichols & Co.) do not in the report presented in the circular, "virtually" recommend lead pipes, as stated by Dr. Winsor. They intended to convey the idea that, as the result of careful experiments made upon Spot Pond water in connection with the two kinds of pipes, lead is less objectionable than galvanized iron. They state that under "ordinary conditions" lead is safe to conduct Spot Pond water, and this is true of the waters of most New England ponds. The waters of these open reservoirs among the hills are quite free from chlorides and nitrates, and generally hold in solution sufficient carbonic acid to change soluble oxides into insoluble carbonates; therefore the waters exert a protective influence by the formation of an insoluble coating of carbonate of lead upon the interior of the pipes. If this coating was not liable to be interfered with by local agencies, lead pipes would be "virtually" safe to conduct water from these ponds, and I should not hesitate to recommend them. But so long as this liability exists, however small the risk, they must be regarded as dangerous.

For a period of more than twenty years, the writer has made frequent and extended experiments upon waters brought in contact with lead, and these waters have been taken from ponds and open reservoirs in nearly all the New England and Northern States. In 1857, fourteen years ago, he published a paper in this JOURNAL upon "local decomposition in lead aqueduct pipes," in which the results of a series of experiments upon Cochituate water were presented in detail. They coincided with those of Prof. Horsford and Dr. C. T. Jackson, the able chemists employed by the City Water Board, so far as relates to the general protective influence of the water, but it was shown that there was danger from local decomposition in service-pipes, and lead was detected in the water flowing into dwellings in various parts of the city. It was proved that local disturbances arose from changes in the electrical condition of the pipes, twisted and bent by plumbers when placed in position; also that organic matters—mud, leaves, and other vegetable *débris*—were capable of dissolving the coating of carbonate of lead and rendering pipes unsafe. In this communication, which may be seen by consulting files, the writer was emphatic in condemning lead pipes, and in no subsequent printed or verbal communication has he actually or "virtually" recommended them.

As regards the statements of Dr. Winsor concerning the safety of the "galvanized" iron pipes, which have appeared in this JOURNAL in the form of Reports, etc., little need be said beyond the bare expression of regret that such communications should have appeared at all. The question of the influence of zinc-impregnated water upon the health of individuals and families is of the gravest importance, and should not be discussed by one who has no experimental results or personal observations to offer, and who is unable to quote from a single credible or respectable authority. If Dr. Winsor was *required* to write or "report" on this subject, he could have given to his paper some value by consulting proper books and files of scientific journals, and presenting the results of experiments and observations made by others. If he had even opened the U. S. Dispensatory, a book presumed to be found in every doctor's library, he would have learned that the salts of zinc were regarded as poisonous many years ago. Prof. Bache says :—"The compounds of zinc *are poisonous*. The oxide of zinc, used in painting as a substitute for white lead, is said to be capable of producing a colic resembling that caused by lead and called *zinc colic*. It attacks workmen engaged in packing it in barrels, and yields to the remedies appropriate to the treatment of lead colic."

The old *Chemical Gazette* published an article in September, 1850, upon zinc poisoning, in which facts are presented of a startling character. The experiments of Dr. Witherbee and others with the salts of the metal upon animals, prove the oxide and chloride to be fully as dangerous as any of those of lead. The sad and fatal effects which in England followed from the use of milk and butter which had been in contact with zinc vessels, are significant facts which ought not to pass unheeded by careful, competent physicians. Disregarding the allusions made by Dr. Winsor to physicians who have with great care reported cases of zinc poisoning in this vicinity and in the Western States, I will simply state that several well-marked cases of zinc poisoning have come under my observation during the past year, and no one can reasonably doubt that a considerable number have suffered to a greater or less extent from the oxide and perhaps chloride of zinc, brought to them in water which passes through the so-called "galvanized" iron pipes. To me it is a matter wholly incomprehensible that a physician in respectable standing should be willing to state, over his own signature, that the filthy, unscientific zinc-washed pipes are proper for water conduction, that "no safer available material for water pipes than galvanized iron is known to us." And this is said after "virtually" admitting that all the zinc is dissolved from the pipes by the water and disappears in a few weeks, and that the carbonate and oxide of the metal are largely found in the water employed in the culinary departments of dwellings.

JAS. R. NICHOLS, M. D.

REPORT OF THE SALEM WATER BOARD.

THE good people of the city of Salem who take water from Wenham Lake, ought to feel grateful to the gentlemen of their Water Board for the assurances conveyed in their last Report, that "the galvanized iron pipes are the best service pipes in use, and the *citizens need have no fears of poisonous matter in their water.*" It is a pity that there should be any drawback upon these comforting assurances. We are afraid the intelligent water takers of that ancient city may be in a slight measure disturbed by the very next remark of "the Board." They say, "When the pipes are new (the galvanized), or if the water has been standing in them over night, *it may be well to draw off a pailful or two of the water before using*, but if the pipes are in *constant use* there is not the slightest danger of any poison in the water." As aqueduct water is very apt to "stand" in service pipes "over night," and as the kitchen Bridgets and Maries are apt to forget to "draw off" a bucketful or two every morning, it is very possible that some of the citizens may take, in their tea or coffee, a little of this water which the Board advises, *for some reason*, to be *thrown away*. As, however, the citizens are further told that "constant use" of the pipes avoids the "slightest danger of *poison*," they may conclude to open their faucets and let the water run continuously. In no other way can the pipes be in "constant use," and in no other way, it is to be inferred from the statements of the gentlemen, can there be safety in the use of the "perfectly safe" galvanized pipes. It is evident the Water Board are a little "confused" in their views, but this is not the worst of it; the statements of their consulting chemists are unfortunately "very obscure." They state, as quoted in the Report, that they "experimented with and analyzed the water after it had stood 15 hours in the galvanized iron pipe, and the water was *perfectly clear, and con-*

tained a sediment in the bottom." Indeed! water that lets fall "a sediment" may be "perfectly clear," but there is a strong suspicion that there has been a time when it was not so "clear." These chemists go on to state that they "found this sediment to be zinc," but there was "none in the water." Why, then, do they not recommend the water takers to draw the water and "let it settle" before using? This would be as sensible and practicable a way to get rid of the poison, as to draw and throw it away, as recommended by the Water Board. We are not acquainted with the chemical gentlemen who make this luminous Report, but it is stated they are from Philadelphia, a city long famous for its "lawyers," and for its men of science also. There are a great many cultivated and sagacious people in Salem who are fully competent to appreciate this Report, and further comment is unnecessary.

LUBRICATING OILS AND INSURANCE.

The article upon "Spontaneous Combustion" in our March number appears to have attracted considerable attention in various quarters, having been copied in full or in part by many scientific and other journals. That spicy little sheet, *The Oil Monthly*, after quoting that portion which suggests that "the introduction of coal oils for lubrication of machinery has very materially reduced the number of fires from spontaneous combustion, owing to the fact that the coal oils *do not absorb oxygen*," and that insurance companies should recognize this fact in fixing their rates for mill property, comments upon it as follows: —

"That all underwriters should count well their risks, and refuse to insure where dangerous articles are kept, is certainly commendable; but that they should prohibit the use of paraffine or coal oils in cotton and woollen mills, is an indication of a prejudice bordering on perversity. Lard, whale, and even linseed oils are not objected to, but any mineral oil is regarded as dangerous. While lard and whale oil *can* produce spontaneous combustion, and linseed oil is particularly liable to it, the very nature of the mineral oils is cooling; for not being capable of absorbing oxygen, they are absolutely proof against self-ignition. In the manufacture of the hydro-carbon oils, all the volatile and burning properties are taken off before the remaining oil becomes heavy, or is worthy of the name of a lubricator. This heavy oil is nothing but a *grease*, and will burn no easier than butter or lard. A red-hot iron immersed in it would have no more effect than if dipped in so much water. Nothing but an intense heat sufficient to vaporize it will cause it to burn."

CONCERNING "GASOLINE."

Respectable journals are not unfrequently rash in the "puffs" they give the manufacturers of bad kerosene, under its many *aliases* of "gasoline," "safety oil," "sunlight oil," etc.; and we wish that they were all as ready to retract the hasty and indiscreet commendation as the *American Builder*, of Chicago, has been in a recent instance. That excellent journal is so rarely at fault that it will not suffer in reputation for the frank confession made in the following article from its May number: —

"'The light is clear, steady, and much whiter than that produced from kerosene, burns with no perceptible odor, and is unincumbered with a chimney, that ever-breaking nuisance which accompanies an ordinary lamp.

"'Good gasoline is as safe as kerosene, is cheaper, and gives a better light.'

"So read a 'local notice' in the last issue of this magazine, but the statement made in the lower paragraph is hereby retracted, with an apology to the public. We wrote candidly, and thought we were telling the truth, but have since had reason to believe that gasoline is not so safe as, in fact, almost anything else. We tried a lamp, and for a week all went well, and the above notice was written; but since then there has been an explosion. Nobody was hurt, but the demoralization was extreme. The lamp contracted a habit of lighting, much in the manner a newly arrived Irishman described the sun as setting in this country, after he had heard the evening gun fired, — 'wid a bang.' But this was considered only one of the eccentricities of genius — of the inventor — and the lamp still remained in favor, for it certainly did give a clear light. But the crisis came at last. On a recent memorable occasion the lamp, somehow, would not burn well for two or three hours, but in a single moment it made up a good average flame for the entire evening. The flame suddenly shot up to the height of a yard, and burned blue and fiercely. Frontiers were rectified, and the room vacated rapidly. Then followed an earthquake, and now the lamp has a permanent physical deformity. It is for sale.

"The conclusion reached by the experiment is, that gasoline may be safe for a week, but no longer. At least, there's no depending upon it after the expiration of this time, and we cheerfully subscribe to it, as something no family should be without, where there is more of a family than the parents can honestly support."

COFFEE AND TEA.

One of our best physicians sends us the following note: —

"I am extremely fond of a good cup of coffee, and wish to add my testimony as to the truth of the article on this subject in your March number.

"Twenty years ago, I purchased in Paris a small filtrating coffee-pot. For a long time I used the coffee ground as coarsely as it is usually sold in the shops. Although procuring the best berries possible, I did not uniformly succeed in obtaining at the breakfast table a first-rate beverage. I consulted many wiseacres, some of whom said that the water used should be hotter, others that the coffee should be first soaked in cold water, etc., etc. By mere accident one day I happened to have the coffee *re-ground* to the fineness of snuff. Herein lay the mystery. I have never since failed to obtain a strong, full-flavored beverage, and that, too, without using so large a quantity of coffee."

A correspondent of the *Independent*, travelling in Sweden, was intensely delighted with the coffee served on the steamboats and hotels. "At Upsala," he writes, "we determined to find out how they made such perfect coffee as we had just drank, and stepped into the neat little kitchen of the little hotel, and this was the report: Take any kind of coffee-pot or urn, and suspend a bag made of felt or very heavy flannel, so long that it reaches the bottom, bound on a wire just fitting the top; put in the fresh ground, pure coffee, and pour on freshly boiled water. The fluid filters through the bag, and may be used at once; needs no settling, and retains all the aroma. The advantage of this over the ordinary filter is its economy, as the coffee stands and soaks out the strength, instead of merely letting the water pass through it."

A French chemist asserts that if tea be ground like coffee before hot water is poured upon it, it will yield nearly double the amount of its exhilarating qualities. Another writer says: "If you put a piece of lump sugar, the size of a walnut, into a teapot, you will make the tea infuse in half the time." Persons who have tried this last experiment say that the result is satisfactory.

EDITORIAL NOTES.

Preserved Meat. — In 1866, the whole value of preserved meat brought from Australia to England was only £321. In 1870, the importations amounted to £200,000, and it is estimated that this year they will be at least doubled. To introduce the article to the lower classes, cheap eating-houses have been opened in London, Manchester, Liverpool, and other places, where the meat is dressed in a variety of ways by good cooks and sold in penny dinners. At one of these establishments a steam cooking apparatus has just been added, which will provide for 10,000 persons at a time. The proprietor proposes to send out hot penny dinners to factories and other places where large numbers are congregated, and the system is likely to work well.

Most of the patent methods of preserving the meat, however, have proved to be failures. *Land and Water* remarks that "none seem really to have answered as yet, except the old-fashioned system of salting and packing in hermetically sealed cans, and the new extract system invented by Liebig." In this country, Lyman's process promises to be perfectly successful. Messrs. Clapp, Bridgman, & Co., of Houston, Texas, are now putting up large quantities of "concentrated roast beef" by this method. As soon as the animal is killed, the meat is cut from the bone, put into a vacuum chamber in which it is cooled by its own evaporation down to about 40°, and then placed in an oven, about twelve feet high, where it remains exposed to a current of pure warm air at a temperature of from 160° to 180° for three or four hours. The meat is laid upon shelves of iron rods, one above another, and is carried slowly by an endless chain from the top to the bottom of the oven. The juices from the upper shelves drip upon the meat on the lower ones, and by the time it reaches the bottom it has ceased to drip, and is thoroughly cooked, without having lost a particle of its nutritious matter. It is then chopped up fine, pressed into cans, and sealed up. The cans are afterwards heated in a bath of boiling water, pricked so as to let out the air and steam, sealed up again, and kept hot for three or four hours more, in order to combine any free oxygen that may possibly remain in the cans. The whole process is continuous, and in ten hours after the animal is killed the beef is packed and sealed up. A thousand pounds of beef, including the bone, furnish one third the weight of the concentrated meat, which is sold in the markets at twenty-five cents a pound. It is likely to become a popular article of diet, especially as a substitute for the ordinary salted beef, than which it is both cheaper and more nutritious.

Popular Lectures on Science. — In referring to the penny lectures on science, at Manchester, England, we asked the question, "When shall we have something of the kind in this country?" Our correspondent, C. S., reminds us of the Lowell Lectures in Boston, and other similar courses which do not cost even the penny, being free to the public. Of course we did not forget the existence of the Lowell Institute, and the other admirable institutions of the kind which are now to be found in New York, Baltimore, and other of our cities. But these as yet are only exceptional instances, and we meant merely to express the hope that in some "good time coming" they may be the rule rather than the exception. We believe that in providing for popular instruction in science, not only by lectures, but by other educational agencies (of which the South Kensington Museum is the most notable example) and by cheap literature, England is considerably in advance of this country, though we are beginning to emulate her example. We shall speak of the subject more at length hereafter.

The Theory of the Bunsen Flame. — As we stated, a year or more ago, in an article on the luminosity of flame, Frankland's investigations throw

some doubt upon the commonly accepted theory that the light is solely due to incandescent carbon, and that the non-luminosity of the flame of the Bunsen burner is caused by the perfect combustion of the coal-gas; the particles of carbon being burned up at once instead of remaining for a moment in a white-hot state before the oxygen can get at them. Some recent experiments by Herr Knapp appear to prove that this latter explanation cannot be the correct one. He finds that if instead of allowing air to mix with the coal-gas in the Bunsen burner, a sufficiently strong stream of nitrogen, hydrochloric acid, or carbonic acid gas, no one of which can act as a supporter of combustion, be passed into the flame, the latter becomes perfectly non-luminous. Probably this is in great part due to the reduction of temperature and pressure in the flame consequent on the introduction of the above gases.

ATOMS.

A German pharmacist recommends chloroform for rendering cod-liver oil palatable; 10 drops to 3½ ounces of oil being sufficient. — There are now about 250 postmistresses in the country, and the number is rapidly increasing. — Coniine, the alkaloid found in the poison hemlock (*Conium maculatum*), has been made artificially, by Schiff; and we may look soon to see morphine and quinine produced in the laboratory. — The total value of machinery, agricultural implements, etc., exported from Great Britain, last year, amounted to £5,337,774, or over twenty-six millions of dollars; rather more than one half of the amount being for steam-engines. — The cotton-seed product of the Mississippi Valley would make forty million dollars' worth of oil. — The street railways of Philadelphia carried last year over fifty-five millions of passengers, of whom but one was killed and four injured. — In 1870 more than ten tons of chloral were imported into England from Germany; almost enough, one would suppose, to put the whole island asleep. — Pure *carotine*, a tasteless and inodorous yellow compound, obtained from carrots by slicing, drying, and treating with bisulphide of carbon, is recommended as a substitute for annatto in the coloring of butter. — Pencil and crayon drawings may be fixed on paper, by washing the back of the sheet with a moderately strong solution of bleached shellac in alcohol. — It is said that a little coarsely cut gentian root well masticated (the saliva being swallowed), taken after each meal, will soon cure one of all desire for tobacco-chewing. — If you want some of the best English scientific journals at half the price usually charged for them in this country, look at our clubbing list. — The first crop of potatoes ever raised in England was grown at Formby, on the Lancashire coast, by a native of that village, who had sailed with Sir Walter Raleigh. — The *American Journal of Microscopy* is a new monthly "devoted to the elucidation of scientific and popular microscopy," edited by E. M. Hale, M. D., and published at Chicago, for two dollars a year. — Certain pious Hindus, anxious for the spiritual welfare of their young countrymen in England, have resolved to build a Hindu temple in London, and have subscribed a lac of rupees for the purpose; so there will be no lack of money to carry out the plan. — An edition of the English Statutes, accompanied with explanatory comments, has been published in London, which is sold for *one penny*. — Of eighty "freshmen" in the Michigan Agricultural College, sixty are the sons of farmers. — A Scotchman lately bought ten thousand acres of land in the Fiji Islands, for sixpence (twelve cents) an acre. — An acre of land in London was recently sold for $3,600,000. — About 850,000 tons of coal are used annually in London to make some 8,000 *million* cubic feet of gas, and the "little bill" for the same amounts to more than eight million dollars. — Some of the leading Southern journals are calling the attention of French immigrants to the attractions of that section of the country. — The city of Cleveland, Ohio, is excavating a tunnel under Lake Erie, a mile and a half from the shore, for the purpose of procuring a supply of pure water.

LITERARY NOTES.

The Harpers have just published the *ninth* enlarged and revised edition of Prof. Martyn Paine's *Institutes of Medicine*. When a large and elaborate work like this has reached a ninth edition, it has evidently come to be regarded as a medical classic, and its latest revision needs no special commendation from us. The book has been well called "a library of philosophical and practical medicine," for it contains the learning and labor that would ordinarily be expanded into many volumes. "Its strong points are a broad and thorough treatment of the whole science of physiology, pathology, and therapeutics; a sturdy conviction of the soundness of its positions; a clear understanding of the opposing theories; and a vigorous, classic, concise, and unflinching style of writing."

The Harpers are publishing a capital series under the title of "Science for the Young," by Jacob Abbott. The first volume, on *Heat*, is now ready. They have also in press Shakespeare's *Tempest*, with notes by W. J. Rolfe, A. M., to be uniform with his edition of *The Merchant of Venice*.

Messrs. Lippincott & Co. have issued a new and improved edition of Bourne's *Handbook of the Steam-Engine*, which has an established reputation as the standard work on the subject. The introductory chapters on "the arithmetic of the steam-engine," and on "the mechanical principles of the steam-engine," fill nearly 200 pages, and form a good elementary treatise on Mechanics; and the chapter on "the theory of the steam-engine" is an excellent outline of the physics of Heat. The remainder of the work is devoted to the practical construction and management of the various kinds of steam-engines, and is exhaustive on these subjects.

Mr. Henry C. Lea, of Philadelphia, has reprinted the revised edition of Professor Attfield's *Chemistry*, "a manual on the general principles of the science, and their applications to medicine and pharmacy." The work holds a high rank in England, and as a handbook for the medical student and the pharmacist we know of nothing better in English. This edition adopts the new notation, and the partially reformed nomenclature which gives us *mercuric chloride* and *mercurous chloride*, *ferric* and *ferrous* salts, etc., but *nitrate of potassium*, etc. (not *potassic nitrate*), instead of the old *nitrate of potassa*. This, as the author says, is "a step in the direction of simplicity and consistency," but we wonder that those who have courage to take this step should hesitate to take the next, and thus to make *all* the names uniform and consistent.

We intended, last month, to speak of the *Annual of Scientific Discovery for* 1871, published by Messrs. Gould and Lincoln, of Boston. The volume is edited by Prof. Trowbridge, of Harvard College, and Prof. Nichols, of the Institute of Technology, and the work is in the main very well done. The introductory sketch of the progress of science for 1870 is excellent, but even there we note some awkward misprints, as "*presence* of the confined gas" for "*pressure*," etc.

Travellers about to start for Europe should not fail to read Curtis Guild's *Over the Ocean*, recently published by Messrs. Lee & Shepard. It is like a guide-book in the minuteness of its details, and yet it is very pleasant reading, which a guide-book is *not*. The reason is that it tells you the story as a friend would *talk* it to you when just returned from his tour, and eager to make you a sharer in all that he had enjoyed, while the guide-book tells it in the parrot style of the professional cicerones that beset one at every step in foreign lands. The majority of travellers are at the mercy of these fearful bores, because they do not prepare themselves for the trip in advance by reading good books of travel written by those who have been over the same ground. Besides this book of Mr. Guild's, we especially commend to friends who are going to Europe this summer *Old England*, by Prof. Hoppin, published by Hurd and Houghton, a year or two ago. There is nothing better worth seeing in that country than the old cathedrals, and you will enjoy them all the more for the companionship of so genial and sympathetic a guide. Rev. Dr. Peabody's *Reminiscences of European Travel* is another book that you should read before you go, and Gilbert Haven's *Pilgrim's Wallet* is another. The two latter together cover about all the ground that one can go over in a summer vacation in Europe. We might mention other books if we had the space, but the above are specially to be commended. In the way of a *Guide-book*, we have nothing as yet in a single volume that is better than Harper's. The maps and plans of cities in the last issue are a valuable addition.

Messrs. Hurd & Houghton have reprinted from the Edinburgh edition J. C. Shairp's *Culture and Religion*, a book which no man who has any claim to the one, or any interest in the other, should fail to read.

Wonders of the Heavens, from the French of Flammarion, translated by Mrs. Lockyer, is the last issue in the "Library of Wonders." The translation is not quite satisfactory, but the book is a good popular presentation of the leading facts in astronomy.

The second number of the *Memoirs of the Peabody Academy of Science* (Salem, Mass.), containing "Embryological Studies on Diplax, Perithemis, and the Thysanurous Genus Isotoma," by A. S. Packard, Jr., has been issued in very handsome style by the Academy. We have received also the *Second and Third Annual Reports* of the Trustees, which make a very creditable exhibit of the work done in the past two years by this excellent scientific association.

Prof. G. H. Cook, the State Geologist of New Jersey, has sent us his *Annual Report for* 1870, which contains much interesting matter, especially on the subject of marshes and reclaimed lands, and on the analysis of the soils of the State.

OUR SCIENTIFIC AND MEDICAL EXCHANGES.

The American Journal of Science and Arts, for May, contains articles on the Solar Corona, by Prof. Young; on the supposed Legs of the Trilobite, by Prof. Dana; on some new Fossil Serpents, by O. C. Marsh; on the Estimation of Phosphoric Acid, by C. E. Munroe, of the Lawrence Scientific School; Calorimetric Investigations, by Prof. Bunsen; on the Geology of the Delta, and the Mudlumps of the Passes of the Mississippi, by E. W. Hilgard; with much other valuable matter.

The Journal of the Franklin Institute has fourteen pages filled with the editorial "Items and Novelties," an interesting miscellany, which is an admirable feature of this magazine; Editorial Correspondence on the Suez Canal; several valuable articles under the head of "Civil and Mechanical Engineering," and as many more under "Mechanics, Physics, and Chemistry;" with Bibliographical Notices, etc., etc.

The New York Medical Journal gives in full Prof. Lente's Oration on the Objects and Aims of Medical Science, and the Relations existing between the Medical Profession and the Public; an article on Hypodermic Injection, by Dr. T. J. Gallaher; one by Dr. G. M. Smith on Diabetes; with Proceedings of Societies, Miscellaneous and Scientific Notes, etc., etc.

The American Practitioner has the following Original Communications: Will Quinine Originate Uterine Contractions? by L. A. Sayre, M. D.; Observations on the Use of Mercury, by A. P. Merrill, M. D.; Iodine Inhalations in Diphtheria, by G. H. Eyster, M. D.; Sudden Death of an Applicant for Life Insurance, by S. M. Bemiss, M. D: Foreign Correspondence — From London, by R. O. C.; etc., etc.

The Oregon Medical and Surgical Reporter enters upon its second year as a quarterly instead of a monthly, and appears in enlarged and improved form.

The Boston Medical and Surgical Journal, of May 11, publishes Dr. Carpenter's Address on "Quackery in the Regular Profession," delivered before the Bristol North Medical Society, at Pawtucket, R. I.

The Nashville Journal of Medicine and Surgery, for May, appears promptly (which is a rare virtue with a medical magazine) and is an excellent number.

ANSWERS TO CORRESPONDENTS.

☞ Questions pertaining to *all departments of the paper* — home science, arts, agriculture, medicine, etc. — will be answered under this head, but *only when the subject is one of general interest to our readers*.

H. M., Brooklyn, N. Y. — A message does *not* make any perceptible sound in passing over a telegraph wire. The sounds popularly supposed to be made by the electric fluid are due to the wind blowing through or over the insulators, etc.

U. U., Springfield, Mass. — Our correspondent says that the scientific association in S. did not endorse the Cardiff giant as "a genuine antique," though some of its members argued that "fossils of like character might be in existence." We saw in a Springfield paper some certificates signed by certain officers of the association *as* its officers, and naturally supposed that they represented the association. We see that the "giant" is still on his travels in the Connecticut Valley, and that the local papers are "puffing" him in the old style. It has been stated on good authority that tool-marks have been distinguished on his body, and that they are evidently made by tools of modern invention. If one had any doubts on the point, this would prove that he is neither a "petrification" nor a work of ancient art.

J. B. C., Concord, N. H. — Mivart's "Genesis of Species" has been reprinted by the Appletons of New York, and they have also published the revised edition of Darwin's "Origin of Species."

L. A., Mound City, Kansas. — There is no remedy for perspiring under the arms, and no way of preventing the perspiration from changing the color of the dress, if it comes in contact with it. A lining of oiled silk under the arms often serves as a sufficient protection to the dress.

L. G. D., Ann Arbor, Mich. — The five-dollar microscope advertised by us admits of *four* different powers, and is really an excellent instrument for the price. It will "show eels in vinegar" (that is, if they are there) and may be used for the other purposes you mention, none of which require a powerful or costly microscope.

Flushing, N. Y. — An envelope from this post office comes to us with $1.00 enclosed, but no writing to show who sends it. We have quite a list of subscribers in Flushing, and do not know to whom the credit is due.

D. R. Smith sends us $1.00 for the Journal, but fails to give his address. Hence we are unable to credit the amount, or to attend to the other business mentioned in his letter.

Medicine.

OBSCURE SOURCES OF DISEASE.

NEARLY ten years since we published the following article upon obscure sources of disease, and the importance of the subject leads us to present it again for the benefit of our readers. There can be no question that the use of the galvanized iron pipes for the conveyance of water to dwellings is causing illness which physicians are unable to account for, not knowing the nature or dangerous character of the pipes. It is the duty of physicians to inquire closely into the character of water used in families, and the sanitary condition of dwellings, before deciding as to the nature or cause of diseases which they may be called to treat. These are points too much neglected by medical men both in city and country: —

There are many instances of disease brought to the notice of physicians which are exceedingly perplexing in their character, and the sources of which are very imperfectly understood. They belong to a class outside of, and distinct from, the usual forms of disease resulting from constitutional idiosyncrasies, or accidental causes, within the knowledge of the patient or medical attendant. The obscurity of their origin, and persistence under treatment, render them peculiarly trying to the patient and the skill of those who have them in charge, and after the trial of the usual remedies without effect, the patients are sent into the country or to the sea-shore, as the case may be, with the expectation that a change of air or residence may prove beneficial.

We cannot, in a majority of cases, regard these affections as altogether imaginary, or as resulting from some casual derangement of the nervous system; they are instances of true disease, and should be studied with the view of bringing to light the hidden source from whence they originate. I am led to believe that a considerable number arise from some disturbance in the sanitary conditions of dwellings or their surroundings, and that however improbable this may seem from a superficial or even careful examination of suspected premises, a still more thorough and extended search will often result in the discovery of some agent or agents capable of producing disease.

The chemical and physical condition of water used for culinary purposes has much to do with health, and is perhaps the oftenest overlooked by the physician in searching for the cause of sickness. We must not suppose that water is only hurtful when impregnated with the salts of lead or other metals; there are different sources of contamination, which produce the most serious disturbance upon the system. Some of these are very obscure and difficult of detection. The senses of taste and smell are not to be relied upon in examinations, as it often happens that water entirely unfit for use is devoid of all physical appearances calculated to awaken suspicion. It is clear, inodorous, palatable, and there is no apparent source from whence impurity may arise.

A few instances which have come under my observation may serve to illustrate the view presented, and as suggestions to those who are in doubt as regards the cases of patients upon their hands.

During the past summer, the writer was consulted by a gentleman residing in Roxbury, respecting the water used in his family. It was taken into the dwelling through tin pipe from a well in the immediate vicinity, and appeared to be perfectly pure and healthful. Analysis disclosed no salts of lead or copper, as indeed none could be expected from the unusual precautions taken to prevent contact of the water with these metals. Abundant evidence was however afforded that, through some avenue, organic matters in unusual quantities were finding access to the water. Careful examination of the premises disclosed the fact that an outhouse on the grounds of a neighbor was so situated as to act as a receptacle for house drainings, and from thence by subterranean passages the liquids flowed into the well. Some cases of illness, of long standing in the family, disappeared upon abandoning the use of the water.

A few months since a specimen of water was brought to me for chemical examination, by a gentleman of Charlestown, who stated that his wife was afflicted with protracted illness of a somewhat unusual character. It was found to be largely impregnated with potash and the salts resulting from the decomposition of animal and vegetable *débris*, and the opinion expressed that some connection existed between the well and the waste fluids of the dwelling. This seemed improbable, as all these were securely carried in a brick cemented drain, and in a direction opposite the water supply. The use of the spade, however, revealed a break in the drain at a point favorable for an inflowing into the well, and hence the source of the contamination. Rapid convalescence followed on the part of the sick wife upon obtaining water from another source.

Analysis was recently made of water from a well in Middlesex County, which disclosed conditions quite similar to these. The owner was certain that no impurity could arise from sources suggested, but rigid and persistent investigation disclosed the fact, that the servant girl had long been in the habit of emptying the "slops" into a cavity by the kitchen door (formed by the displacement of several bricks in the pavement), where they were readily absorbed. Although the well was quite remote, the intervening space was filled with coarse sand and rubble stones, and hence the unclean liquids found an easy passage to the water. This proved to be the cause of illness in the family.

It is unnecessary to present other instances of a similar character on record. These serve to bring to view some of the sources of impurities in water used for household purposes, and the obscure cause of serious diseases. The location of wells connected with dwellings is a matter which should receive attention at the hands of physicians.

It is well known that in the gradual decomposition of animal and vegetable substances, at or near the surface of the earth, under certain conditions, nitrogenous compounds are developed. The nitre of the earths found beneath old buildings results from these changes, although it is quite difficult to understand the precise nature of the chemical transformations which produce them. In the waters of a large number of wells in towns and cities, and also in the country, the nitrates are found at some seasons in considerable quantities. The salts form at the surface in warm weather, and being quite soluble, are carried with the percolating rain-water into the well. In cities and large towns, where excrementitious matters accumulate rapidly around dwellings compacted together, it is difficult to locate wells remote from danger, and hence it might seem that suspicion should be confined to these localities. This, however, is not a safe conclusion. How often do we see, upon isolated farms in the country, the well located within, or upon the margin of the barnyard, near huge manure heaps, reeking with ammoniacal and other gases, the prolific sources of soluble salts which find access to the water and render it unfit as a beverage for man or beast. It may no doubt be a convenience to the farmer to have his water-supply so situated as to meet the wants of the occupants of his barn and his dwelling, but it is full of danger.

Whilst admitting that such may be the conditi[on] of the water of many wells, doubts may arise wi[th] some, whether substances not decidedly poisonous, ar[e] received in such quantities, can after all be produ[c]tive of much harm, or the real source of illness. T[o] the great majority of people they are certain[ly] harmless, but it must be admitted that there is [a] class, and one or more are found in almost eve[ry] family, whose peculiar sensitive organization do[es] not admit of the presence of any extraneous agen[t] in food or drink, or in what they inhale. Th[e] functions of life and health are disturbed by th[e] slightest deviation from the usual or normal con[]dition of things around them. It is manifestly [of] importance that physicians should recognize the[se] peculiarities in individuals. It is unsafe, in makin[g] a diagnosis of disease, or seeking for causes, to ove[r]look or forget them.

We are, indeed, incapable of understanding ho[w] this can be. It seems incredible that the thou[]sandth part of a grain of one of the salts of lea[d] dissolved in water and taken daily, will disturb th[e] system of any one; and yet such is the case. W[e] can see no reason why a very little nitrate of po[]tassa, or soda, or lime, taken in the same way, shoul[d] produce any effects; still stranger it is that the in[]finitesimal amount of dust dislodged from painte[d] wall-papers, received into the lungs, should mak[e] inroads upon health.

Several instances of this latter result have re[]cently come to my knowledge. In two families o[f] the highest respectability in this city, illness of a[n] unusual and protracted character existed, and a[t] the suggestion of the physician, portions of th[e] green wall paper of the dwelling were submitted t[o] me for analysis. The pigments were found to con[]sist mainly of arseniate of copper, and upon th[e] removal of the papers the illness disappeared. I[n] experimenting with apparently the most suitabl[e] apparatus, and employing delicate chemical tests, in rooms the walls of which were covered with these arsenical papers, no evidence of the presence of the poison in the atmosphere has been afforded; an[d] this corresponds with the results of all similar ex[]periments made in this country and in Europe, so far as my knowledge extends. We must conclude that agents not recognizable by chemical tests are capable of disturbing vital processes. The evidence is very clear that in instances of illness confined to one or two members of a household, the cause may be due to some accidental disturbance with which all are equally brought in contact, but which has the power of injuriously influencing only a part. It is also clear that these sources of disease are of such a character as easily to escape detection, and therefore any facts or experience which may serve as guides to their discovery, are worthy of record.

CITRATE OF IRON AND MANGANESE.

THERE seems to be no good reason why the *citrate of iron and manganese* should not displace the well-known citrate of iron. The citrate of iron and manganese is, like the iron citrate, presented in the form of *beautiful garnet-colored plates*, which are readily soluble in cold water. The taste is very pleasant, rather pleasanter than the common iron citrate, and it may be prescribed in the same manner. It possesses the very great advantage of combining with the iron a soluble salt of manganese in just the right proportion, so that all the desirable qualities which can possibly result from the iron are secured, and, in addition, the manganic property, which is often of more importance than the iron.

The fact that iron is one of the normal elements of the blood has been universally admitted since the demonstrations of Menghini, Fork, and Laibach.

Now, as Scheele's and Gahn's discoveries in 1774

ıowed that manganese is invariably associated with on in organic nature, a suspicion arose that it existed so in organisms containing iron, and it was subseıently found not only in a multitude of plants, but so in the blood, flesh, milk, etc., as a constant ccompaniment of iron.

Fourcroy and Vauquelin had already discovered anganese in bone-ashes; afterwards, in 1830, Wur·r found it in calcined blood; Millon in 1847, larchesan in 1848, and, lastly, Hanon in 1849, rmally declared, after further diligent research, ıat manganese is the constant and natural associate ' iron in the blood.

Such facts could not fail to lead to the inference .at, as morbid elements are produced by the abnce or deficiency of iron in the blood, the same fect must likewise occur with regard to mangase, and consequently that, whenever the exhibition iron alone failed to cure chlorosis, the sole use was that chalybeates could not supply the onomy with the manganese which was wanting.

Repeated experiments soon confirmed the truth these conclusions. Numerous analyses of the ood demonstrated that the diminution of the prortion of iron in the blood of chlorotic patients as in constant ratio with the diminution of mannese, and many obstinate cases of chlorosis, which d resisted all treatment with chalybeates, were mpletely cured by ferro-manganic preparations.

These facts led Dr. Hanon to the singular theory ıich consisted in distinguishing two kinds of lorosis, one arising from a deficiency of iron, the her from a deficiency of manganese. But as Dr. anon was unable to give a diagnosis of the differce between these two kinds of chlorosis, we canıt but regard as empirical his method of administring manganese by itself in cases for which iron one had produced no result.

Chemical experiments having demonstrated, as ove stated, that manganese exists in the blood multaneously with iron, and in clearly determined oportions, the absence of one being always atıded with a proportional decrease of the other, this t supplies a most reasonable motive for the simulıeous use of manganese and iron for all cases which the exhibition of the latter alone was inficient.

The subsequent experiments of Dr. Pétrequin, d after him of Dr. Gensoul, Gubion, Contagne, nnaric, Delorme, and many more, perfectly justi-l this theory, and we can assert, without fear of or, that it is not only rational, but indispensable, many cases to prescribe ferro-manganic preparans instead of the simple chalybeates.

There is no form of ferro-manganic combination beautiful and efficient as the scales, which are fectly soluble in water, and therefore adapted to scription employment.

The scales contain of citrate of iron *seventy-five cent.*, of citrate of manganese *twenty-five per cent.* is affords the best proportion of the two agents, l meets all the possible needs of the physician.

The scales of *tartrate of iron and manganese* are ıally beautiful and pleasant, but not so *readily uble* as the citrate. The proportions in both salts the same, and the cost is also the same. These w scientific combinations may be employed in ce of the common citrate and tartrate of iron h manifest advantages. The *citrate of iron, nganese, and strychnine* may replace the citrate of n and strychnine, so well known to every physin. This preparation is in scales, and they contain same proportions of iron and manganese, with *per cent.* of strychnine.

Young Cantharides. — According to Nertwich, immature cantharis insect does not possess the stering property. It is only the adult flies that ıtain cantharidin.

PROPYLAMIN IN RHEUMATISM.

BY JOHN M. GASTON, M. D.

It is about eleven years since this article was placed before the profession as a remedy in rheumatism, on the recommendation of Prof. Aryenarious of St. Petersburg, Russia, in a report published in the "Annals de Thérapeutique" in 1857, p. 74, claiming for it specific powers of a high degree in this disease. He treated with it, in two years, — between 1854 and 1856, — 250 cases of rheumatism, acute and chronic, with all sorts of complications, metastatic, pericardial, pleuritic, meningeal, hemiplegic and paraplegic, and all recovered.

Numerous articles appeared in the journals some years ago confirmatory of these claims for it, and setting forth its uses in other diseases, as neuralgia, etc., but of late years I have not seen much mention made of it in the journals. But my own experience during the past eight years, the time during which I have been using it, has accorded so harmoniously with those reports, and that of the distinguished gentleman named above, as to give me great confidence in its usefulness, and some assurance in recommending it to the profession.

I need not attempt to give you the detailed report of the cases I have treated with it, as that would involve the consumption of too much time, but will, if you please, relate circumstantially only the first case and the last one in which I have used it. And I here take occasion to say that in no single instance have the pain and the soreness of the parts failed to yield completely in twenty-four or forty-eight hours, the cure progressing from that time on without interruption, except in two cases, occurring in individuals affected with gonorrhœa at the same time; and even in these two cases it afforded decided relief, but failed further to arrest the disease, and so did everything else that I could do, and I finally lost sight of both cases. It will be remembered here that, of all forms of rheumatism, gonorrhœal rheumatism is the most inveterate and unamenable to treatment.

My first experience in the use of this agent occurred in 1863, in the case of an interesting little girl, a child five years of age, in which all the joints of both the upper and lower extremities were successively invaded by the disease, despite my most strenuous efforts to the contrary; and fearing daily the involvment of the heart in the grand ruin, I was in an agony of anxiety and apprehension. I sought counsel, but it availed nothing as to relieving the case. At last, almost in despair, and scarcely knowing the powers of the remedy for good or evil, and unable to obtain from any source the information I wanted, I brought to bear upon the case, as a sort of forlorn hope, the propylamin, and to my great surprise and gratification, in a little less than forty-eight hours the relief was complete to the aching limbs, but I regret to say a slight valvular murmur was left in the heart.

I presume every physician, when a case of this disease has gone pleasantly with him, and yielded in apparent obedience to some new agent, has fancied that he has at last found the true remedy for rheumatism, but on the next trial it has, perhaps, disappointed and deceived him. It has been so with me in former years, and I soon learned to distrust such experience. But in the case of this, the time has been so long, and the success so uniform and so good, that it must be more than a simple coincidence.

My latest case occurred a few weeks ago, in the person of John Whitaker, a blacksmith, thirty years of age, involving the feet, knees, wrists, shoulders and elbows successively, with great constitutional disturbance, fever, furred tongue, constipation, and loss of appetite. In this case the disease was first arrested in a little *over* forty-eight hours — delayed a little beyond the usual time on account of having to stop in the midst of its use, and wait for the administration and operation of a cathartic, the patient being one of those matter-of-fact individuals, who believe in the importance of the daily performance of that particular function, sick or well. His recovery progressed satisfactorily for two or three weeks, but on the very day that he had set to go to work again he suffered a relapse, and became worse than ever. After administering a cathartic, this time in advance to make sure, I put him on the use of the agent, and in forty-eight hours he was all right again.

I may observe here, that my experience with the use of it has been confined to cases of acute rheumatism altogether — and so confident have I become of its powers that I have been in the habit for years, on first diagnosing a case of rheumatism, of promising relief in twenty-four or forty-eight hours. The cases have not been so very numerous, but, perhaps, as many as would naturally come under the attention of a physician in ordinary practice in that time.

Most cases of acute rheumatism are ushered in by chill, fever, and general disturbance, as well as pain. I usually see that the patient is in a proper condition for the use of the agent, his bowels not constipated. I sometime order a cathartic, and I frequently premise its use by administering fifteen or twenty grains of quinine in the first twenty-four hours to an adult, after which from two to six or eight drops of the liquid propylamin in a tablespoonful of water every two hours for the first twenty-four hours, and at longer intervals the next twenty-four hours, and the cure is accomplished, so far as relief from soreness of the joints and pain is concerned.

The propylamin is found in the shops in two forms, the liquid and chloride, or muriate. The former is a colorless, transparent liquid, with a singular ammoniacal and fish-brine odor; is soluble in water, and has an alkaline reaction, and, in solution of two to ten drops in a tablespoonful of water, is nearly tasteless, and is, so far as I have been able to learn, devoid of poisonous or injurious properties. Its chemical equivalent is C_3H_9N.

The chloride is in the form of white crystals, very soluble in water, one grain of which is equivalent in action to about one drop of the liquid.

The agent in either form is somewhat expensive, and that has perhaps been a hindrance to its general use. It formerly sold for five dollars an ounce in this city, but it is cheaper now, costing about three dollars per ounce. I imagine it is sometimes diluted as found in the stores, and if it should seem to fail sometimes on trial, it might be well to bear that in remembrance, and increase the dose.

It is said to exist in cod-liver oil, in ergot, in chenopodium, and in sorghum, and is extracted chemically from opium and several other sources, but the most abundant source of its supply is found in herring brine.

A very convenient formula for its administration is as follows: —

℞	Propylamin . . .	50 to 80 or 100 drops.
	Distilled water . . .	8 oz.

M. — S. Dose, tablespoonful every two hours to adult.

This is a larger dose than was used by the authority above referred to, but experience has assured me that it is within the bounds of perfect safety. — *Indiana Journal of Medicine.*

Test for Sugar in Animal Fluids. — Dr. Ehrardt gives a simple method of testing urine and other animal fluids for sugar. Add to the liquid a few drops of the following mixture: —

Natr. carb. cryst.	gr. v.
Pot. hydrat.	gr. v.
Pot. bitart.	gr. vi.
Sulph. cupri cryst.	gr. iv.
Aqua pura.	gr. xxx.

It takes after heating it, if it contain traces of sugar, a greenish yellow color; or, with large quantities of sugar, a yellowish red.

THE CARE OF THE TEETH.

In the last number of the Journal of Chemistry, I was glad to see, in an article from *The Dental Register*, the faithful use of a quill or ivory toothpick recommended. For it will tend not only to prevent offensive breath, for which it was advised, but will also do very much to prevent decay and loss of the teeth. But I was sorry to see in the same connection the remark that "as a rule, tooth pastes and powders should be eschewed as harmful agents."

That there are tooth pastes and powders that are harmful I do not doubt. But I have found by my own experience and the experience of scores of patients, that the enamel of the teeth cannot always be kept perfectly clean, by the use of toilet soap with the brush and water, nor by the use of the brush and water alone. It may be best for persons who have very offensive breath to use charcoal, but I cannot recommend its general use as a dentifrice: for I have frequently found dark spots upon the teeth of those who have used it for a considerable time, owing, as I think, to lodgment of particles of that material in the little pits and rough places of the imperfectly developed enamel. I have therefore for several years recommended a tooth powder instead; prepared from pumice stone reduced to a very fine powder, prepared chalk, pulverized orris root, and Castile soap. I have never seen the slightest ill effects, but very great benefits resulting from this, where frequently and faithfully used. The use of such a powder, together with that of the toothpick (and the latter should always be used after eating) will keep the teeth clean and smooth, and the *gums* healthy.

Disease of the gums usually results from a collection of extraneous substances upon and between the teeth, which are gradually forced under the margins of the gums, about the necks of the teeth, so that, both mechanically and chemically, they irritate both the gums and teeth.

Does any one object that the use of such a powder may wear away the enamel, and thus of course very materially injure the teeth? I never have seen any such effects from its use. I find invariably, where the enamel of the teeth is worn away, it is upon the grinding surfaces of the molars and bicuspids, and the cutting edges of the incisor and canine teeth. That is to say, the enamel is worn off only by long continued use in masticating food, and in some cases, I am sorry to say, in chewing tobacco and holding a clay pipe between the upper and lower teeth. Could the people generally be made to appreciate fully the importance of keeping the teeth always scrupulously clean, there would be much less need of the services of the dentists, and a much better appreciation of the efforts of those members of that profession who are suitably educated and otherwise qualified whenever their services should be required.

S. P. Martin.

Worcester, Mass.

MEDICAL MEMORANDA.

Salt Meat and Vegetables. — Some French physicians are of opinion that salt meat does not play so great a part in the production of scurvy as is generally supposed. Dr. Mary-Durand, in the *Siècle*, observes that the experience of the garrison of Metz is nearly conclusive on this point. The defenders of Metz were deprived of salt from the 4th of September to the 17th of October, and yet suffered severely from scurvy. Dr. Mary-Durand attributes this disease to cold and damp, to the want of fresh vegetables, to compulsory drill, and, above all, to insufficient food. He also considers nostalgia a powerful adjunct to these cases.

New Test for Blood Stains. — Acetate of zinc will completely precipitate the coloring matter of blood from solutions. The flocculent precipitate must be washed by decantation, left to evaporate and dry on a watch glass, and if blood was present the microscope will reveal delicate and beautiful hæmatin crystals. The blood stains can be dissolved in a variety of agents (for example, ether, oxalic acid, alcohol, gallic acid, and potash), and the acetate of zinc produces precipitates even in extremely dilute solutions.

Adulteration of Oil of Cloves. — Carbolic acid is said to be used for this purpose, and Fluckiger gives the following test for its detection: agitate with 50 or 100 volumes of hot water, decant the latter and evaporate it, add a little ammonia and good bleaching powder, and agitate. If carbolic acid be present, a blue color will in time appear.

Odors and Health. — This is the subject of an interesting article in a Belgian medical journal of recent date, from which we condense a few facts. A knowledge of perfumes reaches to the most remote antiquity. The Jews made use of them in the time of Moses. They were highly esteemed by the Greeks in the time of the wise but rigorous Solon. Their use was carried to excess by the Romans; and finally, in our times, they appear to have arrived at their utmost perfection and delicacy. It has been reserved also for the present day to use them in the greatest profusion. But if the perfumes that are everywhere found, and can be extracted by certain processes, may be used with safety, this cannot be said in every case of the odors that are naturally exhaled by flowers, leaves, or fruits. Their action on the economy in a limited space, and especially during the night in a closed chamber, deserves to be noticed. It manifests itself by serious disorder, headache, syncope, and even by asphyxia if their action is too long prolonged. In nervous persons numbness may occur in all the members, convulsions, and loss of voice, but in general only a state of somnolence, accompanied by feebleness and retardation of the action of the heart. This state is often associated with well-marked dimness of vision. Amongst the flowers that are most deleterious may be mentioned the lily, hyacinth, narcissus, crocus, rose, carnation, honeysuckle, jessamine, violet, elder, etc. In addition to the danger caused by their smell, should be mentioned their action on the air. During the night, flowers actively produce carbonic acid, which is injurious to health. Magendie even cites a case of death caused by a large bouquet of lilies, which the sufferer, a previously healthy woman, had in her bedroom while sleeping. Amongst the more dangerous plants may be mentioned the walnut, the bay-tree, and hemp. The action of these is well-known, the latter indeed producing a kind of drunkenness.

Iron as a Deodorizer. — Dr. Voelcker regards spongy iron as a more potent deodorizing material than animal charcoal. Sewage water passed through a filter of this substance is completely purified; and this filtered water, after having been kept six months protected from the air, is perfectly sweet, and free from any fungoid growth. The spongy iron is obtained by calcining a finely divided iron ore with charcoal. Its power of rendering water beautifully transparent, and apparently free from all organic matter, is remarkable.

Fungi and Cholera. — Mr. T. R. Lewis, a surgeon in the British Army in India, has recently published a report on the microscope objects found in cholera evacuations, illustrated with engravings of microscopic slides, executed with remarkable beauty and correctness in the office of the Surveyor-General of India. In this report Dr. Lewis has added considerably to our knowledge of some obscure points of microscopical science, while his conclusions are in direct opposition to those of Hallier and Pattenkoffer with regard to the fungoid origin of cholera. His general conclusions may be summed up as follows: 1. That no cysts exist in choleraic discharges which are not found under other conditions. 2. That cysts or "sporangia" of fungi are very rarely found under any circumstances in all the discharges. 3. That no special fungus has been developed in cholera discharges, the fungus described by Hallier being certainly not confined to such. 4. That there are no animalcular developments, either as to nature or proportionate amount, peculiar to cholera, and that the same organisms may be developed in nitrogenous materials even outside the body. 5. That the supposed *débris* of intestinal epithelium is not of this origin, but appears to result from effused blood plasma.

To Keep a Mustard Plaster Moist. — If a little syrup or molasses be added in mixing a mustard poultice, it will keep soft and flexible, and not dry up and become hard and uncomfortable, as when mixed up with water alone. A thin paper or fine cloth should come between the plaster and the skin. The strength of the plaster can be varied by the addition of more or less flour.

VALUABLE FORMULÆ.

Diphtheria. — The late Dr. Magruder, of Washington, used the following treatment with success in eighty-two out of eighty-five cases: —

The throat was rubbed frequently, externally, as soon as the swelling and soreness commenced, with spirits of turpentine. Internally, this: —

℞	Potassæ chlorat.	ʒj.
	Tinct. guaiac. comp.	℥ij.
	Tinct. cinchonæ	℥ij.
	Mellis	℥ss
	Aquæ	℥ij.

M. — S. A tablespoonful every three hours. Twenty drops of the muriated tinct. iron, an hour and a half after each dose.

Treatment in Diarrhœa in Infants. — Dr. Smith (in "Wasting Diseases of Infants and Children") recommends the following prescription if the bowels are rather loose, with dark, slimy, offensive stools: —

℞	Tinct opii	♏v
	Ol. ricini	ʒj
	Syrupi zingib.	
	Mucilag. acaciæ	aa

M. — S. A teaspoonful three times daily. In the screaming fits, accompanied by constipation, this combination of castor-oil with laudanum is valuable.

Colic in Infants. — The following formulæ will be found valuable in the colic of infants: —

℞	Pulv. rhei.	
	Fennel seed, aa.	℥ii.
	Water	O. i.

Boil until $\frac{1}{3}$ is dissipated. Dose, half a teaspoonful to half a tablespoonful, two or three times a day. It is useful in those cases attended by constipation. The addition of bromide of potassium in minute doses will, in some cases, be found beneficial: —

℞	Tr. opii.	gtt. 80
	Anise oil	gtt. 18
	Alcohol	℥i. —

Then put in ℥viii. of boiling water, first adding fine sugar, q. s., to suit the taste. Dose, half a spoonful or more, according to age.

Indolent Ulcers and Suppurative Surfaces. — Maisonneuve and Grislin recommend: —

℞	Charpie dipped in	
	Carbolic acid	℥ss.
	Spirits	℥i.
	Water	℥xv.-[illegible]

A similar treatment answers for cancer and fetid discharges of all kinds. Dr. Wolfe prefers the following, in order to get rid of the offensive smell of the acid: —

℞	Soft cotton	q. s.
	Saturate with carbolic acid —.	

Press out the excess of acid; then dry. This is to be applied to the diseased parts. The cotton thus prepared should be kept closely in a tin box.

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THE

Boston Journal of Chemistry.

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AGRICULTURE, AND MEDICINE.

JAMES R. NICHOLS, M. D., EDITOR.
W. J. ROLFE, A. M., ASSOCIATE EDITOR.

VOLUME VI.

JULY, 1871—JUNE, 1872.

BOSTON.
PUBLISHED BY JAMES R. NICHOLS AND COMPANY.
NEW YORK: HURD AND HOUGHTON, 13 ASTOR PLACE.
Printed at the Riverside Press, Cambridge.
1872.

BOSTON JOURNAL OF CHEMISTRY.

JAMES R. NICHOLS, M. D., EDITOR. WM. J. ROLFE, A. M., ASSOCIATE EDIT[illegible]

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Boston Journal of Chemistry.

olume VI. BOSTON, JULY, 1871. Number 1.

Familiar Science.

ICE-MAKING IN SUMMER.

Methods of keeping warm in winter have een long familiar, but it has been reserved to e present generation to find methods of keep-g cool in summer. Our attention has been lled more particularly to this fact by various ragraphs floating around in our exchanges in gard to the New Orleans ice-making machines. seems a little singular that ice can be pro-ıced in a tropical country in midsummer eaper than it can be stored at the North in inter and shipped to the South at the proper ne.

Methods of producing intense cold have been ng known in the laboratory, but these gener-ly are very expensive, and are applicable only a small scale. A familiar instance of artifi-al cold is the common pulse-glass. This is a ass tube bent twice at right angles, with a bulb own on each end. This is partially filled with her, which is boiled to expel the air, and the be is sealed while the ether is still boiling. holding one of the bulbs in the hand a sen-tion of cold is felt, while the ether in the bulb thrown into violent ebullition.

This at first sight seems rather paradoxical, t a little investigation will show us that this not the case. All solids in passing from the id to the liquid state, and all liquids in passing om the liquid to the gaseous state, absorb heat; is heat becomes latent or hidden. It has in ct become converted into work or force, being ployed in keeping asunder the molecules of e substance.

After we have boiled the ether to drive out e air, sealed the tube, and allowed it to cool, have only an atmosphere of ether in the tube. e tension or elastic force of this will of course ry with the surrounding temperature, but by a ll-known law of physics it will never exceed maximum tension corresponding to the cold-portion of the tube. Now when we hold one the bulbs in the hand we increase the tension that portion of the tube; but instantly a cor-ponding portion of vapor is condensed in the er portion of the tube, and the tension is re-ed again. But the warmth of the hand still tinues to evaporate the ether in the bulb ich is held in the hand, giving up its own t to the ether, and this will continue until all ether is evaporated or the tension of the or in both ends of the tube becomes equal. I instead of using ether we fill the tube tially with water, drive out the air as be-, and then plunge one of the bulbs into a ture of snow and salt, the water in the other will be frozen by its own evaporation. In these cases the heat is removed by the poration, and we can always produce cold if can secure a sufficiently rapid condensation of vapor in a different portion of the same appa-ratus in which it is produced. In the earlier forms of ice apparatus, the cold was produced by the evaporation of the water itself; the vapor being condensed by sulphuric acid, which has a strong affinity for aqueous vapor. This method is still used in Paris in the production of *carafes frappées*, or frozen decanters, which are frequently used at the restaurants. The ap-paratus used resembles a small steam-boiler; this is partially filled with concentrated sulphuric acid, and then connected with an air-pump and with the flask to be frozen. The air-pump not only removes the air from the vessel, but con-nected with it is an agitator which serves to keep the acid continually stirred up, and thus prevents the formation of a layer of dilute acid on the surface of the liquid in the vessel. If the vessel contains one hundred pounds of acid originally, it will serve to freeze about five hundred pounds of water. The inventor, Mr. Edmond Carré, claims that this apparatus will furnish ice at a cost of about half a cent a pound, since the acid is as valuable for many purposes as it was before being used. The apparatus of Mr. E. Carré is, however, completely eclipsed by that of his brother, Mr. F. Carré. This in its more simple form consists merely of two upright cylinders which communicate with each other at their up-per parts. These cylinders are made of iron, and must be capable of withstanding a pressure of at least one hundred and seventy-five pounds to the square inch. The larger of these two cylinders serves alternately as a boiler and con-denser; the other, or the refrigerator, is con-structed with double walls, the inside cylinder being open at the top to receive the liquid to be frozen. In order to freeze the substance, the condenser is partially filled with a concentrated solution of ammonia in water. This solution when boiled gives off all its ammonia. Ammo-nia is a gas at ordinary temperatures, but may be condensed to a liquid by cold and pressure. The apparatus has a valve so arranged that air may readily pass out from the interior, but in so doing it must pass through water. When the condenser is heated the ammonia is volatilized, and tends to escape from the vessel; and this it is allowed to do until it has carried all the air with it. The valve is then forced down to its seat by means of a screw, and the apparatus is ready to be used. Heat being still applied to the condenser, and the refrigerator being placed in cold water, the ammonia gas soon acquires such a tension that it cannot exist in the gas-eous state in the refrigerator, and it is conse-quently condensed, a large amount of heat being given out in the operation. This heat is ab-sorbed by the water surrounding the refriger-ator. When all the ammonia has been driven over, the condenser is removed from the fire and placed in its turn in cold water, the refrigerator being surrounded by woolen cloths or any other poor conductors. The operation is now re-versed; the water becoming cooled recovers its power of absorbing ammonia gas, and conse-quently the tension of the gas is at once reduced; the condensed ammonia in the refrigerator is thrown into violent ebullition and is rapidly evap-orated. But the evaporation requires a large amount of heat, and this is abstracted from the body placed within the refrigerator, which is soon reduced to a temperature many degrees be-low the freezing point.

The capacity of the machine in this form is very limited, as it takes about two hours to pro-duce two and a half pounds of ice. The cost of this apparatus in Paris is 282 francs, or 56 dollars in gold, for one producing two and a half pounds of ice at an operation; for one producing double this quantity the price is 406 francs, or 81 dollars. Neither of these forms of apparatus is however available for the manufacture of ice on a commercial scale; but the same is not true of the continuously acting machine of Mr. Fer-dinand Carré.

This process depends like the last upon the evaporation of liquid ammonia, but the apparatus is on a much larger scale, and is quite compli-cated, although the essential parts as before are the boiler and the refrigerator; but a separate condenser is added. The ammonia passing from the boiler into the condenser is there con-densed and cooled; it is then conveyed in a liquid form to the refrigerator. Having now become gaseous again, it passes into another con-denser, which is supplied with the exhausted water which is being continually drawn off from the bottom of the boiler. This having been cooled is ready to absorb the gas again, and as soon as it is saturated it is pumped back into the boiler by a pump worked by a steam-engine. The process of freezing thus becomes continuous so long as the fire is maintained under the boiler and the pump is in operation. Ice can be produced by one of these machines at a cost of about one cent for four pounds, or five dollars per ton. Several of them are now in successful operation at New Orleans. Some curious ex-periments may be shown with these machines. Flowers and fruit may be enclosed in solid blocks of ice. Fish may be preserved in this way for transportation to distances from the sea-coast, and in fact the applications are almost numberless.

THE CRYSTAL PALACE AQUARIUM.

The latest addition to the attractions of the great "house of glass" at Sydenham is an aqua-rium on a larger scale than has ever been at-tempted before. It was built by a company with a capital of £12,000 (or \$60,000), and, though not yet fully "stocked," it has been opened to the public.

This marine menagerie occupies a building 312 feet long, 50 wide, and 20 high. One

side is taken up with sixty enormous tanks, the largest holding 4,000 gallons of sea-water. Thirty-eight of these are for the public exhibition of their inhabitants; the others contain creatures for experiments, and for replenishing the other tanks. A corresponding series of fresh water tanks is to be added at a future day.

Under the building is a vast reservoir, which is to be filled with sea-water, no less than one hundred and fifty thousand gallons of which will be required for the purpose. This enormous quantity of water is to be brought from Brighton by rail. The reservoir is so large that it takes four thousand gallons to cover the bottom to the depth of an inch. A steam-engine is at work day and night, to pump the water from the reservoir into the tanks, which are so arranged that the water falls from one into another, and thus becomes oxygenated in its progress. From five to ten thousand gallons an hour will pass through the tanks back to the reservoir, and then round again on its journey. The steam-engine is thus like a great heart, ever beating and forcing the briny fluid through all the veins and arteries of this vast circulation. All the pipes through which the current passes are made of hard rubber, or vulcanite. Even the pumps, strainers, stopcocks, and valves are constructed of this material. Iron would not do, for it would soon rust, and both the apparatus and the water would be spoiled. All the essential parts of the machinery — as the boilers, engines, and pumps — are duplicated, so that if one gets out of order, the other will be ready to supply its place without delay.

Arrangements have been made for the collection of marine animals from all parts of the kingdom, and depots for them have been established at Plymouth, Tenby, Menai, and several other places, where the "water-babies," as Kingsley would call them, are to be acclimated in tanks before being transferred to the Crystal Palace.

It is suggested that this magnificent aquarium may be made something more than a mere exhibition to gratify the curiosity of the public. Scarcely anything is known of the habits of sea-fish; but here their behavior may be watched and studied, and many disputed points in their history may thus be settled. Certain problems of no small practical importance may be solved in this way. Oyster-beds are subject to extensive depredations from creatures whose "ways" are so "dark" that nobody knows how to thwart them. They can neither be trapped nor driven away, and the oyster and his owners suffer accordingly. If the habits of these marine pests were better known, some method could doubtless be devised to circumvent them. Thus the Crystal Palace Aquarium, by adding to our knowledge of marine zoölogy, may enable us to control or exterminate animals that are mischievous, and to make those that are useful more abundant and more valuable to man.

SIR JOHN FREDERICK WILLIAM HERSCHEL.

One after another of the leaders of scientific thought passes away. The past few years have been remarkable for the number of scientific men who have ended their earthly career, and now the death of Sir John Frederick William Herschel is announced. He has occupied a peculiar position in regard to scientific knowledge. The son of the most eminent English astronomer of his day, he enjoyed great advantages in his youth which he did not fail to improve. He was graduated at St. John's College, Cambridge, where he distinguished himself as a mathematician. After completing his studies at that place he naturally turned his attention to the science which had already rendered the name of Herschel so renowned. His chief astronomical work was the completion of the map of the entire heavens, already carried to a great extent by the labors of his father, uncle, and aunt.

But it is not from his astronomical work, great as that was, that he is generally known. His literary labors in popularizing science will ever render his name a household word. No man has done so much to bring scientific knowledge within reach of the ordinary reader.

He had the happy faculty of giving accurate information, which was equally free from dry, technical details, and from the charlatanry which so often disgraces books written for popular information.

A mere list of his works, and of the papers which he contributed to various journals would fill many pages.

OZONE AND HYGIENE.

Several brief papers upon the nature of ozone have been published in the Journal, and therefore we presume it is quite well understood by our readers. Its relations to the economy of Nature form an interesting subject, and, at this season of the year, one well worthy of study. The manufacture of test paper, and the conduct of experiments upon air, are so easy of accomplishment that any one who will make the attempt will succeed. Much may be learned by careful observation, when experiments are made under varying circumstances. Dr. Cohen, of Quincy, Ill., communicates the following results of some experiments to a local paper, which are interesting: —

It is quite common, during very hot, dry weather, to hear the expression — "Oh! for a good thunder-storm to clear the air!" Those who make use of these words probably do not consider the true philosophy and science to which they give utterance; but that a thunder-storm does purify the miasmatic-laden atmosphere is positive fact, and it is the ozone generated at the time that does the work. It will not be forgotten that I have dwelt most particularly on the powerfully oxidizing nature of this substance; it acts, indeed, by carrying oxidation at once to the very highest degree. Slow oxidation of organic substances is putrefaction; rapid oxidation is combustion; and if organic germs bearing malaria or miasmata in the atmosphere, in clothing, bedding, or any other vehicle, are subjected either to a high temperature (about 300° F.), or to the influence of ozone, the result is the same: they are *burned* — consumed, and converted into innocuous, aye, even health-restoring substances; and thus from death springs forth life.

In 1858, Dr. Lankester, of London, constructed the ozonometer, on the principle of the test I have already mentioned; the standard preparation consists of one part of iodide of potassium, ten parts of starch, and one hundred parts of distilled water; this is boiled for a few moments, unsized paper is saturated with it, dried rapidly, cut into slips, and kept in an air-tight bottle or box in a dark place; when wanted for use, one or more of the slips are exposed to the atmosphere to be tested, generally for twenty-four hours, although of course, as many observations can be made as the investigator desires.

The ozonometer, as thus simply constructed, was used in London during the outbreaks of typhus fever, in 1859 and 1860; but we have more extended accounts of the observations taken during the fearful epidemic of cholera that raged in Alexandria, in June and July, 1865. For more than a month, not a trace of ozone could be found in the atmosphere above and to leeward of the ill-fated city; observations made a few miles to the windward showed its presence in considerable quantity. A southerly wind prevailed, and the neighboring villages, as also Ghizeh, Cairo, and other parts of Egypt, were exempt from the terrible scourge. From Alexandria it crossed the Mediterranean and appeared first at Constantinople, where similar observations were taken, as also afterwards at Marseilles, Paris, Madrid, Naples, and still later in London. In the infected districts, in all these cases, the ozonometer showed no change, remaining perfectly white, while a few miles to windward the reaction upon the paper was intense. During the epidemic of yellow fever in New Orleans, in 1867, not a trace of ozone could be discovered; and by the observations of Prof. Ford and myself, this condition of the atmosphere continued during the entire winter following, which was marked by the prevalence of an unusual number of cases of malarial fevers, characterized by various types. In the autumn and winter of 1868, however, according to the observations of Prof. Ford, a very large amount of ozone was constantly present, and while for the first time in many years, not a single genuine case of yellow fever was reported, and much less than the usual amount of intermittent, remittent, and typhoid fevers prevailed — influenza, diphtheria, and pneumonia became almost epidemic. We find, then, that while cholera, yellow fever, typhus, typhoid, intermittent, remittent, and other malarial fevers are attended by a deficiency, and in many cases, a total absence of ozone, an increased amount of this agent accompanies certain diseases affecting the respiratory organs.

In the daily ozonometric observations that I have taken and registered in this city, since July 1st, 1869, my experience has proved the same rule. From that date up to February 6th, 1871, there has never been, in Quincy, a total absence of ozone in the atmosphere for more than three or four days at a time; and this has occurred only in very cold weather. My professional brethren will confirm the statement that during the past two years, there has been much less of malarial disease, than ever formerly known, indeed, it may be said, a marked decrease, while on the other hand, catarrhal and bronchial affections have increased in prevalency. Within the last few weeks, there has been a remarkable exemplification of the effects of the sudden appearance of a large amount of ozone in the atmosphere; from the latter part of January to February 6th, there had been a considerable quantity indicated; and it will be recollected that catarrhal and eruptive fevers were then quite prevalent. On February 6th, the ozonometer recorded "*highly intense*," and from February 7th to March 10th, inclusive, the record was "*none*," with the exception of one day, February 26th, on which it was "*moderately intense*," and five other days, at intervals, on which there was a slight indication. During this period, the complaints I have mentioned disappeared, but, on March 11th the record was again "*highly intense*," and has remained fluctuating with a tendency to a high degree up to this day. Mark the results: influenza, bronchitis, tonsillitis (which some sharp practitioners have dignified with the title of diphtheria, a disease which never appears unless there is a *continued excessive* amount of ozone present), some cases of pneumonia, and other severe catarrhal affections

have appeared as if by magic, while intermittent, remittent, and typhoid fevers — often prevalent at this season, but never when those affections I have mentioned are rife, — are scarcely, if at all, heard of.

A GAS TREE.

Dr. J. H. Salisbury, of Cleveland, Ohio, sends us the following interesting account of a tree holding inflammable gas under pressure. It is a singular occurrence: —

"In January last, Messrs. Wallace and Nathan Salisbury, of Cortland Co., N. Y., went on to Mt. Topin to procure white oak lumber. Having selected a tree that would answer their purpose, they commenced chopping it down. The tree was two feet in diameter. When they had cut in about four inches on the east side, their attention was called to a peculiar sound issuing from the tree. Their first impression was that it contained a swarm of bees. On striking a couple more blows, the small chips and dirt commenced flying from the stump. On putting the hand down they discovered a strong current of gas issuing from a fresh crack in the stump. The odor was like that of confined air. This blowing continued for full five minutes, when for curiosity they applied a lighted match; to their astonishment the gas ignited instantly, and burned at least five minutes, with great heat, and a blue flame like that of alcohol. After the gas had all escaped they finished chopping down the tree.

"They found a hollow in the stump about six inches in diameter. Their conclusion was, that the gas was light carburetted hydrogen, and had formed from the gradual decay of the wood.

"You can rely upon this statement, as being correct in every particular."

NATURE'S ECONOMY.

Prof. Huxley, in a recent lecture, gives the following curious and striking view of a geological process: —

"Let us suppose that one of the stupid, salamander-like labyrinthodonts, which pottered, with much belly and little leg, like Falstaff in his old age, among the coal forests, could have had thinking-power enough in his small brain to reflect on the showers of spores which kept on falling through years and centuries, of which perhaps not one in ten million fulfilled its apparent purpose and reproduced the organism which gave it birth: surely he might have been excused for moralizing upon the thoughtless and wanton extravagance which Nature displayed in her operations. But we have the advantage over our shovel-headed predecessor, — or possibly ancestor, — and can perceive that a certain vein of thrift runs through this apparent prodigality. Nature is never in a hurry, and seems to have had always before her eyes the adage, 'Keep a thing long enough, and you will find a use for it.' She has kept her beds of coal many millions of years without being able to find much use for them; she has sent them down beneath the sea, and the sea-beasts could make nothing of them; she has raised them up into dry land, and laid the black veins bare, and still, for ages and ages, there was no living thing on the face of the earth that could see any sort of value in them; and it was only the other day, so to speak, that she turned a new creature out of her workshop, who, by degrees, acquired sufficient wits to make a fire, and then to discover that the black rock would burn."

After alluding to the value of coal to the arts as a fuel, he goes on: —

"All this abundant wealth of money and of vivid life is Nature's interest upon her investment in club-mosses and the like, so long ago. But what becomes of the coal which is burnt in yielding this interest? Heat comes out of it; light comes out of it; and if we could gather together all that goes up the chimney and all that remains in the grate of a thoroughly burnt coal-fire, we should find ourselves in possession of a quantity of carbonic acid, water, ammonia, and mineral matters, exactly equal in weight to the coal. But these are the very matters with which Nature supplied the club-mosses which made the coal. She is paid back principal and interest at the same time; and she straightway invests the carbonic acid, the water, and the ammonia in new forms of life, feeding with them the plants that now live. Thrifty Nature! Surely no prodigal, but most notable of housekeepers!"

BATHING IN THE DEAD SEA.

Bathing in the Dead Sea produces as novel a sensation as if you found yourself suddenly endowed with wings, and emulating the feats of a tumbler-pigeon in mid-air. You become a clumsy float, a top-heavy buoy, or swollen cork, the instant you are in its waters; and arms, legs, and body are apparently endowed with the strangest qualities. It is as if heavy weights were affixed to each, directly you attempt to move, and experienced swimmers fail in their best strokes, by reason of the unnatural buoyancy with which they have to contend. Your limbs are on the surface, and you cleave the air with your hands, the moment you try to swim; and the man who would be drowned as soon as he was out of his depth in any other sheet of water in the world, is the one best fitted for bathing in the Dead Sea. He cannot sink in it, let him do what he will. It is as if he were encased in life-belts, or sprawling on a feather-bed. If he lean back and throw his feet up, it is exactly as if he were resting in a peculiarly well-stuffed easy-chair, with a leg-rest to match. He may fold his arms, turn on one side, lie flat upon his stomach or back, clasp his knees with both of his hands, or draw his toes and head together, in the same shape the human body would assume if crammed hastily into a jar with its extremities left out, and all with no more possibility of sinking than if he was in so much soft sand. Woe to him if he be tempted by these unusual facilities to stay long in the water with his head uncovered! The bare and rocky walls of the low-lying caldron which holds the Sea of Death reflect back the burning sun and concentrate its rays; and a *coup de soleil* will be the all but inevitable consequence of his imprudence. Two of our party entered the water, and remained in it some seconds before they re-covered their heads, and the result was severe shooting pains, sickness, and dizziness, which lasted until their immersion, an hour later, in the refreshing waters of the Jordan. Woe, too, to the inexperienced stranger, who, following his rule in other bathing, dips his head as well as his body into the Dead Sea. Inflamed eyes and nostrils, together with hair and beard laden with acrid salts, are among the penalties of his rashness; while if he tastes of its waters, he becomes acquainted with a greater concentration of nastiness than had entered his imagination before. In buoyancy and bitterness the Sea of Sodom exceeded all we had heard or read respecting it; but in some other particulars our anticipations were falsified surprisingly. We looked for gloom, and we found brightness; we had imagined turbid waters, and we found a lake exquisitely clear and delicately blue; we expected perfect silence and an unbroken waste, and we found the birds singing sweetly among the tamarisks and oleanders, which spring up wherever a stream finds its way from the mountains to mingle with the mysterious inland sea.

THE PHILOSOPHER AND HIS DAUGHTER.

[The following charming poem, which has the merit of combining "instruction and amusement," and of showing the estimation which usually attends learning, was written by Shirley Brooks, and first appeared in the *Illustrated London News*.]

A sound came booming through the air!
"What is that sound?" quoth I.
My blue-eyed pet, with golden hair,
Made answer, presently,
"Papa, you know it very well;
That sound — it was Saint Pancras bell."

"My own Louise, put down the cat
And come and stand by me;
I'm sad to hear you talk like that, —
Where's your philosophy?
That sound — attend to what I tell —
That sound was not Saint Pancras bell.

"Sound is the name the sage selects
For the concluding term
Of a long series of effects,
Of which that blow's the germ.
The following brief analysis
Shows the interpolations, Miss.

"The blow which, when the clapper slips,
Falls on your friend, the bell,
Changes its circle to ellipse
(A word you'd better spell),
And then comes elasticity,
Restoring what it used to be.

"Nay, making it a little more,
The circle shifts about,
As much as it shrunk in before,
The bell, you see, swells out;
And so a new ellipse is made,
(You're not attending, I'm afraid.)

"This change of form disturbs the air,
Which in its turn behaves
In like elastic fashion there,
Creating waves on waves;
Which press each other onward, dear,
Until the outmost finds your ear.

"Within that ear the surgeons find
A tympanum, or drum,
Which has a little bone behind —
Malleus, it's called by some;
Those not proud of Latin grammar,
Humbly translate it as the hammer.

"The wave's vibrations this transmits
To this, the incus bone,
(Incus means anvil, which it hits,)
And this transfers the tone
To the small *os orbiculare*,
The tiniest bone that people carry.

"The *stapes* next — the name recalls
A stirrup's form, my daughter —
Joins three half circular canals,
Each filled with limpid water;
Their curious lining you'll observe,
Made of the auditory nerve.

"This vibrates next — and then we find
The mystic work is crowned;
For then my daughter's gentle mind
First recognizes sound.
See what a host of causes swell
To make up what you call the 'bell.'"

Awhile she paused, my bright Louise,
And pondered on the case;
Then, settling that he meant to tease,
She slapped her father's face.
"You bad old man, to sit and tell
Such gibberygosh about a bell!"

NATURAL HISTORY NOTES.

Quill-pens and Spiders. — The saying that no created thing is without its use was somewhat curiously illustrated — at any rate so far as spiders are concerned — at a sale which took place some short time ago in London. The business and premises to be disposed of were those of a quill-pen manufacturer, and the presence of vast quantities of well-fed spiders in the establishment was accounted for by one of the old employés in a somewhat curious manner. It would appear that the feathers of the goose-quill are infested by a most destructive species of moth for which spiders have an especial predilection, and therefore quill-pen manufacturers keep these insects upon the same principle that a good housewife keeps a cat. Since the days when the perseverance of a spider read Robert Bruce the lesson he afterwards utilized so well at Bannockburn, no pleasanter story has been told of this ill-favored insect.

Fish in Deep Water. — A curious experiment was performed in France, recently, to ascertain whether fish could live in great depths of water. The fish were placed in vessels of water made to sustain 400 atmospheres, under which they lived and preserved their health. It is therefore concluded that fishes may penetrate to very great depths in the ocean with impunity, as a pressure of 400 atmospheres corresponds to a depth of 13,600 feet, or about two miles and a half.

The Home of the Ostrich. — The ostrich has usually been considered as peculiar to the continent of Africa, where two species have been recognized, one belonging to the northern portions, the other to the regions nearer the Cape of Good Hope. These species were long considered identical, and their distinctness was first suggested by the difference in the texture of the egg. In a recent work by Hartlaub and Finsch on the Birds of Eastern Africa, it is shown that either the ostrich of Northern Africa or a third species was known at a very remote period in Central Asia, and perhaps even in India; and that at the present time it occurs wild in Syria, Arabia, and Mesopotamia, where, in fact, it was mentioned by the earliest writers, including Herodotus, Aristotle, and Diodorus.

HOUSEHOLD RECIPES.

A Useful Cement. — There is a first-rate home-made cement for filling up cracks in an old stove or range. The ingredients are wood-ashes and salt, equal proportion in bulk of each, little less of salt; reduce to a soft paste with cold water, and fill cracks when the range or stove is cool. The cement will soon become perfectly hard. Fire-clay (obtained at the stove dealers) will sometimes answer, but this home-made cement is always at command, where wood is the fuel used.

Perspiration. — The unpleasant odor produced by perspiration is frequently the source of vexation to persons who are subject to it. Nothing is simpler than to remove this odor much more effectually than by the application of such costly unguents and perfumes as are in use. It is only necessary to procure some of the compound spirits of ammonia, and place about two table-spoonfuls in a basin of water. Washing the face, hands, and arms with this leaves the skin as clean, sweet, and fresh as one could wish. The wash is perfectly harmless, and very cheap. It is recommended on the authority of an experienced physician.

A Parlor Vine. — To grow a very pretty vine from the sweet potato, put a tuber in pure sand or sandy loam, in a hanging basket, and water occasionally. It will throw out tendrils and beautiful leaves, and will climb freely over the arms of the basket and upward toward the top of the window. Not one visitor in a hundred but will suppose it to be some rare foreign plant.

The Arts.

THE CARBURETTING OF COAL GAS.

In an article on this subject, last September, we referred to the fact that most of the processes for improving the illuminating power of coal gas by the admixture of a hydrocarbon vapor had proved of little practical value. We stated some of the difficulties of the problem, and gave the results of the attempt, under Dr. Letheby's supervision, to economize gas without loss of light in the street lamps of London. Even when there was a gain by carburetting the gas, it did not appear to be more than 20 per cent. (according to the experiments made in England), and this, as we remarked, is too small to balance the extra cost and the risks incurred.

It appears, however, that experiments made on a large scale in this country have given more favorable results; and we are very happy to publish the following communication on the subject from one of our ablest and most trustworthy chemists: —

Fifteen years' experience has given us practical knowledge of this subject, perhaps to a greater extent than any other party in New England, for our experiments cover the carburetting of coal gas for from one thousand (1,000) to four thousand (4,000) burners, for several years.

We think it perfectly safe to state, as the result of this experience, that from 25 to 33 per cent. of the cost of coal gas can be saved without the least doubt, even when the carburetting is indifferently attended to.

There are many conditions to be observed in carburetting successfully, not the least of which is the temperature at which the gas *enters* and *leaves* the carburetters; for the rapid evaporation of the naphtha produces cold, *for which compensation must be made if we would secure uniformity of light.*

In the annexed table, we think all the essential points are covered: —

Capacity of Burner per Hour.	Pressure of Gas in Inches of Water.	Naptha burned in Gallons to 1,000 Feet.	Temperature of the Room.	Temperature of the Gas.	Strength of Light in Candles.	Per cent. of Light.	Relative Cost of 1,000 Feet.	Percentage of Saving.
3 feet.	Four eighths		75	64	4.75	100	$3.90	
6 feet.	Four eighths		75	64	10.75	237	2.65	
3 feet.	Five eighths	1.55	76	75	8.75	185	1.76	41
3 feet.	Five eighths	1.45	76	65	8.00	167	1.93	35
3 feet.	Five eighths	1.37	76	58	7.50	158	2.06	32
3 feet.	Five eighths	1.24	65	65	7.00	147	2.17	28
3 feet.	Five eighths	1.10	75	54	6.50	137	2.35	22

In the first experiment recorded in the table, gas was burned *without carburetting*, and this is taken as a standard. In the second experiment, the gas was not carburetted, but a different burner was used.

Carburetting gas in street lamps can never be successful, owing to the want of uniformity of temperature; but it does not follow, that carburetting is not successful where a uniform temperature can be secured. We are aware of the variation in the intensity of the light of carburetted gas, and have well-kept records of the same, but this does not practically enter into the question, for the simple reason, that for most practical uses, six hours' continuous illumination meets the wants of the public, and not forty hours, as in the experiment described in your article.

It is an interesting feature in the use of artificial light, that increase of light is always agreeable to all parties, and there is very slight danger of any one's complaining of too much artificial light. The more light is given, the more we are inclined to use, and still the cry is for *more light.* It is this universal craving for the best artificial light, that has prevented the more general introduction of carburetting coal gas; for the simple reason, that giving by means of carburetting a 8.75 candle light, in lieu of a 4.75 candle light of common coal gas, does not save the gas bill, but it does give 41 per cent. *more light for the same money.* Make the light equal in the two cases, and the economy will be obvious.

In your article you give the result of experiments in England with air passed through naphtha, and state that 50 per cent. of the naphtha remained, the most volatile portions having passed off. The experiment was upon too small a scale to be conclusive. We have used during the last four years hundreds of barrels of naphtha in carburetting, and we have no evidence that any non-illuminating naphtha remains in the carburetters, or has condensed in the gas pipes.

NEW METHOD OF OBTAINING CHLORINE.

Mr. H. Deacon, of the Widnes Alkali Works, England, dispenses with the use of manganese altogether in making chlorine. His method consists in passing a mixture of air and hydrochloric acid vapor over a mass of broken brick heated to 700° F., that has previously been soaked in a solution of cupric sulphate (blue vitriol) and dried. An almost complete decomposition of the acid takes place. The copper salt acts in some unknown way, as it is found at the end of the operation unchanged; the sole obvious result being, that the chlorine of the acid is set free by the oxygen of the air, with a rapidity that leaves nothing to be desired. It is well known, however, that chloride of copper gives off a portion of its chlorine by heat alone; the following may therefore be the reaction: —

$$CuCl_2 + O = CuO + Cl_2$$
$$CuO + 2HCl = CuCl_2 + H_2O$$

Although this process has not yet been worked on a manufacturing scale, considerable experience has been acquired in regard to it, and the difficulties to which it at first seemed liable have been overcome. One inevitable difficulty, arising from the dilution of the chlorine, has proved to be less serious than was anticipated; it has not been found to interfere with its application to the manufacture of potassic chlorate or of bleaching powder.

The requisite apparatus for carrying out this invention on a large scale is now being erected at the works of Messrs. Gaskell and Deacon.

THE RANSOME ARTIFICIAL STONE.

This artificial stone was originally made by treating an intimate mixture of sand, pulverized carbonate of lime, and silicate of soda, with a solution of chloride of calcium. An interchange of elements took place, resulting in the formation of silicate of lime, which became hard, and chloride of sodium, which could be dissolved out. The silicate of lime cemented the sand into a hard and permanent stone. If the chloride of sodium (common salt) is not washed out, it forms an efflorescence which injures the appearance, if not the quality of the stone.

To obviate the necessity of the inconvenient and costly process of dissolving out the salt, Ransome endeavored to dispense with the use of the chloride of calcium; and after many experiments he has succeeded in doing so. He now prepares a mixture of sand, Portland cement, ground carbonate of lime, and some silica, which is soluble in caustic soda at ordinary temperatures; from this, with soluble

lass, he obtains a mass that remains plastic long nough to be run into moulds, and gradually changes) a hard stone, which resists the action of heat and old, is impervious to water, and in process of time icreases in hardness and durability. He explains ie chemical reaction as follows: If Portland ce- ient, which consists of silicate of alumina and lime, e mixed with soluble soda, the latter is decom- osed in such a way that its silica forms silicate of me with the lime of the cement, while caustic soda liberated; this latter, however, at once re-unites rith the soluble silica placed there for the purpose f producing soluble glass, to be again decomposed y the Portland cement. The whole of the caustic oda does not appear to be liberated each time, but silicate of lime and soda is produced, and in that ay all of the soda is absorbed.

By the addition of fragments of quartz and oxide ' iron, artificial granite can be produced, and also, another way, imitation of marble, both of which e very hard, and admit of a fine polish; and they ave the advantage of the natural stone in being ist in moulds and patterns of any form.

MEMORANDA IN THE ARTS.

A Comprehensive Implement. — An English- an, who by some mistake was not born a Yankee, is invented a spade which is thus described: — he back forms, as occasion requires, a spade, a ying-pan, or a breastplate; the handle can be used a rest for the rifle, and, in addition, it can easily e transformed into a "pick" and an axe. Among ie minor details of this novel implement are a saw, hammer, and a match-box; and the whole is so ght and portable as to be easily carried on the arch.

Submarine Telegraphs. — The progress in ıbmarine telegraphy during the past year has been omewhat remarkable. The enormous length of 1,568 knots of cable was actually manufactured in 370, and no less than 11,292 knots submerged. he principal lines laid were the British Indian, e British Indian Extension (Madras to Singapore id Penang), the Falmouth, Gibraltar, and Malta, e Anglo-Mediterranean (Malta to Alexandria), e Marseilles, Algiers, and Malta, the West India id Panama, the Cuba Submarine, and sundry nall ones in connection with the British Post ffice.

Silken Newspapers. — In Pekin, a newspaper extraordinary size is published weekly on silk. is stated to have been started more than a thou- nd years ago. In 1827, a public officer caused me false intelligence to be inserted in this news- per, for which he was put to death. Several umbers of the paper are preserved in the Royal brary of Paris. They are each ten and a quarter rds long. But silken newspapers are not confined the "flowery land." The editor of the *Journal Brest* (in France), during a short stay of the ince de Joinville in that town, after a cruise, in e reign of Louis Philippe, presented the Prince th a copy of his paper printed on white satin. kewise, in April, 1839, a copy of the *Cheltenham* ng.) *Chronicle*, printed on the same material, con- ining an account of the proceedings in that town the occasion of presenting Her Majesty with a ld medal, was transmitted to the Queen.

Money Paper. — The contract for making the per for Government stamps has been awarded to e Glen Mills, Delaware Co., Penn. These mills e owned by the Messrs. Wilcox. They have obably made the raw material for more money an any other family in the world, having been gaged in the manufacture of bank-note paper for er a hundred years. The new paper is to have a re in it similar to that used in the fractional cur- ncy. This will effectually prevent any attempts at cleansing the stamps, as the color of the fibre will be destroyed at the same time that the stamp is cleaned.

The Messrs. Wilcox have been engaged in mak- ing the paper for the fractional currency for several years. It is all made under the strictest govern- ment supervision, every sheet manufactured having to be accounted for to the proper officers at Wash- ington.

PRACTICAL RECIPES.

Painting Zinc. — A difficulty is often experi- enced in causing oil-colors to adhere to sheet zinc. Boettger recommends the employment of the follow- ing composition: One part of chloride of copper, one of nitrate of copper, and one of sal-ammoniac are to be dissolved in sixty-four parts of water, to which solution is to be added one part of commercial hy- drochloric acid. The sheets of zinc are to be brushed over with this liquid, which gives them a deep black color: in the course of from twelve to twenty-four hours they become dry, and to their now dirty-gray surface a coat of any oil-color will firmly adhere. Some sheets of zinc prepared in this way, and afterwards painted, have been found to withstand entirely all the atmospheric changes of winter and summer.

To Blacken Zinc. — Zinc may be given a fine black color, according to Knaffl, by cleaning its surface with sand and sulphuric acid, and immers- ing for an instant in a solution composed of four parts of sulphate of nickel and ammonia in forty of water, acidulated with one part of sulphuric acid, washing and drying it. The black coating adheres firmly, and takes a bronze color under the bur- nisher. Brass may be stained black with a liquid containing two parts of arsenious acid, four of hydro- chloric acid, and one of sulphuric acid, in eighty parts of water.

To make Artificial Marble for Paper Weights or other Fancy Articles. — Soak plaster of Paris in a solution of alum; bake it in an oven, and then grind it to a powder. In using, mix it with water, and to produce the clouds and veins, stir in any *dry* color you wish; this will become very hard, and is susceptible of a very high polish.

Paint for Iron Work. — There is no protec- tion for iron work so efficacious as boiled linseed oil, properly laid on. The iron should be first well cleaned and freed from all rust and dirt; the oil should be of the best quality, and well boiled, without the addition of litharge or any dryer. The oil must be laid on as thin as possible, for if there be too thick a coat of oil put upon the work, it will skin over, be liable to blister, and scarcely ever get hard; but if iron be painted with three coats of oil, and only so much put on each time as can be made to cover it by hard brushing, it will preserve the iron from the atmosphere much longer than any other process of painting. If a dark coloring matter be necessary, burnt umber is preferable to any other pigment as a stain; it is a good hard dryer, and mixes well with the oil, without injuring it.

Varnish to Protect Polished Metals from Rusting. — Dr. C. Puscher recommends the use of a solution of paraffine in petroleum (1 part by weight in 3 of petroleum), as a varnish which may be usefully applied to polished metals, especially as after having brushed this liquid over the surface of the metal it may be gently wiped clean with a soft piece of flannel, so as to leave only a very thin film of the varnish, yet sufficient for the protection of the polish.

The Tredegar Iron Works, at Richmond, Va., now turn out five tons of iron to one before the war, and last year manufactured 17,000 tons of wrought and cast iron, in addition to implements, bringing $2,000,000 to the city of Richmond.

Agriculture.

CURING HAY.

Dr. P. Simonton of Maine, in some remarks regarding the curing of hay, divides the process into three methods, as follows: —

"1. The old method, which originated in the days of wooden pitch-forks — 'the more drying the better;' all the leaves and seeds dropped out and lost — all the fragrant aroma and nutrient juices gone into the air forever. This wooden pitch-fork method, from all we can see and learn, is the very poorest, as it is the one still most common in practice. Raking up and spreading out, over and over again, even in good weather, is about the idea of this over-drying method.

"2. Let the grass be sufficiently dried to remove all external moisture, and to wilt it well, — such as well stirring it in one day's sun will do; then put it in small bunches lightly forked up — not rolled — so to remain till the interior of the piles feels slightly warm; then for one day to be spread out and tended as during the first day, when, if the grass is reasonably ripe, and the weather tolerably good, it is fit for the barn. Two great advantages result from this method over the first; less labor, and saving the most valuable part of the hay, — the leaves, seed, and juices, which are largely lost in the other.

"3. When every particle of dew and all other outward dampness are off the grass, mow, and put it as soon as possible, without stopping for it to wilt, — certainly before any moisture comes upon it, — where it is to remain in the barn. When it is all in, or when for any reason the work is suspended for a few days, cover the top of the hay with a foot of straw or other cheap material. It is claimed for this method that it is a great saving of time and labor, and that every valuable property of the hay is saved; especially its juices, so nourishing and so relishable to the stock, and which serve as a natural pickle to preserve the hay. In a few days the hay heats and ferments, causing a dense steam to rise to, and lodge in, the upper foot of the heap, spoiling it; hence the use of the straw, to receive the steam and save so much hay.

"Last year many of the agricultural publications spoke of this new (No. 3) method, and advised a trial of it. But we do not so much allude to it here for that reason, — for there is no absurdity so great that it does not have powerful advocates somewhere: the famous Farmers' Club of New York city, which so often sends out, through the *Tribune*, its wordy-wise and often ridiculous advice and instruction, being composed, it is said, of 'doctors without patients, lawyers without clients, and clergymen without parishes,' — but because it was last year tried in this locality, the results of which trial, if known, may lead to future profit. And the person who has tested the thing, who is a practical and intelligent farmer, has kindly furnished the following for publication: —

"Dr. P. Simonton, — *Dear Sir:* In reply to your inquiries respecting my experience in putting hay green into the barn, I will state that early in last haying season, before the grass was fully ripe, one morning, beginning at nine o'clock, the grass being perfectly free from dew and all outward moisture, I mowed, by machine, two tons of grass, which with the help of two boys I put upon the scaffold in my barn by two o'clock the same afternoon. That was all I did to it. It went through a process of heat and sweating which caused the upper layer, perhaps 10 or 12 inches thick, to spoil for eating purposes. All below this proved excellent hay; some of the leaves turned dark, but nearly all the useful parts, which are lost by the drying method,

being saved, it was very rich in fodder, and was much better relished by the stock than common dried hay. Specimens of it can now be seen on my premises, and at the Selectmen's office in this town. I intend to cure my hay in the same way this season on as large a scale as the weather will permit. Covering it with some cheap material, like straw or refuse hay, would be a saving. Thanking you and all who take an interest in these matters, I am

"Yours respectfully, WM. M. LARRABEE.

"SEARSPORT, *June* 24, 1869."

REMARKS. — We have always advocated cutting hay early, and drying it less than is the practice of many farmers. To properly secure the hay crop is the most important work the farmer is called upon to perform, and the want of judgment and common sense in conducting the labor causes the most serious losses. It will not do to advise farmers to follow Mr. Larrabee's method, and yet we are certain it is safe, and the best under certain conditions. During the dry, hot days in July, when but little dew drenches the grass in the morning, it may be safely cut and housed the same day. With the use of a hay-tedder and in the absence of dew in dry weather, two thirds of the hay grown upon any farm may be placed in the mow without cocking in the field, and the quality be much improved. Let farmers try some apparently *hazardous* experiments in a small way during the present season, in storing partially cured hay, and they will learn some most important and instructive facts.

UNOCCUPIED LAND.

WHILE there is a narrow strip of country on our Atlantic coast, extending from Portsmouth, N. H., to Philadelphia, which approximates the countries of Europe in the cultivated condition of the soil and the density of the population, the rest of the United States is only settled in spots and oases. Human occupancy is the exception, and the wilderness condition the rule. Massachusetts, Southern Maine and New Hampshire, and Rhode Island and Connecticut have the aspect of old countries, brought under human subjection. But a greater part of the soil of even the old Thirteen States is still unoccupied and unreclaimed. The railroads of the West and South run through wildernesses for the most part. The greater portion of the old State of New York is a wilderness, and yet settlers have been going West from that State for a generation and more. Only the choice spots and localities of our vast territory are taken up. Settlers are dainty. Our oldest States are not yet settled. Large as is the stream of emigration flowing from Germany, Great Britain, and other European countries into the United States, it is only a drop of water in the bucket. Some four millions and a half of European emigrants have landed at New York during the past twenty years. It would take all this host to settle Northern, Central, and Western New York alone, and even then that State would not begin to approximate the crowded condition of such European countries as France, Belgium, Bavaria, etc. The North American continent can furnish homes and abundant food for all comers for centuries. Land, which is so precious in the Old World, will continue to be a drug here for an indefinite period of time. Nobody with a spark of enterprise need be a drudge in our old Eastern commercial and manufacturing towns and cities. There is a piece of soil with abundance and independence for everybody. This fact makes trade unions and labor leagues, modelled on those of England and other European communities, ridiculous. The Secretary of the Treasury recently said, in a speech before the Chicago Board of Trade, that if we were to aggregate the entire population of the States and Territories of this Union within the boundaries of the State of Texas, and leave the whole country elsewhere uninhabited, the population to the square mile would not exceed the present population of Massachusetts. — *Boston Courier.*

AGRICULTURAL BREVITIES.

CROPS IN EUROPE. — The *Mark Lane Express* (London), of May 23d, gives a gloomy account of the crop prospects in England and on the Continent of Europe. It says the week before was very cold, with snow in the north. Grass received a severe check, and the grain crops were very backward on that date, with a certainty that the yield will be below rather than above the average. In the southern countries of Europe and on the Barbary coast, there has been a severe drouth, and a general backwardness of crops is the feature all over the Continent. On the other hand, the stock of wheat and other grain in store is much smaller than usual at this season, and the price of wheat in England was 58s. 7d. against 44s. 5d. in 1870. From present appearances Europe will call for a large supply of breadstuffs from this country this year, and will have to pay us good prices.

FARMING IN MASSACHUSETTS AND IN NEW JERSEY. — The following statistics are gleaned from the reports of the last census: —

The area of New Jersey is about 200 square miles less than that of Massachusetts, but it has 240,000 more acres of improved land, 12,000 more of woodland, and about 7,000 more of other unimproved land. The cash value of farms in New Jersey is $257,523,376 against $180,250,338 in 1860, a gain of more than 42 per cent. The cash value of farms in Massachusetts is but $116,432,781, or less than half New Jersey's; yet the farm products of Massachusetts are valued at 32 millions, and in New Jersey less than 43 millions, — only a third greater. The orchard products of New Jersey are nearly $1,300,000, of Massachusetts $940,000; the market gardens of New Jersey, which supply New York and Philadelphia, produced nearly three million dollars in 1870, while those of Massachusetts produced a million dollars less. These products have nearly doubled in New Jersey since 1860, while in Massachusetts they have increased 41 per cent.

MIXED FARMING. — The *Farmers' Herald* (Chester, England) forcibly says: "Mixed husbandry is needful to realize the full amount of profit which the farm properly managed will yield. Every year the price of farm products varies: some will be high and some low, and thus the farmer catches good prices for a part, if not all; whereas, if he is wholly dependent upon one kind of crop, he may be wholly disappointed. A little sold of everything makes a muckle, and if one thing does not pay, another will."

THE POTATO BUG. — This interesting insect does not appear to be a favorite article of diet with many of the animal creation. It has been stated that the only creature that will eat it is a certain species of snake; but it now appears that ducks have an appetite for it. A gentleman of Piqua, Ohio, put a pair of Muscovies into his potato patch, which was literally swarming with the bugs. The ducks ate the bugs with such avidity that the latter were soon exterminated, and the patch has not since been troubled with them. The ducks did not appear to suffer any ill effects from eating the bugs.

THE PEANUT CROP. — Previous to 1860 the total product of peanuts for the United States did not exceed 150,000 bushels, and five sixths of the whole amount came from North Carolina. Now, North Carolina produces 125,000 bushels; Virginia, 300,000; Tennessee, 50,000; Georgia and South Carolina, each, 25,000; while from Africa co[me] about 100,000 bushels each year. 550,000 bush[els] are now sold annually in New York.

AMERICAN CHEESE IN LONDON. — An exchan[ge] prints a letter from a friend who has been exami[n]ing the cheese-markets of London. He believes th[at] if a superior quality of cheese be sent, there ne[ed] be no fears of the market, and that the recent fa[ll] in price was not caused by excess in quantity [of] the market, but by the inferior quality. He al[so] states that the quantity of Swiss cheese supplied [to] the London market will be much lessened, from th[e] large amount of condensed milk now sent from th[at] country, of which a great deal is sold in London.

THE MARSHALL P. WILDER STRAWBERRY. — This new berry with a very long name we hav[e] fruited the present season, and it appears to b[e] quite a desirable variety. It resembles the Agricu[l]turist in form, and in flavor it is like the Russe[ll's] Prolific, but it is a harder berry than the latter, an[d] handsomer than the former. We judge it to be [a] good bearer, and well adapted to market or famil[y] purposes. It will however require the experien[ce] of another year to enable us to speak positively re[-]garding it.

DROUGHT AND WORMS. — The crops at Lak[e]side are suffering from the effects of the almost un[]paralleled spring drought which prevails in th[is] section. No rain has fallen for five weeks up to th[e] time of writing (the second week in June), and th[e] tender grass shoots are pinched and dwarfed f[or] want of water. Corn has barely made its appear[]ance above ground, the wheat looks brown an[d] wilted, and altogether the prospect is not a pleasin[g] one. To add to the feeling of general discourage[]ment, the terrible canker-worm has made its ap[]pearance, and the fine apple-trees are turning brow[n] under the effects of its ravages. It is difficult t[o] know why this filthy pest is permitted to cut it[s] way through our orchards, in defiance of all th[e] devices of man for his destruction. No plan of suc[]cessful warfare has as yet been devised, and th[e] problem is a difficult one to solve. We intend t[o] commence a series of experiments having in view the destruction of the worm, if we can secure a few moments of leisure.

RECIPES FOR THE FARM AND HOME.

WHITEWASH. — The following recipe is one o[f] those endorsed by the Light House Board of th[e] United States: —

Slake half a bushel of unslaked lime with boil[]ing water, keeping it covered during the process. Strain it, and add a peck of salt dissolved in warm water; three pounds of ground rice, put in boiling water, and boiled to a thin paste; half a pound o[f] powdered Spanish whiting, and a pound of clea[r] glue, dissolved in warm water: mix these well together, and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used put it on as hot as possible, with painters' or whitewash brushes.

POTATO STARCH. — To make starch from potatoes, wash your potatoes clean, then pare them. Take a large grater, and grate them into a tub of water. After it becomes settled drain the water off, putting fresh on again, pouring and changing about three times, when the starch will be ready to dry. This is done by spreading it out on paper or muslin, and it will be dry in a very short time.

A CHEAP ICE CHEST. — A correspondent in Indiana sends us the following directions for a home-made ice chest: Take two drygoods boxes, one of which is enough smaller than the other to leave a space of about three inches all around when it is placed inside. Fill the space between the two with sawdust packed closely, and cover with heavy lid made to fit neatly inside the larger box. Insert

small pipe in the bottom of the chest to carry off ıe water from the melting ice. For family use ıis has proved quite as serviceable, and as econom- ıal of ice, as more costly "refrigerators."

RHUBARB VINEGAR. — Excellent vinegar may ẹ made from the rhubarb plant in the following ɪanner: For *five* gallons take 12 ordinary sized alks of rhubarb; pound or crush them with a piece ' wood in the bottom of a strong tub; add 3 gal- ıns of water; let this stand 24 hours; strain off the ushed rhubarb, and add 9 pounds of sugar free om molasses, and a small teacupful of the best rewer's yeast; raise the temperature to 65° or 68°, ıd put into a 12-gallon cask; place it in a position here the temperature will not fall below 60°. In a onth strain off from the grounds, returning it to the ısk again, and let it stand till it becomes vinegar.

TO DYE WOOLEN BLACK. — Put one pound of ıtract of logwood into an iron kettle, add three ıilfuls of rain-water, and let it dissolve over the ṛe; then put three ounces of blue vitriol into it, irring until it is dissolved. Now put in your oolen yarn, or woolen goods, and boil very gently ɔout an hour, stirring well, to prevent spotting. ry in the air; then wash well in soapsuds, and ınse. This recipe will color three pounds of yarn · cloth a fine black.

TO REMOVE THE TASTE OF WOOD. — A new ıg, churn, bucket, or other wooden vessel, will ɛnerally communicate a disagreeable taste to any- ing that is put into it. To prevent this incon- ınience, scald the vessel well with boiling water, tting the water remain in it until cold; then dis- lve some pearlash or soda in lukewarm water, lding a little lime to it. Wash the inside of the ssel well with this solution. Afterward scald it ell with hot water, and rinse with cold water be- re using it.

TO SAVE FRUIT WITHOUT SUGAR. — Put in ide-mouthed bottles; fill up with cold spring water. ıt them in a vessel of water up to the neck; boil ılf an hour; tie bladders or oil-skin over tight, or rk and seal while hot. Let them set until cold. ıep in a cool place. Use as soon as opened. ıck hay around while boiling to steady them.

TO HULL CORN. — Take one quart of strong lye, ɛpared as for making soap, and two quarts of ıter. Put the corn into this for boiling, and let it il till the hulls begin to start, which you can find t by washing a few kernels in cold water. Then ıce the corn out, and rinse it in one or two waters. ıt it in cold water again, and let it remain over ẹ fire until it boils; after boiling five minutes ıse it till all the lye is removed. To cook it, boil ır hours slowly, add salt to your taste, and let it il half an hour more.

HOOD, in his *Comic Annual* for 1830, communi- ted the following from a contributor: "Sur, my f had a tomb cat that dyd. Being a torture shell d a grate faverit, we had him berried in the guar- ın, and for the sake of inrichment of the sile, I d the carkis lade under the roots of a guzberry ısh, the frute being, up till then, of the smooth nd. But the next seson's frute after the cat was ırried, the guzberris was all hairy, and more re- arkabul, the catpilers of the same bush was all of e same hairy discription."

IN the Hagenau forest, in Alsace, an oak-tree is be seen, whose age is estimated at 1,300 years. he trunk and main branches are hollow from de- y, but the tree stands firmly, and continues to put rth fresh foliage every year. Near Groenenberg, the Prussian province of Hanover, a beech-tree to be seen, which was planted in 1668 in remem- ance of the Peace of Westphalia, concluded in at year, by which the Thirty Years' War came an end.

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, JULY 1, 1871.

HOW WE STAND.

IN commencing a new volume (Vol. VI.) we venture upon a few statements regarding the progress and success of the JOURNAL, and our past and present aims. At the commencement of the last volume the paper was enlarged, and the price raised to one dollar a year, and we are pleased to state that this change has resulted greatly to its benefit. It is always hazardous to make radical changes in successful journals, and they are oftener fraught with evil than good; but so strong a hold had the JOURNAL upon the regard of its patrons, that out of more than a *score of thousands of subscribers*, scarcely a *single hundred* relinquished it on account of the change, while during the year every month has added hundreds of new members to our family of readers. It is in no spirit of boasting that we are led to remark, that probably no popular journal of science in this country or in the Old World has a wider circulation, or exerts a greater influence than the BOSTON JOURNAL OF CHEMISTRY at the present time. For this we are indebted to the enthusiasm and kind efforts in its behalf of a little army of stranger friends, who have worked with untiring assiduity for its welfare. Through their efforts it has found its way into every nook and corner of our widely extended country, and into foreign lands, and we trust it is a messenger of good, and not of evil, to the many happy families who receive its monthly visits.

We have labored from the start with the expectation that a respect for science might be engendered in the popular mind, that the youth of our country might be stimulated to higher aims, that a taste for scientific investigation and observation might be excited, and that a class of reading which leads the mind into channels hurtful and immoral might be rendered distasteful and consequently avoided. We have aimed to correct pernicious errors, to expose shams and delusive schemes, to point out sources of danger to public health, and to promote the sanitary welfare of individuals and families. We have aimed to raise the noble pursuits of agriculture to a higher plane, and to place husbandry, so far as possible, among those pursuits which are guided and governed by known scientific laws and facts. We have presented so much of astronomy, medicine, and pharmacy as would serve to show what progress was being made in these departments of science, and at the same time to interest the reader, and excite that respect for them which is their due. The efforts of charlatans and quacks have done much during the past twenty or thirty years to excite vulgar prejudice against the scientific treatment of disease, and we have preferred to furnish medical facts and principles in the language and with the technicality peculiar to the science. Of all the sciences, that of medicine is the most difficult and hazardous to attempt to make plain to the common apprehension. It is hazardous because it is apt to lead to presumptions, on the part of the imperfectly informed, which might result in disastrous consequences.

Our journal has been conducted in the belief that science, in most of its departments, can be *popularized* without being *vulgarized;* that the great principles which govern and control natural laws may be made plain to ordinary minds or to the common class of readers, without in any degree compromising the dignity or accuracy of science in any of its aspects. We believed the people would generously support an undertaking having these ends in view, and in this we have not been disappointed.

Of course, a journal so positive and independent as this must have its enemies as well as friends. We should be troubled were it not so, for in our view journals or individuals without enemies are poor affairs, and afford evidence of a want of moral courage, which is despicable. It is much easier to float along in the smooth current of ready acquiescence, or to avert the eyes from that which is selfish, erroneous, mean, or vulgar, but it is less honorable. While the JOURNAL has been open and fearless in its exposures of errors and absurdities, and in its criticisms of men and things, it has not, as our readers very well know, been a roving corsair, ready to pounce upon anything and everything which might invite attack. We have never intended to do an act of *injustice* to any individual, or to any plan, scheme, or device which may have come under notice; and if errors or wrongs of this kind are unwittingly committed, a prompt disclaimer or explanation will be made.

But few changes will be made in the conduct of the JOURNAL during the year. It will remain under the same editorial supervision, and will continue to be printed at the Riverside Press and published by Messrs. H. O. Houghton & Co., as formerly. It is proper to state that we have made arrangements with some of the most distinguished scientific gentlemen of the country to furnish short popular articles upon scientific topics, which we trust will add to the interest of the JOURNAL. The editor will, if health and strength permit, furnish more of the essays which have proved so welcome and interesting to our readers upon the chemistry of familiar objects, and also resume the publication of the series of farm papers, entitled "Shore Pencillings at Lakeside."

THE DARTMOUTH OBSERVATORY.

Professor Young, the accomplished astronomer and spectroscopic observer, who has done so much for the honor of American science abroad, having returned from the eclipse expedition to Spain, is devoting himself with extraordinary ardor to his favorite investigations at Dartmouth. He found upon his return that the instruments at his command were entirely inadequate to enable him to push his researches beyond the limits already attained, and consequently he has set about seeking funds to enable him to procure telescopes of increased power. He needs at least $5,000 to put everything about his observatory in good condition, and he ought to have it at once. If he needs $100,000, the friends of science and learning must promptly respond to his needs, for he is engaged in a *great work*, and he brings to that work extraordinary powers of analysis and observation. We think it only necessary for Professor Young to make known his wants, and the friends and patrons of science will most gladly supply all needed funds. If the indefatigable astronomer is willing to devote all the powers of his mind and body to the arduous, self-denying labor of observation, the least we can do is to keep him well supplied with instruments.

Alvan Clark & Sons, of Cambridge, are making for Professor Young a fine telescope with 9½ inches aperture, and 12 feet focus. This will be a great improvement upon the small, imperfect one with which he has made so many important discoveries. When this is mounted, and everything in his observatory put in suitable condition, we shall look with much interest to the results of further continued patient research.

LIGHTNING RODS.

At this season of the year, when thunder-storms are of frequent occurrence, and considerable damage is done to buildings, and human life is placed in jeopardy, the question regarding the measure of protection afforded by rods upon buildings is discussed with much interest. It is a pity the matter should be one of doubt or uncertainty, and when rightly understood it ceases to be such. Properly constructed rods, placed upon buildings in a proper manner, afford absolute protection against any electrical discharges which are liable to occur in thunder-storms, and this should be clearly understood by every one. Public confidence has been weakened in regard to the efficacy of rods, by the frequent attacks made upon buildings to which they have been affixed; but this affords no evidence that they are worthless in principle. It rather affords proof that the rods were badly constructed, or that they were adjusted in a careless, unscientific manner. During the past twenty years we have made it a point to investigate, personally, every instance of the kind which occurred within our reach, and in every one palpable defects were discovered in the arrangement of the rods.

The defects most generally found have been in the ground connections of the rods; and we venture to assert from what we have learned by investigation, that a large part of the rods put upon buildings by ignorant, irresponsible "peddlers," afford no measure of protection at all. Quite recently it came to our notice in repairing a building, that the rods penetrated into the dry surface soil only about *two feet.* The rods were well enough, but the house was unprotected in consequence of the imperfect earth connections. Peddlers carry with them a crow-bar, and with this they make little superficial orifices in the ground, and thrust in the ends of the rods, caring nothing for the consequences which may result from their negligence. Usually they claim earth penetrations of eight or ten feet, and take pay for that extent of rod, and it is time this form of fraud was stopped. Every person who desires to protect his buildings must attend personally to having them adjusted. He must *know* that the rods penetrate to a point where permanent moisture is present, which cannot be less, in ordinary soils, than eight or ten feet. The terminals should be constructed of copper, and it is always desirable to have them placed in a well, or attached to iron water-pipes, if the service-pipes of the building are of lead or tin. As regards the form of rod, the old-fashioned, large iron rod is best, and it may be attached to buildings in any way most convenient. The pretty glass insulators, so largely used, are unobjectionable, but they are quite unnecessary; they do not add to the measure of protection, or increase the value of the conductors. There are a half dozen different forms of what are known as "cable rods" manufactured, which are constructed of a bundle of small copper and iron wires bound or twisted together. These, for the most part, are of good size, and well adapted to the purposes for which they are designed. With good rods carefully and scientifically adjusted, a perfect sense of security may be entertained by the owner or occupants of buildings.

HOUSEHOLD WARMTH.

It affords us great satisfaction to learn that the wrought-iron air-furnace which we devised a year ago, contributed so essentially to the health and comfort of those who used it during the past winter.

Among many letters received from those who used the furnace with great satisfaction, is the following, from the honorable and venerable N. P. Trist, who negotiated the famous Mexican treaty, under Mr. Pierce's administration, and whose claim for the service has just been paid by Congress. It was not designed for publication, but there is no impropriety in presenting it, as it relates to a sanitary matter of much public importance: —

Alexandria, Va., *January 30th*, 1871.

"Dr. Nichols: — *Dear Sir.* Nearly two months have elapsed since the air-furnace you devised was procured from the makers, Messrs. Lebosquet Bros., of Haverhill, Mass., for the house occupied by me here. During the whole time I have been kept in-doors by a lameness which forbids my walking or even standing. I am the better able therefore to speak of the merits of the furnace as a house-warming and ventilating contrivance.

"As respects the first object (warming), its efficiency is of course not affected one way or the other by its being made of wrought-iron, but as respects the *quality* of the air supplied by it the case is far otherwise. In the course of my life I have lived as tenant, or boarder, or visitor, in houses warmed in all ways; by wood and coal, in open fire-places and stoves, by steam, and by air passing over cast-iron furnaces, but never before have I had such air to breathe within doors as that we have all been enjoying this winter. Not a day has passed but the difference has forced itself upon my attenti all the more strongly from my having been troul with a bronchial affection which compelled me reside for many years in a tropical climate. annoyance from it this winter has been much than usual, and for this, and more important for not having my general health impaired by a l confinement, I believe myself indebted wholly to pure air I have breathed — air *unpoisoned* by d terious gases. Last winter, in the same hou warmed by *cast-iron* Baltimore heaters, connec with the same flues, we were all made unpleasan conscious of the presence of these gases in the roo many times every day.

"So very important in my estimation is this b efit — vitally important before as a matter of sci tific knowledge, but now *brought home* to me a matter of personal experience — that nothing wo induce me to accept any other mode of warmin house. Very truly yours, N. P. Trist

LABORATORY FOR ANALYTICAL WORK

The demands on our time for a long while ha been so pressing, we have been compelled to ref many of the requests made by patrons and frie for analytical work. This has been a source much disappointment to those who have wished our services in the examination of waters and co mercial substances, for the detection of deleteri agents, adulterations, etc. In view of these fa we have been led to establish, in connection w our laboratory for industrial products, one for stric analytical work, and to complete arrangements conducting chemical analysis of such substances may be sent to us. This laboratory is in charge Mr. S. P. Sharples, who has been the assistant Prof. Gibbs of the Lawrence Scientific School, Ca bridge, during the past five years, and whom we gard as one of the most accurate and accomplish chemists in this country. The substances a agents to which we can give attention embrace wide range. We will make analysis of cister spring, well, or pond waters, or of nitre, soda, i digo, bleaching salts, pigments, colors, wall pape articles of food, substances suspected to cont poison, in short all articles known to commerce, used in the arts or in medicine. Special attenti will be given to work connected with medical che istry, such as the examination of urine, and urina deposits, blood, sputa, etc.

Persons in any part of the country desiring an lytical work, can send to the editor of the Journ. through the mail or by express, and prompt atte tion will be given to their commands.

EDITORIAL NOTES.

American Telescopes. — In the manufactu of optical instruments, we are at this time leadi all the nations of the earth. American microscop spectroscopes, and telescopes are certainly superi to any made in Europe, and this is acknowledg by some of the best scientific observers of Engla and Germany. Tolles's and Wales's objectives a of the highest excellence, and none better have ev been produced. The telescopes of the Messr Clark, at Cambridge, stand at the head of all i struments of this class which are now made, an their orders, from parties at home and abroad, a much greater than they can promptly meet. The celebrated makers have recently received orders f *two telescopes, of 25-inch aperture,* which, whe completed, will be the largest instruments in th world. The largest hitherto made has an apertur of 24 inches.

The Pittston Coal Mine Disaster. — W have recently returned from a visit to Pittston, Pa the scene of the sad disaster by which a large num ber of men and boys lost their lives. The mine i

s...ated in a most charming locality, just upon the ...skirts of the thriving village of Pittston, with ...ling meadows and hills around, and orchards ... grass above it. In this neighborhood there ... now sixteen widows, and three times as many ...hans, who have been made such by the terrible ...ualty. In conversation with the men that es...ed, we found that there was experienced but ...e physical suffering on their part. They nearly ... became unconscious, but passed into that con...on by a process which resembled sleep. The ...d suffered but little except from mental anguish. ...o mules were pointed out to us grazing in a ...dow which were taken from the pit after being ...it *seven days*. It is the opinion of the brave ...ineer and the proprietor that all could have been ...d if the proper course had been pursued by the ...risoned miners.

...INNESOTA A HOME FOR INVALIDS. — Dr. B. M...tocks, who has been for the last four years S...erintendent of Health at St. Paul, Min., has w...ten an interesting and very suggestive book re...rding the advantages of Minnesota as a Home fo... Invalids. Dr. M. has had the very best facili...ti... for observation in that section, and his high st...ding as a physician is an assurance that his st...ements and conclusions are reliable. The open...in... chapters are devoted to the cause and treatment of ...onsumption, and then follow those which have st...t reference to the climate and the hygienic in...ences of the State. Physicians and invalids sh...ld consult this book.

...EPUDIATION. — This is not a chemical topic, b...is one so closely affecting the best interests of a ce...ain section of the country that we cannot refrain fr... alluding to it. It is stated that the young ar... thriving State of Minnesota has by actual vote re...diated a portion of her State debt, and now we le...n that St. Paul, the largest city in the State, is re...rained, by action of a city jury, from paying the co...ons upon a portion of her bonds. No greater in...y could befall the city than conduct like this; it ... more disastrous to her fair fame, and business in...ests, than fire or famine. It is disastrous to the in...ests of the whole West, for if there is the least lo... towards dishonesty, not a dollar of Eastern ca...al can they borrow to carry forward the works of ...ternal improvement upon which their prosperity de...nds. Minnesota and her capital city must im...diately look to their interests.

...YNDALL ON HERSCHEL. — We have elsewhere re...red to the death of Sir John Herschel, which ha...called forth many tributes to his memory in for...gn journals. In one of these the writer, while do...; justice to much in Sir John's character, re...ma...ed that his great fault was a habit of flattery, wh... even affected his honesty as a critic and re...vie...r, and his manners as a gentleman. In a let...ter ...the *Daily News*, Professor Tyndall thus vin...dic...es his friend's memory: "I think it was in 18..., and in presence of a Friday evening audience at ...e Royal Institution, that Faraday introduced me ... Sir John Herschel. From that hour to this, th...gh the advancing years, his character has gr...n in beauty to me. As I knew him better, re...spe... ripened into reverence, and until I read the wo...s of your correspondent, this feeling never en...cou...ered from the expressed opinions of others the sli...est shock. During the past week I have sou...t to check and extend my data by reference o...ler men. I have conversed with many whose in...acy with Sir John Herschel extended far be...yon... the range of mine, and if their unanimous and ...nant testimony be worth anything, I should ...te to write the term that would most fitly de...scri... your correspondent's quoted words. He ma... perhaps, be able to make good his position, an...e may even have the courage to give his name; but ...s it now stands, I must regard his article, notwithstanding its apparent warmth of appreciation, as embodying the most conspicuous personal wrong to which anonymous writing has of late years given birth."

COMPLIMENTS FROM OVER THE OCEAN. — A London paper says of the JOURNAL: "We give it a cordial recognition as likely to interest and instruct every member of a household as well as a man of science. It is edited with an ability that is at once open and frank, and in a popular manner which English journals of a similar character cannot even imitate. We wish such a periodical could be placed on the table of every thoughtful family in the land."

An English gentleman, who has received the paper for the past year, writes in a similar strain in a private letter, from which we venture to quote the following sentences: "I have longed to tell you how much your entertaining and instructive journal is relished by myself and family. . . . . I know of no periodical we have in England, that resembles it in variety of contents and in the curious *mélange* of the scientific and the practical (though of course these are often twain made one) that is served up in every number."

ZINC WATER TANKS. — In a French medical journal of recent date, there is an article by M. Zinrek on this subject. He has found that the water dissolves the more zinc in proportion as it contains more chlorides, and also in proportion to the length of contact. Boiling does not, however, precipitate the zinc from water charged with the metal. A sample of the water was tried, in which the chlorides were in small proportion, but which had been a long time in a zinc tank. As much as fifteen grains of zinc was found in each quart. To prevent this state of things, the author advises the zinc tanks to be coated inside with an oil paint, the basis of the paint being ochre or asphalt. No minium, ceruse, or carbonate of zinc should, however, be used. Better than painting it, is to discard its use for this purpose altogether.

THE SPHEROIDAL STATE OF LIQUIDS. — From Leidenfrost's experiments, it seemed probable that a drop of water assumes the spheroidal state when the tension of the steam formed at its under surface is sufficient to support the pressure of the atmosphere plus the weight of the drop itself, and that, therefore, if the pressure be removed, a lower temperature must suffice to cause the phenomenon. E. Budde has proved this experimentally by means of the following apparatus: a glass bell jar was cemented on a copper dish standing in a water-bath; the bell was connected with an air-pump and exhausted, and by means of a simple arrangement a drop of water was brought on to the plate. It was found that when the pressure was reduced two thirds more, the drop assumed the spheroidal state state at a temperature of 83° C.

THE SUPPLY OF GOLD FROM CALIFORNIA. — There has been a popular impression that the yield of gold in California is likely to become less and less, so that in a generation or so the ore may be exhausted. But if the gold is really going to "give out," there are few signs of it at present. So far, at least, as the deposits at the San Francisco Branch Mint are an evidence, the yield is actually and largely increasing. These deposits for the first eight months of 1870 have been: of gold, 719,211 ounces, against 532,686 ounces in 1869, and 398,081 ounces in 1867. The silver deposits in the same time have been 209,104 ounces, against 99,661 ounces for last year. This is inverting the usual experience of auriferous districts in favor of a region which must certainly, in material respects, be considered the most fortunate in the world.

ELECTRIC LIGHT. — In some experiments made at St. Petersburg it was found that by aid of an electric light, a target at 1660 yards was so well illuminated that, with an ordinary field-piece, the balls could be invariably lodged as truly as in daylight. Objects at some distance, on either side of the target, were also rendered clearly visible.

BOTTLING SUNBEAMS. — We find the following in one of our English scientific exchanges, but we doubt whether it will really prove to be an improvement upon the process for the extraction of sunbeams from cucumbers, mentioned by that veracious traveller, Lemuel Gulliver: —

"According to the *Echo Rochelais*, a professor residing in the Charente Inférieure has invented a method of bottling sunbeams, which can be used for various purposes when the sun is obscured by clouds — at least, so the professor thinks. His *modus operandi* consists in exposing a vase to the full effects of the summer sun, and corking it at the proper time. When required for use, he inserts a lens in the cork, and, if his statement is to be believed, has succeeded in lighting a candle by means of 'bottled sunbeams.'"

ATOMS.

AMONG the attractions advertised for the season, at the Crystal Palace, Sydenham, are a Cat Show (the first ever held, it is said), for the 13th of July; and a great "Pigeon Concours," after the Continental fashion, on June 26th, when 1,000 pigeons, of the same breed as those employed in the late war (and some of them the identical birds), will be let loose to race for prizes to various stations in Belgium. — The census of London, taken this year, shows a population of 3,251,804, an increase of 447,815 over that of 1861; but, on account of the great increase of railway facilities, a much larger proportion of the inhabitants of the city (that is, those whose occupation is urban), have their homes in the country than was the case ten years ago; and as the census includes only the people *actually in the city* at midnight on Sunday, April 2d, a large number who take advantage of cheap excursion trains to spend Sunday in the country were "counted out." — The new section of the Museum of Comparative Zoölogy, at Cambridge (profanely designated by certain members of the Legislature as "Professor Agassiz's Bug Palace") is rapidly approaching completion, and will more than double the present capacity of the building. — A block of granite, weighing seven tons, recently taken out at Westerly, R. I., will measure seventeen feet square after being dressed, and is to be used for the basin of a fountain in Central Park, New York. — The *Toledo Blade* remarks that "non-explosive" lamps and burning fluids are generally found to differ from others chiefly in the malignant and unexpected manner in which they explode. — At Birmingham (England), a rope has been made, which is more than six miles long, and weighs more than sixty tons. — The *Maine Journal of Education*, under the editorship of Mr. A. P. Stone, is one of the best magazines of its class. — It is said that new books by Huxley, Tyndall, Darwin, and Proctor, are as much in demand at English circulating libraries as the productions of the leading "sensation novelists" of the day. — Dr. Thudichum, in a lecture on wines, at the Society of Arts, introduced a new wine which had been made from *tea*, and which he commended as a good stomachic, likely to be useful in ordinary diet, and also in medicine. — The increase in the number of iron steamships for river navigation in Great Britain has been so great within the last few years, that sailing vessels on the streams there are likely ere long to become as rare as stage coaches in the streets. — The *Illustrated Price Current*, published by Messrs. Perry & Co., 37 Red Lion Square, London, gives as much good reading for a sixpence as any monthly magazine in England, published at the same price. — A recent English statute makes it illegal to advertise that if stolen property be returned, no "questions will be asked."

— The little kingdom of Belgium buys more British produce and manufactures than Prussia does, the amount for the last year having been £3,992,722 against £3,231,403; while France purchased £11,659,933 worth from John Bull's shop. — The Dominion of Canada, with a population of nearly four millions, supports thirty-seven daily papers, while the Australasian islands, with somewhat less than half the population, maintain thirty-five dailies. — A ladies' paper, the *Frauen Zeitung*, devoted to "education, housekeeping, domestic medicine, cooking, and light literature," has been started at Munich. — It is a singular fact that, with all the improvements in navigation, the number of shipwrecks in the British mercantile marine is increasing (that is, there are more in proportion to the amount of tonnage afloat than there used to be); the number in 1869 being about *fifty per cent.* more than in 1864, while collisions were about thirty per cent. more, and other casualties nearly sixty per cent. — It is an interesting question in meteorological zoölogy whether "sun-dogs" belong to the breed of Skye terriers. — Oiling the points of nails will save "elbow grease," in driving them into hard wood. — The philosophy of taking care of furniture is thus concisely summed up by *The Technologist*: "Keep water away from everything porous, alcohol from varnish, and acids from marble."

LITERARY NOTES.

The Appletons have just published their *Annual Cyclopædia*, for 1870. It is the tenth of these useful year-books, and one of the most valuable of the series, containing, as it does, a full account of the German-French War, and the tabulated results of the United States Census, so far as they can be given at present, in addition to the usual summary of political, scientific, industrial, and other intelligence for the year. It is illustrated with maps, and steel portraits of Gen. R. E. Lee, Count Von Moltke, and Victor Emmanuel.

The same house has reprinted Tyndall's *Fragments of Science for Unscientific People*, which include the famous lectures on the Scientific Use of the Imagination, on Dust and Disease, and on Radiation, with the fine tribute to Faraday, and some dozen other papers longer or shorter. The author says in his preface: "From America the impulse came which induced me to gather these 'Fragments' together, and to my friends in the United States I dedicate them."

The Harpers have issued *Light*, the second volume of Abbott's series of "Science for the Young." If the forthcoming volumes are equal to the first two, they will form by far the best juvenile library of natural science that has appeared on either side of the Atlantic.

Classical scholars will welcome the translation of *Livy*, which the Harpers have just added to their standard series of such works, and the edition of *Sophocles*, which, after an interval too long, adds another volume to their "Greek and Latin Texts." The cheap edition of Miss Muloch's works will be welcome to thousands, and the first instalment of *Lord Brougham's Autobiography* will make the reader impatient for those that are to follow.

The interesting papers on *The Eye in Health and Disease*, contributed by Dr. B. Joy Jeffries to "Good Health," have been published in a neat volume by Mr. Alexander Moore, of Boston. The author, in revising them for publication in this form, has made several additions, which increase their practical value.

Messrs. Hurd and Houghton publish *Wake-Robin*, by John Burroughs. The author says it is meant as "an invitation to the study of ornithology," and it is admirably adapted to awaken an interest in this branch of natural history. "Wake-Robin" is the common name of a flower, the white *Trillium*, whose blooming marks the vernal advent of the birds; and it was a "happy thought" to take it for the title of this charming little book.

OUR SCIENTIFIC AND MEDICAL EXCHANGES.

The *American Journal of Science and Arts*, for June, contains articles on Jupiter and his Satellites, by Maria Mitchell; on the Physical Constitution of the Sun, by Prof. Norton; on some New Analytical Methods, by T. M. Chatard; on the Oil-bearing Limestone of Chicago, by T. S. Hunt; on the Geology of the Delta of the Mississippi, by E. W. Hilgard; on Certain Forms of the Electrical Discharge in Air, by A. W. Wright; and other valuable papers.

The *Journal of the Franklin Institute* has papers on the Use of Pulverized Fuel, by Lieut. C. E. Dutton; on a Ship Canal across Cape Cod, by J. P. Frizell, C. E.; Notes on Crystallography (illustrated), by Prof. Wahl; on Pennsylvania's Foundation Stones, by Prof. Leeds; on a New Connection for the Induction Coil, by Prof. Houston; on Hydraulic Mortar, by Dr. Michaëlis; and many minor articles of great interest.

The *New York Medical Journal* has the following original communications: I. On the Physiological Effects of Severe and Protracted Muscular Exercise; with especial Reference to the Influence of Exercise upon the Excretion of Nitrogen, by Austin Flint, Jr., M. D.; II. On the Use of the Plaster-of-Paris Bandage in the Treatment of Fracture, especially Fracture of the Femur, by Henry B. Sands, M. D.; III. The Causes and Treatment of Œdema of the Lungs, by Thomas K. Cruse, M. D.; IV. A Plea for Bloodletting, by D. S. H. Smith, M. D.

The *American Practitioner* has original papers on Rupture of the Cervix Uteri occurring at the time of Parturition, by W. H. Newman, M. D.; Remarks on Chronic Rheumatism, by C. F. Ulrich, M. D.; Chloroform as an Internal Remedy, by A. P. Merrill, M. D.; Carbolic Acid in the Treatment of Intermittent Fever, by Dr. Freulich, of Melnik; Foreign Correspondence — Craniotomy, by M. Rhorer, M. D.

The *American Journal of Obstetrics* will hereafter be published by Messrs. Wm. Baldwin & Co., 21 Park Row, New York. The subscription price is $5.00 per annum, and our medical readers will bear in mind that we furnish it *with the* Journal at that price.

☞ The "Answers to Correspondents" are unavoidably laid over to our next number.

Medicine.

TABLE FOR THE EXAMINATION OF URINARY CALCULI.

By J. Campbell Brown, D. Sc., London, Lecturer on Chemistry and Toxicology at the Royal Infirmary School of Medicine.

1. Heat a portion of the powdered calculus upon platinum foil.

Destroyed.
(*a*) *Uric acid: Ammonic urate: Cystine: Cholesterine: Bile-pigment.*
(*b*) Uric acid from *Calcic and Sodic urates.* Ammonia from *Triple Phosphate.* Oxalic acid from *Calcic oxalate.*

Not destroyed.
(*c*) *Calcic Phosphate: Calcic Carbonate.*
(*d*) Calcic Carbonate from *Calcic Oxalate and Urate.* Sodic Carbonate from *Sodic Urate.* Magnesic Phosphate from *Triple Phosphate.*

If it chars and gives odor of burnt feathers, add to another portion a drop of concentrated nitric acid, and evaporate to dryness: pink color; cool, and add ammonia: purple color; *Uric acid* or *Urates.* If the odor is peculiarly disagreeable, resembling carbonic disulphide, dissolve in ammonia, and allow the solution to evaporate spontaneously; microscopic six-sided plates indicate *Cystine.* Mix another portion with lime; ammonia may be evolved from the *Urate* or *Triple Phosphate.*

2. Ignite another portion in the blowpipe flame until it burns entirely away (Class (*a*), see above), or leaves a white residue. If it fuses, it consists of a mixture of *Calcic* and *Ammonio-magnesic Phosphates.* Place a portion of the residue on red litmus-paper, and moisten with a drop of water; alkaline reaction indicates *Soda* or *Lime* from Class (*d*) or from *Calcic Carbonate.* Dissolve the rest of the residue in water, and filter. If the filtrate is alkaline, add a drop of hydrochloric acid and evaporate cautiously to dryness; microscopical cubical crystals prove the presence of *Sodium.* Dissolve the residue, insoluble in water, with hydrochloric acid, observing whether or not any effervescence due to carbonic acid takes place; add a comparatively large quantity of ammonic nitro-molybdate, and heat; a yellow precipitate indicates *Phosphoric Acid.*

3. Boil a portion of the powdered calculus in dilute hydrochloric acid; effervescence indicates calcic carbonate; filter; neutralize the solution by ammonia, and add acetic acid in excess; a turbidity indicates *Calcic Oxalate.* To the clear solution (or the filtrate if calcic oxalate is present) add ammonic oxalate; a precipitate indicates *Calcium, which was not previously in the state of oxalate;* filter, if necessary; add ammonia, and stir; a white crystalline precipitate indicates *Magnesic Phosphate.*

4. Biliary Calculi. *Cholesterine* is soluble in boiling alcohol, in ether, or in benzole; and, upon the spontaneous evaporation of the solution, is deposited in rhombic nacreous laminæ, which polarize light.

Bile pigment is insoluble in ether; soluble in potassic hydrate, and, when treated with nitric acid, becomes first green, then blue, passing into violet, red, and yellow.

Remarks. — We should modify the above somewhat for the detection of the inorganic constituents. For the detection of sodium or calcium the spectroscope should be used; or if that is not at hand, a little of the substance when mixed with alcohol will impart the characteristic yellow tint to the flame of the ignited alcohol, if sodium is present. For phosphorus, Bunsen's test surpasses all others. For this, take a piece of magnesium wire about a quarter of an inch in length, and place it in a small tube drawn from hard glass; the tube being about an inch long, and its diameter about three times that of the wire. Put a little of the finely powdered substance on the wire, and heat before the blowpipe until the wire takes fire. If the ignited tube be crushed with a drop of water in a watch glass the characteristic odor of hydric phosphide is at once perceived.

INFLUENCE OF ATHLETIC SPORTS ON HEALTH.

Dr. Farquharson read a paper on this subject before the Medical Society of London. Exercise, he contended, was necessary not only to preserve the balance between body and mind, but to promote the functions. It might, however, be potent either for good or evil; and damage was often done by persons of sedentary habits indulging, without due preparation, in such exertions. Dr. Richardson had, in the "Social Science Review," drawn attention to the dangers of volunteering in this relation. The nervous system had, even in repose, a heavy strain to bear; and if to this any sudden addition were made, the destructive processes were apt to exceed those of repair. The influence of the mind was, however, necessary for beneficial exercise; and athletics seemed best to supply this combination. The Germans, French, and Americans were behind us in this respect. Dr. Farquharson then showed that muscular degeneration was the result of excessive, as well as of deficient work. It was not likely that such results would follow our present system of sports; but there was reason to fear the danger of their being carried too far in our public schools, and thus checking mental progress, and dulling the clearness and sharpness of the brain. He next referred to the sports in detail. Rowing had been condemned by Mr. Skey and Dr. Richardson; but Dr. Farquharson endeavored to show that, from the great care exercised in picking and training crews, boating was less dangerous than these eminent authorities supposed. Gymnastics must be cautiously used when the frame was consolidated. Our public school boys or university men required valuable moral as well as physical training. It was argued that if the education of girls was eventually to be assimilated to that of men, they must also graduate in manly sports. In the treatment of the insane, active employment was most beneficial. An interesting letter from Dr. Langdon Down was read, showing the remarkable results which he had obtained with idiots at Earlswood Asylum. As regarded the proper dose of exercise, every one must be his own physician under ordinary circumstances; but

F quharson believed that he had seen cases of i table heart improved by a moderate amount, and q ted a case by Dr. Stokes in which relief from v ent cardiac dyspnœa was only obtained by run- n g. While serving in the Coldstream Guards, he h met with several cases of dilated heart in re- c its, from over-exertion. He condemned running; c ket he considered harmless. As to football, Dr. F quharson's experience had been derived from R gby; and although the game was apparently p ed there with great violence, an accurate list o the casualties during the past two years showed t it was comparatively harmless. One case of se ous injury to the spine had occurred, and steps w e taken to remove the apparently objectionable f ures of the game. It was not unreasonable to s pose that, although permanently serious results did n often follow that game of football in which the b was carried by the player, necessitating falls on th head and injury to the spine, the sharpness and c rness of the mind must be blunted; and he q ed the opinion of an eminent educational au- th ity to this effect.

SUPRA-ORBITAL NEURALGIA.

LLOW me to contribute a few lines to the JOUR- N in regard to Supra-Orbital Neuralgia. I have h many patients afflicted with a severe pain over o eye, sometimes over the whole of the forehead. T patients complain of a *sun* pain, as they most u lly term it, the pain beginning about the rising of e sun and subsiding about sundown, and also be g most severe on a clear bright day. On ex- a ination I find pain and tenderness on making pr sure in the supra-orbital notch. This soreness is vidence of inflammation in the course of the su a-orbital nerve, and is so severe that I have had tw patients who had to shade the eye for three days fr any light.

find a specific almost (if there are any specifics) in e hypodermic injection of morphine. I always ta about ¼ grain of morph. sulphate, pinch up a d of the skin just where the nerve makes its pa age over the supra-orbital ridge, and inject the sol ion well under the integument, withdraw the in ument and slip the finger over the puncture, re n it a minute or two and not a drop of blood wi be lost. The pain is very little and the relief is stantaneous, and no return of the complaint has oc rred.

J. W. FOSTER, M. D.

AMDEN, Mo.

MEDICAL MEMORANDA.

ONVICTS AS NURSES. — We find the following in late number of the *Pall Mall Gazette*, sent us by friend in England: —

Now that the question of the employment of co ict labor in works of public utility is again a su ect of discussion, it may be interesting to those w are anxious to devise some scheme for carrying ou his object to point out that in 1793, when the ye w fever was raging at Philadelphia, the convicts w employed with great success as nurses and at- te ants for the sick at Bush Hill Hospital. As th was great difficulty in finding persons who w d undertake this duty, recourse was had to the pr n, the convicts being fully warned of the dan- ge they would incur if they volunteered for the se ce. Nevertheless, as many offered as were w ted, and moreover continued faithful to their tr until the epidemic had ceased, without making a demand to be remunerated for their services. O man, committed for a burglary, who had seven ye s to serve, observed, when the request was m e to him to act as attendant at the hos- pi , that having offended society, he would be h y to render it some services for the injury. H went to the hospital, nor ever left it but once, and then by permission to obtain some articles in the city. His conduct was so good that he was made a deputy steward, and after receiving extra compensation, at his discharge married one of the nurses. The women convicts also behaved equally well, and when requested to give up their bedsteads for the use of the sick at the hospital, they cheerfully offered even their bedding. When a similar request was made to the debtors they all refused."

A SINGULAR MISTAKE. — Our readers have doubtless seen the accounts of the investigations made by the French Communists at the convent of Picpus, and the discovery of sundry strange-looking instruments of torture — "steel collars, iron corsets, and skull-caps, a rack turned by cog-wheels," and the like. But a correspondent of the *British Medical Journal* quotes the testimony of the "best known orthopedic mechanist in the country," to the effect that "he has not the slightest doubt that the nuns spoke with perfect truth in describing what were supposed to be instruments of torture as orthopedic appliances." The corset, the skull-cap, and the rack are beyond doubt instruments for the treatment of torticollis and spinal curvature, and would be recognized as such by persons familiar with the antique methods of orthopedy. The authority above quoted adds that he has for some time attended the convent establishments of London when their inmates needed mechanical aid.

POISONOUS GLOVES. — A correspondent of the *Medical Press and Circular* (English) states that a patient of his, a lady, purchased a box of green colored gloves, at a well-known and respectable house. In none of the gloves was the dye permanent, for upon the hand becoming heated it was stained to such a degree that warm water would scarcely remove it. After wearing a few pairs — for the gloves rapidly became shabby — the lady noticed a vesicular eruption at the sides and roots of the nails. This vesication in a few days proceeded to ulceration. Under suitable remedies the rash disappeared, but upon resuming the wearing of the gloves, the mischief recommenced with renewed severity. A further examination of the gloves, and analysis of a solution prepared from them, proved the existence of an arsenical salt, which at once cleared up the mystery of the case, and the nature of the dye.

A ROYAL VICTIM OF POISONOUS HAIR DYE. — The King of Sweden has been trying to renew his youth with a certain "Vegetable Hair Restorer," and the result has been that his Majesty barely escaped with his life. A royal commission is now sitting (or was, a few weeks ago), at the recommendation of the King's physican, Dr. Hamberg, to pass judgment on the cosmetic, which has been shown to contain the large proportion of lead usually found in these popular "vegetable" preparations.

AN ENGLISH PRESCRIPTION. — *The London Chemist and Druggist* gives the following among other recipes furnished by a "travelling doctor" to one of his patients: —

"℞ C. E. of Sarsaparilla . . . . fl. ℥vi.
Iiodroide of Potassum . . . fl. ʒi.

N. B. The above to be prepared by the chemist.

Q. S. Cochl parvum Magnum Mediocre."

The last line is particularly rich.

EMULSION OF ALMONDS. — The *Journal of Pharmacy* gives the following recipe for this useful preparation: —

Take sweet almonds (blanched), sugar, and glycerine (C. P.), of each 1 ounce; powdered gum arabic, 1 drachm; water, 2 ounces. Rub to a uniform paste, strain through muslin, and evaporate, by a heat not exceeding 150° F., to the consistence of a fresh solid extract; preserve in wide-mouthed bottles, of size convenient for use; may be flavored to suit taste. The author prefers orange-flower water and oil of almonds. When an emulsion of almonds is prescribed, as is now often the case, as a vehicle for chloral hydrate, it is readily prepared as follows: Take concentrated emulsion, 2 drachms; water, sufficient to make 1 ounce of mixture; mix thoroughly. The above emulsion is preserved, or rather condensed, milk of almonds, and may be useful for dietetic and culinary purposes, — as, for instance, to prepare readily orgeade. The *syrop d'orgeade* does not, as is well known, keep for any length of time without fermenting and spoiling.

SULPHATE OF QUININE IN THE TREATMENT OF SPONTANEOUS ERYSIPELAS OF THE FACE. — According to Dr. Perroud, the sulphate of quinine, administered in moderate and fractional doses, promptly arrests the march of non-traumatic erysipelas of the face, and removes it wholly, in most instances, on the second or third day of its administration. The effects of this medicinal agent are less evident in wandering erysipelas, and in those attacks which appear under the influence of constitutional states, as, for example, rheumatism. The researches of modern microscopists on the diffusion of leucocytes lead one to think that it is through its opposition to this diffusion that sulphate of quinine acts upon erysipelas.

M. Perroud gives daily from thirty to forty centigrammes of quinine in a simple solution, of which a teaspoonful is to be taken every half-hour, so as to keep the patient under the persistent and prolonged influence of the remedy.

LOCAL APPLICATIONS TO BURNS. — Dr. Binkerd recommends as an application to burns, when first seen, carbolic acid and glycerine, in the proportion of from five to ten drops of the former thoroughly incorporated with two ounces of the latter, spread on with a camel's-hair or other light brush, then a layer of white cotton, over which a roller-bandage is neatly adjusted. For the suppuration following burns he recommends the following dressing: Yellow wax, melted and strained, ℥j.; raw linseed-oil, ʒiij.; tannin, ʒj.; subnitrate of bismuth, gr. xx. The wax must be first melted, the oil then added, and the whole stirred until incorporated; next, the tannin is added, and lastly the bismuth. The ointment should be applied on pieces of lint.

BOILING WATER BLISTER. — A boiling water blister may afford a most powerful, ready, and useful stimulus to the nervous system. A basin, say half-a-pint, should be filled with flannel, hastily pressed in, and boiling water poured upon it to saturation; a plate or large saucer should be applied to its top, and, being inserted, the superfluous water can be forced out of it, the saucer removed, and the basin pressed upon the chest or elsewhere; a soft towel round the edge guarding the neighboring parts — of course, it must not remain on long.

VALUABLE FORMULÆ.

APERIENT SOLUTION. — Dr. Mettauer recommends the following: —

℞ Aloes Socot. . . . . . . ℥iiss.
Supercarb. Sodæ . . . . . . ℥vi.
Water . . . . Oiv.
Spirit Lavend. Comp. . . . . f. ℥ii.

Digest 14 days and filter. Age improves the quality and taste. It is used in weak digestion, with costive habits, dyspepsia, etc.

GARGLE FOR ULCERATION OF THE TONSILS. —

℞ Zinci Sulphat.
Chlorat. Potass aa . . . . . . ʒii.
Sage Tea . . . . ℥viii. M.

S. — Gargle the throat frequently. This is an excellent wash in ulcerations of the tonsils, or aphthous affections of the mouth.

AN EXCELLENT DINNER PILL. —

℞ Pulv. Capsic . . . . . . ʒi.
Pulv. Rhei . . . . . . ʒiss.
Ext. Gentian . . . . . . ʒi. M.

Make pills 60. S. — Take two or three every day before dinner.

Sulphur Pills. — The following formulæ, which we take from the *Druggists' Circular*, furnish a convenient and neat method of administering sulphur as an alterative in chronic rheumatism and certain diseases of the skin: —

1. Take Sulphur . . . . . 42 grains.
   Castile Soap . . . . . . 18 "

Mix, and divide into 12 pills. One to three pills for a dose, morning and night.

2. Take Sulphur, Acetate of potash } of each . 24 grains.
   Confection of roses, q. s. for 12 pills.

One to two twice a day in scorbutic and scrofulous patients, and when sulphur generally is indicated.

Glycerine Ointment. —

℞ Starch . . . . 3 parts,
Glycerine . . . . 10 "

The starch, finely pulverized, is digested for about an hour with the glycerine at the heat of a water-bath.

DEATH OF AN ECCENTRIC CHARACTER.

William Sheldon, who died at Longmeadow, Tuesday, the 23d, at the venerable age of 83, was the son and only child of Dr. Sheldon, a leading physician and highly esteemed citizen of Springfield, in the olden time. After his father's decease, his fond mother brought him to Longmeadow, and assiduously devoted her remaining days to that tender and indulgent care which, conspiring with his natural idiosyncracies, developed a life so original and singular as to demand an obituary. An ample income exempted him from labor, and gave him leisure to cultivate his oddities. College was too rough for him, and so interfered with his health and independence, that he came home after a short experience, to the maternal embrace. In his budding authorship, he wrote novelettes for the old *Springfield Gazette*, and in the maturity of his powers at Longmeadow, he published scientific and theological works, but too profound for his age. He understood all mysteries, and explained the "spirit rapping" and the "seventh vial." He felt a sublime contempt for the world's ignorance and fatuity, and the fullest assurance that after his decease, its wiser second thought would raise him to a celebrity level with that of Moses, Mohammed, or Sir Isaac Newton.

He was a daily opium-eater for fifty years, and measured his food with scrupulous accuracy. He walked a given number of miles each day at precise hours, traversing the same well-worn footpaths, and measuring carefully his halls and attics for his rainy-day constitutionals. He utterly eschewed carpets and paper hangings as productive of disease, hated house cleanings even worse than common men, but delighted in an open wood fire and Blackwood's Magazine. He was kind to the poor, even to the suffering of much unrighteous imposition from unprincipled tramps. Always exceedingly gallant and chivalrous toward women, and extending freely the hospitalities of his bachelor home to his friends, he was autocratic and imperious in his domestic rule. He believed in woman's rights to wait and serve both before and after his indulgent mother's death, and yet never toward mother or servant was there a kinder son or master, never a more correct and upright and honorable man in all his social relations. Many will miss the old man from his accustomed haunts, —

"Along the heath and near his favorite tree,"

And a few, casting back long memories, will mourn for him.

Large tracts of lands in New Jersey are devoted to the cultivation of peppermint, bergamot, and wintergreen for their oil, used in making perfumes and toilet soaps.

PHOSPHORUS ESSENTIAL TO FUNGOID GROWTH.

Prof. Frankland has presented a paper to the London Chemical Society on the "Development of Fungi in Potable Waters." It had been previously shown that the addition of sugar to water contaminated with sewage, caused a kind of fermentation, followed by a rich fungoid growth. Prof. F. obtained similar results, but in the course of his researches he encountered some reactions which revealed to him that the presence of sewage matter in saccharic water is in itself not sufficient to produce fungoid growth, but that the presence of phosphates in some form is indispensable to such production. From all his observations he drew the following conclusions: 1. Potable waters, mixed with sewage, urine, albumen, and certain other matters, or brought into contact with animal charcoal, subsequently develop fungoid growth, and other organisms, when small quantities of sugar are dissolved in them, and they are exposed to a summer temperature. 2. The germs of these organisms are present in the atmosphere, and every water contains them after momentary contact with the air. 3. The development of these germs cannot take place without the presence of phosphoric acid, or a phosphate, or phosphorus in some form of combination. Water, however much contaminated, if free from phosphorus, does not produce them.

HOW TO GIVE CHILDREN AN APPETITE.

Give children an abundance of out-door exercise, fun, and frolic; make them regular in their habits, and feed them only upon plain, nourishing food, and they will seldom, if ever, complain of a lack of appetite. But keep them overtasked in school, confined closely to the house the rest of the time, frowning down every attempt at play; feed them upon rich or high seasoned food, candies, nuts, etc., allow them to eat between meals and late in the evening, and you need not expect them to have good appetites. On the contrary, you may expect they will be pale, weak, and sickly.

Don't cram them with food when they don't want, or have no appetite for it — such a course is slow murder. If they have no appetites, encourage, and if need be, command them to take exercise in the open air. Don't allow them to study too much, and especially keep them from reading the exciting light literature which so much abounds in our book-stores and circulating libraries. In addition to securing exercise for the children as above, change their diet somewhat; especially if they have been eating fine flour, change to coarse or Graham flour.

CONSERVATIVE SURGERY.

Probably in nothing is the progress of medicine more apparent than in the gradual abandonment of those heroic methods of practice which were once the glory, but happily have now come to be the shame, of the profession. As science widens the practitioner's knowledge of nature's methods, it at the same time plainly declares the limits of his power, and thus both physicians and surgeons are being brought to see that the process of healing is after all more a matter of time and external conditions, and less a question of drugs and dogmatic interference. The experiences of medical men during our recent war go far to confirm this. Where before the knife had been unsparingly employed — often to the sacrifice of life as well as limb — and dosing was the rule and healthy conditions the rare exception, it was found that less cutting and more care, fewer drugs and better sanitary conditions, gave greatly improved results. Injuries of certain parts, and particularly of the knee-joint, are, however, still held by many to demand the most radical measures in their treatment. But even these turn out be amenable to the saving influences of nature. Dr. Langenbeck, an eminent German surgeon, has put forth the opinion, in opposition to much authority, that injuries of this part, unless involving an extreme degree of disorganization, may be treated with a view to the preservation of the limb; and he fortifies this by citing the fact that out of eighteen cases of this nature under his observation, fourteen recovered. — *The Galaxy.*

WHAT SICKNESS COSTS.

The *Medical and Surgical Reporter* estimates the cost to the people of the United States, of medical services and medicines, at $100,000,000, and $25,000,000 for the quack medicines swallowed. "Let the people," it says, "study these figures awhile, and then reflect that probably one half, or certainly a large fraction, of this expense is incurred by a deliberate infraction of the laws of health; that, if they tippled less, smoked less, overworked less, were less 'fast' and less self-indulgent, they would save some thirty or forty millions a year."

If the cost of the loss of time, loss of happiness, loss of ability to do and dare, was added to the above, there would be no counting the expense of sickness. And then add to this the expense of those indulgences that make us sick.

The truth is, sickness is the most expensive nuisance on the face of the globe. There may be instances where it makes people better, but generally it makes people selfish, sad, misanthropic, nervous, mean, and miserable. The best way to make ourselves happy and good is to keep ourselves well.

Test for Purity of Wines. — The adulteration of wines is readily detected by the microscope. All wines that did not obtain their color through the process of fermentation can be thus proved to be artificial. The natural wine (after evaporating a drop) shows a homogeneous color; the artificial shows small colored globules, differing with the substances used for coloring the liquid.

Anæsthetic Property of Carbolic Acid. — Mr. E. Wilson (*Journal of Cutaneous Medicine*) asserts that carbolic acid has a striking anæsthetic power. "I employ it," he writes, "at present very commonly, previous to the application of caustic to *lupus and epithelioma*. It benumbs the surface, it dulls the excessive sensibility of the superficial nerves, and it thereby permits the caustic application of our remedies with a great reduction in the amount of pain."

Old Dr. Heim, of Berlin, was as original and eccentric as he was celebrated. He used to treat annually as many as 3,000 poor people; but, on the other hand, he demanded liberal fees and respectful treatment from great people. One day the Palatine of Hesse, while on a visit to Berlin, went to consult him. Seeing that the Prince remained seated when he entered, Heim said, abruptly, "Would your Highness please to stand up for a moment?" The astonished patient did as he was bid. "So, it will do; now please to turn about once." This having been done, he remarked, with a musing air of manner, and in a leisurely tone, "Hum! not as stiff as I should have expected a Palatine to be!"

A man stepped into a drug store in Corydon (Ind.) the other day and wanted to buy a "tink's violin," to cure a certain malady. He said the doctor told him to get it. After a vast amount of cogitation and questioning, it was found that the man wanted tincture of iodine.

Boston Journal of Chemistry.

V. UME VI. BOSTON, AUGUST, 1871. NUMBER 2.

Familiar Science.

AMONG THE COAL MINERS.

HERE is no more picturesque or interesting re..n of country in the United States, than that n hich are found the anthracite coal-beds of Pe sylvania. In many respects it is more at- ra ive than the mountain regions of New H. pshire, or the Adirondacks of New York, n it is equally accessible. Upon entering this eg on from New York, by way of the New e y Central Railroad, the first remarkable oi reached is the town of Mauch Chunk, a a which few dare attempt to pronounce with- ut irst taking lessons in the feat from some one f e residents of the place. Correctly inter- re d, it means "Bear Mountain," an Indian a for a lofty peak ascending from the valley. I ch Chunk lies in a narrow gorge between n mong high hills or mountains. This gorge ite narrow, and the scenery is wild and ra. The little Lehigh River, arrested in its o e by dams, canal locks, and rocks, foams and re on its way through the defile, and the cr m of steam whistles, the rumbling of innu- e ble trains of cars, and the shouts of boatmen, a up a chorus of noises, day and night, alto- et r unusual. The town is so wedged in by e ills that only one narrow street is practica- le nd the whole space is taken up by the a d river, the canal, railroads, street, and line f uses. No place on earth presents so many te sting and wonderful points connected with e bal interests, as Mauch Chunk. Standing p the balcony of the hotel, and looking out p the mountains, they seem to be alive with n rains of coal cars. These are not confined valley, but are seen far up the sides of the o ains, and upon their very tops, at an alti- d of twelve and fifteen hundred feet. They o along, looking like huge serpents, winding o d among rocks and trees, and by deep a s, and over trestle-work supports, carrying e heavy loads of black diamonds to the wait- g rs and boats below. The trains not only n ong upon horizontal pathways, but up and w the mountains, upon inclines which seem perpendicular. At the highest points are stationary engines which draw up the long ai of empty cars with the greatest despatch.

T starting-point of what is known as the S ch Back" railroad, is at Mauch Chunk, a most unique and wonderful road it is. It as ot designed for passenger travel, but solely e conveyance of coal from the mountain about nine miles from the town. An en- r ing gentleman some time ago obtained r sion of the owners to run an excursion ver the road twice a day; and parties are aken over the route in comfortable little ithout locomotives or driving power of any To reach the road proper, it is necessary nd to the top of Mount Pisgah, a precipitous dome in front of the hotel upon the opposite side of the river, and which is about thirteen hundred feet high. We take an omnibus, which carries us up four hundred feet to a niche in the mountain, and here stepping into the car we are drawn up an ascent at an angle of 45° to the top of Pisgah, nine hundred feet higher. On the very apex of the mountain the stationary engine is placed, with two huge smoking chimneys which give to the mountain the appearance of a volcano. We started from this elevation on one of the loveliest mornings in June, to make the circuit of the "Switch Back," or what is sometimes more properly called the "Gravity Road," and this carries us over an extent of twenty-five miles upon the tops and sides of mountain ranges. Our first stage is down a gentle decline of nine miles to the foot of Mount Jefferson, up which we are drawn by another stationary engine. The way is now a downward grade until we reach Summit Hill, when we descend rapidly into the valley, where most of the coal mines in working condition are found. This is a sequestered, romantic place, apparently as far out of the world as any one would ever desire to visit. The great coal breakers are upon the right hand and the left; and dark, yawning pits, the entrances to the subterranean passages traversed by the coal diggers, are seen in every direction. Mountains of coal dust, the refuse of the breakers, project into the valley, and give a sombre hue to everything. Even the leaves upon the trees become darkened by the coal dust; and black, turbid streams wind around among the rocks, seeming anxious to escape from the dingy caverns in which they originate. From the "slopes" or entrances to the mines, mule teams attached to trains of cars, loaded with coal, are constantly emerging; and the drivers in charge, with oil lamps affixed to their caps, and begrimed with the sooty powder, seem like mountain imps who have no business with daylight or the outside world.

Before proceeding to speak further of mines and coal mining, let us return to the road by which we came into this region. Shortly after leaving the valley, another mountain opens before us with its smoking chimneys at the apex, and up this we are drawn at a rapid rate. From this high point our return route commences, and we run over the track at a fearful speed until we reach the town of Summit, the home of the miners, which has a church, school-houses, and barracks for troops, as it has been found necessary in turbulent times to quarter a regiment of soldiers at this point to preserve order. The track the whole way is a down grade, and an hour's ride brings us back to the base of Pisgah, our starting-point. During the ride of twenty-five miles we have been seated in our little car by the side of the conductor, whose sole business has been to keep his hands upon an iron wheel which controls the brakes, and governs our rate of speed. We look out of the open door in front and our view is unobstructed by engine or tender, for we travel independent of both; no smoke, gas, or steam whistle annoys us, and we rush along, propelled by an unseen power, a force which is potent, but inexplicable. It is impossible to realize the true nature of the track, for the descent is very gradual, and it appears like an ordinary level road, high up among the clouds. We presume the excursion is not peculiarly hazardous; but it must be confessed it seems so, at least during the first half dozen miles of travel; we could not learn that any serious accidents had occurred during the time the road has been open to excursionists, and it is probable that every precaution has been and will be used to prevent them. This railroad in many respects is as wonderful and more interesting than that constructed up the bare side of Mount Washington. The steep declivities are, however, surmounted by the aid of stationary engines at the tops, whilst the cars on the Mount Washington road are accompanied by the unique little locomotive, which lifts with its arms of iron behind, and forces the train up the almost perpendicular rock to a height of seven thousand feet. We can never cease to wonder at and admire such triumphs of mechanical and engineering skill.

A hunter named Ginter first discovered anthracite coal in this region, eighty years ago; but he did not understand its nature, and it was called "black stone," and supposed to be as incombustible as granite. The history of the early attempts to burn anthracite are not only amusing but instructive, as they serve to show how mankind may be baffled in attempts to reach an end as easy and simple as building an anthracite coal fire. It required more than *forty years* to learn how to burn this form of fuel; and it is alleged that the discovery was made accidentally after all. An experimenter in Philadelphia, after most persistent efforts to ignite the black stones, gave up in despair, and left his furnace filled with a mixture of wood and coal, and went home to dinner. Fortunately there were some sparks left upon the wood, and more fortunate still, the furnace door was left *closed*, with the draft *open*. This arrangement afforded the necessary "let alone" treatment, and the wood, soon igniting, heated the coal to a point where it also could be ignited; and as the downcast experimenter returned to rake out and throw away the supposed worthless coals, he found them to his surprise all aglow, and causing such intense heat that his furnace was well-nigh destroyed. This result of course dispelled the idea that anthracite was an incombustible substance; and soon companies were formed to work the mines. Coal was, however, brought from this region by slow and wearisome modes of conveyance, such as by wagons, and on mules' backs, until 1827, when an imperfect track was laid to run cars down the mountains by gravity, and in this originated the present very remarkable "Gravity Road."

But let us leave Mauch Chunk, and by the Lehigh and Susquehanna Railroad travel up the wild gorges of the mountains through which the Lehigh River forces its way, and when we have reached the summits, we will descend into the beautiful Valley of Wyoming. This broad, fertile basin, with the rim of mountains bounding it upon every side, is indeed a charming retreat; and no wonder the poor Indians in the early days of our history were reluctant to give it up to the rapacious white men. Here every inch of ground rests upon a support of anthracite, for the valley and surrounding hills are full of it, and it crops out at various points, showing what a wealth of the mineral reposes below. Scattered up and down the valley are seen the huge coal breakers, which dot the landscape almost as thickly as do the windmills in Holland. Coal, coal, nothing else but coal is thought of or talked about, and the pretty city of Wilkesbarre is the centre of the great industry. We are pleased to accept the kind invitation of Mr. J. H. Swoyer to visit the celebrated Enterprise Colliery, in Pleasant Valley, which is under his direction, and witness the operations of mining, crushing, screening, and preparing coal for the market. With Mr. Patten, the gentlemanly superintendent, for a guide, we descend the "slope" and penetrate into the side of the mountain, and grope our way through the grim passages made by the miners in order to reach the deep coal seams, hundreds of feet below the surface. Small cars, black as the coal itself with dust, rumble along the excavations, drawn by mules, conveying the coal to the great shaft over which is built the breaker, and here it is hoisted by steam power up to daylight. The reflection occurs that this remarkable substance, which is in itself only solidified sunlight, has rested in its dark abode for uncounted ages, and not a beam of light has shone upon it until to-day, since the floods of the carboniferous epoch swept it into these basins as vegetable matter, and covered it with the silt and mineral *débris* which were forced along with it in its course. We are led to regard it as a kind of *pemmican* fuel, and here is the vast *cachet* established by the Infinite One, from which we can draw unlimited supplies.

The Enterprise Company are at present working upon a seam a little less than five feet in thickness, which is about the least that can be worked with profit. The coal *in situ*, as we look upon it by the dim light of the miners' lamps, appears as a dark, shiny stratum, tightly compressed between heavy masses of shale and limestone. The weight of the mountain seems to rest upon it, holding it as in a vice. To dislodge or break it from its bed is the work of the experienced miner, and this is accomplished with wonderful tact and skill. A sharp drill is used, by which orifices are made in the seam, and when these are filled with gunpowder, tamped, and exploded, large fragments are dislodged, which are placed in the cars by the laborers, and drawn through the dark labyrinths to the shaft. The regular miner never lifts any coal for carriage; this is the work of the *laborer*, and entirely beneath his dignity. As we entered the mine at about noon, several miners were met coming out, and we were informed by the superintendent that they had completed their day's work, and had the afternoon to themselves. They had dislodged as much coal from the bed as the laborers could load and carry away during the day, and their task was completed. There is an aristocracy in these subterranean abodes as exclusive as any found above ground, and "consuming ambition" finds as full play in the breasts of the little sooty colliery boys, as in those met with in our schools or employed in our counting-rooms. The boys born of the men at the mines care but little about books, and dream of no other occupation than mining. At an early age they go into the breakers, and take their first step in the business in picking out the fragments of slate that fall through the meshes with the coal in the process of screening. From this they look forward with earnest desire to the time when they can go into the mines and drive the donkeys attached to the coal cars; from this they wish to become laborers, and load the coal; and the crowning summit of their ambition is only reached when they become miners, and are fully connected with the "ring," and under full pay.

The mines are filled with the smoke of gunpowder; but after a short stay it is not oppressive. The work of mining, viewed from our stand-point, is not an agreeable occupation, but it is less exacting and laborious than many other kinds of labor. It is also less hazardous than many other pursuits, although a contrary notion prevails. The perils incident to the sea are far greater; and also many industrial pursuits, such as the making of gunpowder, matches, pigments, etc., are more destructive to life than coal mining. There have never been in this country but two very serious casualties: that of the Avondale mine, and the recent one at Pittston. There are employed in the anthracite region about 30,000 miners, and the loss of life from accidents incident to the business shows but a very small percentage. It is the terrible *nature* of the casualties, when they do occur, that awakens such wide-spread sympathy, and causes the occupation to be looked upon with dread.

The masses of coal raised from the pits are carried far above the opening of the excavation and thrown into the breaker, a ponderous iron machine, which crushes them to fragments of various sizes; and then they fall into revolving cylindrical sieves, the meshes of which determine the size of the coal manufactured. In this manner, the "egg," "nut," and "bean" coal are separated, each sieve sifting out its appropriate size, and directing it into different receptacles. At some of the mines one thousand tons of coal are raised and broken in a day, and the aggregate of the amount produced is prodigious. The profits of the business, as conducted at the mines, seem reasonable, as we were informed by one of the largest producers that he was entirely satisfied when he could realize twenty-five cents profit on each ton delivered. A vast monopoly has virtual control of our anthracite coal-beds, and what the future may develop it is impossible to foretell. A comparatively few very wealthy men in our large cities are the owners of the mountains and valleys where lie hidden the precious deposits of coal, and upon them depend in a measure the development of our great national industries. At present it is not for the interests of owners to attempt to combine or monopolize, but how long this may continue is a question of no little national importance. The supply *is vast* in amount, practically inexhaustible, — and this fact affords reasonable assurance that centuries may elapse before any measures may be taken to force prices to a point where they will be restrictive, or very oppressive. The high prices of coal which have ruled during the past two or three years are caused by occurrences independent of ownership of the coal lands.

DREDGINGS FROM THE GULF STREAM.

A YEAR or two ago, Mr. Pourtalis, who has charge of the dredging carried on under the superintendence of the Coast Survey, presented us with some specimens of dredgings from the Gulf of Mexico.

They were only some small pieces of red and white rocks, a white clay which had been air-dried, and a piece of bone which the Cambridge zoölogists pronounced a part of the rib of the manatee or sea-cow. Yet the study of these relics has opened to us a very interesting field of investigation.

Our first inquiry was naturally into their chemical composition. This we found to be somewhat variable, depending of course on the nature of substances from which they were formed. The bone had changed but little beyond losing its organic matter, and acquiring some iron and a little more carbonate of lime. The ooze consisted mainly of calcic carbonate, with a little phosphate, a little silica, and some magnesia; while the other rocks varied between these two extremes. In order to understand these facts more fully, we procured, through the kindness of Mr. Pourtalis, and analyzed, a number of specimens of coral, and a piece of the recent bone of the manatee. We found that the coral consisted mainly of calcic carbonate with traces of calcic phosphate, and that the rib did not differ essentially from other bones.

Examination with the microscope showed that the silica contained in ooze was in the form of sponge spicules. We therefore had its formation and composition accounted for. As soon as any portion of coral reef dies or becomes injured in any way, old Ocean at once takes possession of it and grinds it into fine powder, which he deposits in his still depths, ready to form limestone rock. It is supposed by some geologists that all the limestone that exists in the form of rock has been submitted to this process.

But the manatee bones were yet unaccounted for. How did they get into the strait between Florida and Cuba, when their native place is one of the rivers of South America? The great oceanic current that sweeps around the north coast of South America and through the Gulf of Mexico, becoming as it emerges into the Atlantic the well known Gulf Stream, explained this to us. The dead bodies of the manatees would be carried down by the rivers and out to sea; there they would encounter this current, and be swept along by it, and gradually decaying would deposit their bones on the floor of the ocean. In some localities it is almost covered with them, every dredgeful bringing up numerous specimens. Another peculiarity of these dredgings may be mentioned in this connection. The main portion of the dredging was done in the track of the ocean steamers which run between the Gulf ports and the rest of the world, and the dredge was continually bringing up quantities of cinders that had been thrown overboard from these vessels.

Another question still remained unanswered in regard to these deposits: where did the ir

come from? In some of the rocks this seemed to be the cementing material, one of them containing as much as 20 per cent.

Analyses of sea water taken from the open ocean show that iron is almost entirely wanting in such water. But, on the other hand, iron is always found in the water of inland seas and rivers. We have been unable to find analyses of the water of the Gulf of Mexico, or of that of the rivers that empty into it, but reasoning from similar circumstances elsewhere we should say that the water of the Mississippi and other rivers emptying into the Gulf carried down considerable iron. This coming in contact with decaying organic matter, such as would be furnished by the *débris* of the coral, and by the decaying skeletons of the manatees, would be deposited as carbonate. Such a deposition is in fact going on at the bottom of many ponds. The carbonate is thus decomposed and changed into the sesquioxide. Having thus studied up these deposits, we were led to question as to the origin of the bone deposits of South Carolina. May they not have been formed at the bottom of the ocean in the same manner? They differ but little from these rocks, with the exception that they contain a large amount of sand; this may be regarded as purely adventitious, having been washed in from the surrounding sand-hills.

If the deposit at the bottom of the Gulf was elevated only six hundred feet, we should have a series of phosphate beds south of Florida in every way similar to the beds of South Carolina.

WHY CIRCLES PLEASE THE EYE.

PROF. MÜLLER, in a course of lectures in Berlin, offered a simple and mechanical explanation of the universal admiration bestowed on these curves. The eye is moved in its socket by six muscles, of which four are respectively employed to raise, depress, turn to the right, and to the left. The other two have an action contrary to one another, and roll the eye on its axis, or from the outside downward, and inside upward. When an object is presented for inspection, the first act is that of circuition, or going round the boundary lines, so as to bring consecutively every individual portion of the circumference upon the most delicate and sensitive portion of the retina. Now, if figures bounded by straight lines be presented for inspection, it is obvious that but two of these muscles can be called into action; and it is equally evident that in curves of circle or ellipse all must alternately be brought into action. The effect then is, that if two only be employed, as in rectilinear figures, those two have an undue share of labor; and by repeating the experiment frequently, as we do in childhood, the notion of tedium is instilled, and we form gradually a taste for straight lines, and are led to prefer the curves which supply a more general and equable share of work to the muscles.

THE SUNBEAM.

THE greatest of physical paradoxes is the sunbeam. It is the most potent and versatile force we have, and yet it behaves itself like the gentlest and most accommodating. Nothing can fall more softly or more silently upon the earth than the rays of our great luminary — not even the feathery flakes of snow which thread their way through the atmosphere as if they were too filmy to yield to the demands of gravity, like grosser things. The most delicate slip of gold-leaf, exposed as a target to the sun's shafts, is not stirred to the extent of a hair, though an infant's faintest breath would set it into tremulous motion. The tenderest of human organs — the apple of the eye — though pierced and buffeted each day by thousands of sunbeams, suffers no pain during the process, but rejoices in their sweetness, and blesses the useful light. Yet a few of those rays, insinuating themselves into a mass of iron, like the Britannia Tubular Bridge, will compel the closely-knit particles to separate, and will move the whole enormous fabric with as much ease as a giant would stir a straw. The play of those beams upon our sheets of water lifts up layer after layer into the atmosphere, and hoists whole rivers from their beds, only to drop them again in snows upon the hills, or in fattening showers upon the plains. Let but the air drink in a little more sunshine at one place than another, and out of it springs the tempest or the hurricane, which desolates a whole region in its lunatic wrath. The marvel is that a power which is capable of assuming such a diversity of forms, and of producing such stupendous results, should come to us in so gentle, so peaceful, and so unpretentious a guise.

HOUSEHOLD RECIPES.

LAUNDRY POLISH FOR LINEN. — Add to starch made in the usual way a small lump of white sugar, or a bit of white wax or spermaceti, or a few thin shavings of white soap and a teaspoonful of salt. After the clothes are rinsed in the blue water, starch them, and dry on the clothes-line; then wring them from cold water, roll up tightly, and let them lie awhile. Iron smoothly in the usual way. Then place the bosom, or piece to be polished, on a board with a single fold of muslin over it, pass a damp cloth over the linen and polish with an iron made for that purpose, such as may be bought at the hardware or kitchen furnishing stores.

SWEET PICKLES. — The following is a good recipe for making sweet pickles of peaches, tomatoes, apples, etc. For each nine pounds of fruit, take three pounds of sugar, one pint of vinegar, and one half ounce of cloves. Put the sugar and vinegar together in a preserving kettle, let them come to a boil, then put in cloves, ground if for apples; if for peaches or tomatoes, put two whole cloves in each, or more as you like. Put your fruit into the syrup, let it boil until it cracks open, then lift it out carefully, boil down the juice, and pour it over them. As the juice gets thinner by standing, drain it off, and boil it down as much as you can conveniently, pouring it over the fruit again.

CHOW-CHOW. — Chop fine two quarts of green tomatoes, two quarts of white onions, one dozen green peppers, one dozen green cucumbers, one large head of cabbage. Season with mustard and celery seed, to suit the taste. Cover with the best cider vinegar. Boil two hours slowly, stirring continually. As soon as you take it from the stove, add two tablespoonfuls of salad oil. Cover tight, and keep in a cool place.

CURRANT JELLY WITHOUT COOKING. — Press the juice from the currants, and strain it; to every pint put a pound of fine white sugar; mix them together until the sugar is dissolved; then put it in jars; seal them, and expose them to a hot sun for two or three days.

A GOOD HOME-MADE BEER. — Take two ounces of ground ginger, one ounce of cream of tartar, one and one half pounds of white sugar, and two lemons cut in thin slices and seeds taken out. Pour on these ingredients three gallons of boiling water; let it stand until quite cool; then stir well into it a coffee cup of brewer's yeast. In twenty-four hours it will be ready to bottle, and in thirty-six will be fit to drink, but is better in a week.

TONGUE TOAST. — Take cold boiled tongue, mince it fine, mix it with cream, and to every half pint of the mixture allow the well-beaten yolks of two eggs. Place over the fire, and let it simmer a minute or two. Have ready some nicely toasted bread; butter it, place it on a hot dish, and pour the mixture over. Send to table hot.

TO REMOVE WARTS. — Dissolve an ounce of white vitriol in five table-spoonfuls of water, put into a vial, and rub the warts three or four times a day, and oftener if convenient. In two weeks they will be gone, without pain or scar. Other remedies are to moisten the tops of the warts once a day with creosote; or burn a piece of linen or cotton on any piece of steel and rub the moisture left by the burning on the warts, repeating the operation three or four times.

THE WATER HAMMER. — Prof. Lommel has recently made some interesting experiments with the water hammer. By means of tin foil coatings he connected the ends of the hammer with the conductors of a Holtz electrical machine; on working the machine vivid flashes, resembling sheet lightning, passed from end to end of the tube. These flashes are of a brilliant red color, and on being examined with the spectroscope give the hydrogen and sodium lines. After a short time the vacuum is found to be destroyed by the gas set free, and the water has acquired an alkaline reaction from the decomposition of the glass. In tubes filled with dilute alcohol the discharge was of a light green color, and gave the lines observed in the lower portion of the flame of the Bunsen burner.

The tube of a thermometer, when connected with a coil or induction machine by means of tin foil on the ends, is seen to be filled with the green light given by mercury vapor, if the vacuum is perfect. If however a trace of air is present, the discharge is of a reddish color. This therefore gives a ready method of testing a thermometer.

BALLOON VOYAGING. — The siege of Paris by the Germans opened a new era in aerial navigation. It has served to demonstrate the entire feasibility of balloons as means of communication between the inhabitants of the place under seige and the outside world. There is no certain intelligence of any loss of life, and the dangers do not seem to be greater than those which attended navigation in its earlier days. The observed heights to which the balloons ascended were between 2,000 and 8,000 feet. The longest voyages taken were one of 420 miles to St. Baume, at the rate of 28 miles per hour, and one to Norway, at the rate of 55 miles per hour. By means of balloons Paris was enabled to communicate with the country about once in two days, but it is not known whether any attempts to reach the city by these means were successful.

CERTAIN colored rays of light are particularly favorable to the development in organic infusion of infusorial life, while other rays are more favorable for the production of microscopic forms of vegetable life. Thus, M. Pouchet says, *white* light is the best fitted for obtaining the former result, after which comes the *red* ray, then the *violet*, the *blue*, and finally the *green* ray. On the contrary, for the development of vegetable "proto-organisms," the *green* ray is the best fitted; next to this the *blue* and *violet* rays; and, lastly, the *white* light; the *red* ray hindering the development of these organisms.

IN the Museum at Cassel, Germany, is a library made from five hundred European trees. The back of each volume is formed of the bark of a tree, the sides of the perfect wood, the top of young wood, and the bottom of old. When opened, the book is found to be a box, containing the flower, seed, fruit and leaves of the tree, either dried or imitated in wax.

The Arts.

ALVAN CLARK AND HIS TELESCOPES.

We have several times alluded to Mr. Clark and his telescopes in the Journal, and we presume our readers will be pleased to learn something of his history.

Just at the end of the Brookline bridge, in Cambridge, stands a modest-looking brick building that most persons would not consider worthy of a second glance, if indeed it attracted their attention, and near this building is another surmounted by a dome. These form the establishment of Alvan Clark, who has a world-wide reputation as a builder of telescopes, and also as an amateur astronomer.

Mr. Clark was originally a miniature painter, and quite a successful one, as many paintings still in his possession prove. Some years ago his attention was accidentally called to the subject of telescope making, from a description given by one of his sons of the small telescope at Amherst College. After hearing this, Mr. Clark remarked that he could make a telescope, and accordingly went to work and made one. His first instrument proved so successful that he was encouraged to persevere. One of his friends remarked to him about this time, "Mr. Clark, if you wish to know how to make telescopes, you will have to go to the place where they are made." But Mr. Clark thought some things might as well be studied out as learned from another, and so persevered, and was soon enabled to retaliate upon his friend by telling him that he had learned how to make telescopes, independent of instructors.

His telescopes are the kind known as *refracting*. In these the principal parts are the field or object glasses, or *objectives*, as they are most frequently called, and the *eye-piece*. The principal use of the objectives is to collect the rays of light coming from the object, and to form an image at the focus of the lens. This image is afterwards magnified by the eye-piece.

On the perfection of this focal image depend to a great extent the power and capabilities of the instrument. It must be colorless, or at least have no fringes on the edges; it must also be sharp and well defined, and have a large amount of light thrown on it. The first two of these conditions may be fulfilled with a glass of a comparatively small diameter, but in order to accomplish the third, the diameter must be increased to as great an extent as possible.

Mr. Clark's first telescopes were distinguished for their freedom from chromatic and spherical aberration, as the first two errors are called, and latterly he has been devoting his time more especially to increasing the size of the glasses.

In order to correct the chromatic aberration, the objective is made of two disks of glass. The first of these, or the convex lens, is made of crown glass. This alone would form an image at the focus, but the image would be fringed with the colors of the spectrum. In order to prevent this, a concavo-convex lens, made of flint glass, is placed directly behind the first glass; this recomposes the white light which the first lens has decomposed, and forms an image at the focus that is almost perfectly colorless. In order to make it perfectly colorless, we should have to use more than two lenses.

There still remains the spherical aberration to be corrected. This is owing to several causes. In the first place, it may be that the glass is a little more dense on one side than on the other; this will serve to distort the image somewhat, and must be corrected by proper grinding. Then a portion of the glass may polarize light while another portion does not; this must also be corrected by grinding.

In order to test the glasses for these errors, they are placed on a carriage and run into a long tunnel which has a small spot of light at the further end. If now the eye is placed at the focus of the lens, a sharp clear image of the spot will be seen, provided the lens is perfect; otherwise it will be distorted and colored. It must also, when examined with a Nicol's prism, still remain free from color. If this is not the case, the glass is removed, repolished, and the test is repeated.

In order to grind the glasses, a coarse emery is first used, until they have been brought very nearly to the perfect form required. Then finer grades of emery are applied, and finally they are polished with rouge. The process takes a long time from the first arrival of the rough glass, until it becomes the finished objective. Almost the whole of the grinding is done by hand, on laps made of cast-iron. These are used at first naked, and afterwards covered with pitch.

Telescopes are generally spoken of as being of so many inches aperture; and until within a very few years a telescope of fifteen inches aperture was regarded as enormous. In 1867, Mr. Clark constructed one of twenty inches aperture, for the observatory at Chicago. This at the time was the largest refracting telescope ever made. Since then one of twenty-four inches aperture has been made in England; and now the Messrs. Clark have orders for two of twenty-five inches aperture; one intended for the government observatory at Washington, the other to go to Virginia.

These telescopes will be about twenty-five feet long when finished, the rule being that a telescope shall be as many feet long as the objective is inches in diameter. Any one who wishes to indulge himself with one of these instruments as a toy, can do so at an expense of about $100,000, and there will most likely be a *further* expense of fifty thousand dollars in providing a place to keep it. These large telescopes are so nicely adjusted that a person can easily move them with a finger, although they weigh several tons. Besides making telescopes, Mr. Clark has made a specialty of spectroscopes. He has constructed some very fine ones; among others that of Prof. Young, to which we have alluded in the Journal. This instrument has been almost completely rebuilt, and some improvements suggested by experience have been added. Mr. Clark has also built a new telescope for Prof. Young, of nine and one third inches aperture. This instrument has a steel tube, made of plates of steel riveted together, as it has been found that steel tubes can be constructed so as to weigh less and yet be stiffer than wooden ones.

Making Light of the Ancient Dead. — It is said that French engineers have "utilized" the mummies in the catacombs of Egypt for making gas, the "candle-power" of which is much increased by the bituminous wrappings.

MEMORANDA IN THE ARTS.

Paper from Oat Husks. — Paper is manu- tured from oat refuse, in Glasgow (Scotland), by immersing the husks in water in a tank, in orde float off mustard and other seeds, with which are frequently more or less mixed, and which, if separated, materially deteriorate the quality of paper. It is of advantage to have the water stirred, as it facilitates the separation of the for seeds, and allows them to float to the surface. oat-husks are then allowed to settle, and the sur scum and floating seeds are drawn off by an o flow pipe at the top of the tank, or skimmed off a rake or other tool, or otherwise removed; which the water is drained from the husks waste-water pipe at the bottom of the tank, beneath a perforated false bottom, or fitted wit strainer, which retains the husks. These may left to steep in the water for from five to ten h after or during the removal of the scum, as steeping, by softening them and helping to lo the silica from the fibre, facilitates the subseq boiling process, by which they are reduced pulp.

A Floating Steam Fire-Engine for V ice. — A light and compact steam fire-engine, fi on an iron screw launch, has just been complete England. The launch is only forty feet long, is specially designed for the canals of Venice draws but 18 inches of water with the eng boiler, and pump, and having on board its and fresh-water supply, as well as its full com ment of firemen. On the trial trip, the sp reached was between 9 and 10 knots per hour. jet of water was projected at a rate of 225 gall per minute to a distance of 156 feet.

Mining Improvements in California. — is claimed that the so-called "giant powder" reduced the cost of tunneling more than twenty- per cent. by permitting smaller drill-holes to used, and by enabling single-handed drills to the work in the place of those operated by two m previously required; the diamond drill has helped much in reducing the cost of this branch mining operations. One instance is mentioned which, driven by steam power, it bored seve twenty-feet holes in three hours, which by the hand method would have kept six men at work three weeks. These and kindred improvements leading to renewed activity in hydraulic mini and bringing into existence projects for supply the mining regions with water which will throw i the shade even the grand achievements which C fornia already shows in this line of engineering.

A Large Steamship. — The Lairds, of Birk head (England), have just launched one of largest ocean steamships ever built. She has b named the *Spain*, and is to form one of the Natio Steamship Company's line between Liverpool New York. Her length is 437 feet, her breadth beam, 43 feet; she is of 4,900 tons burden, and accommodation for 120 first-class and 1,400 steer passengers. The engines of the *Spain* are largest ever constructed on the compound princi and the vessel is expected to have great speed, b under steam and canvas.

Yankee Pins. — There are eight pin factor in the United States, whose annual production 2,000,000 packs, each pack containing 3,360 pi a total of 6,720,000,000 pins. One manufactur agent in Boston sells every six months from 700 1,000 cases of pins, each case containing 672,0 pins. The factory which he represents turns eight tons of pins per week.

Hair-pins are jobbed by the cask. There is one factory in this country that produces the They turn out fifty tons per month. The machi that cuts and bends the wire makes 360 hair-pi per minute, ready for japanning. Yankee pins a

alable in nearly every city of the world, and the production and consumption increase each year about ten per cent.

PRACTICAL RECIPES.

To Make a Superior Sand-Paper. — Take quantity of broken window glass (that which has rather a green appearance on the edge is best); pound it in an iron mortar; then have two or three sieves, of different degrees of fineness, ready for use when wanted. Take any good tough paper (fine cartridge is the best); level the knobs and lumps on both sides with pumice-stone; tack it at each corner on a board, and with good clear glue, diluted with about one third more water than is used generally for wood work, go quickly over the paper, taking care to spread it even with your brush; then having your sieve ready, sift the pounded glass over lightly, yet so as to cover it in every part; let it remain till the glue is set, take it from the board, shake off the superfluous glass into the sieve, and hang it in the shade to dry. In two or three days it will be fit for use.

The paper will be much better than any you can buy — sand being frequently mixed with the glass, and colored to deceive the purchaser.

Recipes for Waterproof Glue. — 1. If for outside work, mix dry powdered white lead in ordinary glue. If for other work, dissolve your glue in the smallest quantity of water possible, then thin with linseed oil.

2. Take of glue twelve parts, and of water or skim milk sufficient to dissolve; then add yellow resin, three parts, and when melted, add turpentine, four parts. Mix well together.

Coloring Metal. — Dr. Puscher gives an account in Dingler's *Journal*, of a process for obtaining decorative colors on metal. Hyposulphite of lead is dissolved in hyposulphite of soda. The clear solution is then heated to 212° Fahr., and the metal dipped into it, when a thin film of lead is deposited, producing a beautiful display of colors upon any metal employed.

To Clean Soft Mahogany, or other Porous Wood. — After scraping and sand-papering in the usual manner, take a sponge and wet the surface to raise the grain; then with a piece of fine pumice-stone, cut the way of the fibres, rub the wood in the direction of the grain, keeping it moist with water. Let the work dry; then, if you wet it again, you will find the grain much smoother, and it will not rise so much. Repeat the process, and you will find the surface perfectly smooth, and the wood much hardened.

Seasoning Wood by Boiling. — Small pieces of non-resinous wood may be perfectly seasoned by boiling four or five hours. Sash frames of Spanish chestnut which has been so boiled have been "wedged up" within six weeks after the tree was felled, and have stood admirably. The boiling takes the sap out of the wood, and most hard woods so treated shrink one tenth in the process.

Tempering Old Files for Chisels. — Heat the file gradually to a cherry red heat, then dip in water about one inch of the chisel end till it comes to a black heat, then rub with a rubber till you see a blue color, then quench it directly. This is the way blacksmiths manage them.

In dressing for photographs, dark brown, dark green, maroon, and plain black goods, without gloss, will make a rich drab color. Silks, of the same colors, will take considerably lighter. Snuff brown, dark leather, dark drab, scarlet, cherry, dark orange, crimson, and slate, will also take a rich drab color. Violet, blue, purple, pink, and magenta will be very light, and should be avoided. The hair should not be very wet or glossy.

Agriculture.

THE USE OF CONCENTRATED FERTILIZERS.

The cause of failure in the use of the concentrated fertilizers is often due to the *manner* in which they are applied. It is difficult for those who have been accustomed to use bulky manures to realize that the full fertilizing potency of a bushel of animal excrement may be held in a large sized table-spoon, and that a handful of one adds to plant structures as decidedly as several shovels full of the other. A full dose of opium as given to patients furnishes quite a dark, bulky powder, or pill; but if we separate the alkaloidal principle upon which its hypnotic power depends, we have only a little delicate white powder which a breath of wind will blow away. The $\frac{1}{8}$ grain powder will affect the human organism as powerfully as ten times the weight of opium. If we were so forgetful of "potencies" as to administer as much, or even one quarter as much, of the white concentrated powder as of the bulky dark one, we should destroy our patient's life, or at least do great injury to his health. So, if in the use of genuine superphosphate, or guano, or ground bones and ashes, we forget their power, and apply too much, or apply them too directly, we endanger the life of our plants.

An experiment made upon corn affords an illustrative case in point. At the time of planting, upon a field divided by a narrow strip of sward land, we directed that on one side a table-spoonful of the mixed bone and ashes should be placed in each hill, and well covered with soil; upon the other, four rows were to be treated similarly, and upon the remainder the hills should receive a double quantity. It is curious to observe the effects. The first field and the four rows are remarkably thrifty. The corn came up well, and has manifested remarkable vigor from the start. On the other hand, the over-dosed corn appeared for a long while as if it had been paralyzed by some wasting disease. It could not bear up under so much of a good thing. More free ammonia was formed at the start than could be appropriated by the tender plants, and many of them perished from over stimulation and heat, produced by the fermentative changes of the active bodies in contact. The corn that survived is at present growing finely, and will no doubt afford a large yield. Now, if this had happened in the course of our regular agricultural labors, and without any understanding of the nature of the fertilizing substance used, it is probable it would have been condemned as a worthless or dangerous article. This has been the case with hundreds of experiments, and is indeed a perfectly natural conclusion to reach. But we must learn to reason, learn to have patience, learn the character of the substances we employ upon our lands. We must be careful how we reach conclusions; we must examine closely to see if they are based upon correct grounds. There are well established principles in agriculture; let us cling to them, and when we get results that are puzzling or paradoxical, we must study causes, and not judge hastily.

The Agricultural Society of Breslau, Germany, offers a prize of $700 in gold for the steam plough apparatus which will work best at trials to be made on farms near that city this summer.

AGRICULTURAL COLLEGE EXPERIMENTS.

Our attention has been drawn particularly to this subject of late by reading the reports of Agricultural Colleges. That of the Pennsylvania Agricultural College is upon the whole an extraordinary document, and deserving of special attention. It shows how empiricism may flourish in high places.

It is evident from the report that considerable work has been done, for which credit should be given to the superintendents of the various farms. As regards these farms, we would remark that it is questionable whether Congress, when the appropriation for agricultural colleges was made, intended the money to be used in buying farms on which the trustees of the said colleges might carry out some pet ideas without cost to themselves. Little of value has been accomplished, and we are free to say that we have never met with a more barren set of figures than those which are scattered so liberally through the report.

The trustees, with the consent of the legislature, have bought three farms, or rather they have bought two, and sold to themselves a third. These farms have been laid out by rule and compass into similar plats, which are to be cultivated in the same manner, using the same manures, and sowing the same seeds.

This all sounds very well on paper, but now comes the gist of the matter. These three farms are in three different parts of the State, with as different soils and climates as could well be found within a radius of two hundred miles from the centre farm, each requiring a different method of treatment, and a careful study of the modes best calculated to lead to instructive or valuable results. Without regard to this, the president of the college directs his subordinates to treat all alike, or bestow upon each the same empirical treatment. He says, "you will apply *commercial manures* and no others to these plats; the manures will be furnished you by the *makers*, who offer to give them for trial." Accordingly, some twenty or thirty different manures, mostly bone phosphates, were begged or bought, and applied to the soils, and the weight of the crops produced was carefully noted. We will quote one result, as showing the value to scientific agriculture of this method of procedure.

Thirty-three commercial fertilizers were applied, at the rate of thirteen and one third dollars' worth to the acre, to as many plats of ground, an adjoining one being left without treatment. One or two of these manures were applied in slightly different ways, making the whole number of experiments forty.

The following are the results: The yield of wheat varied between 6 quarts to the plat, or $7\frac{1}{2}$ bushels to the acre, and 22 quarts to the plat, or $27\frac{1}{2}$ bushels to the acre. The ground on which nothing was applied yielded $13\frac{1}{2}$ quarts, or $16\frac{7}{8}$ bushels to the acre; while the average of the whole number of experiments was $14\frac{1}{4}$ quarts to the plat, or $17\frac{13}{16}$ bushels to the acre. In no single instance is an analysis given of the fertilizer, and nothing is said about its composition. No care was taken to obtain fair commercial specimens, entire reliance being placed upon superphosphate makers and dealers. In other words, in endeavoring to be strictly practical and accurate in the work, they have thrown overboard

all tests except the empirical one of soil application.

A thorough analysis of these manures, such as was published some years ago by the late Dr. Evan Pugh, in *The Country Gentleman*, should have been made, and presented in the report, and this would have given to it some value. If agricultural colleges can do no better than this, they will do but little to benefit the farmer.

INSOLUBLE MATTER.

The following item has had a wide circulation in our exchanges: —

Prof. Johnson don't like the expression "insoluble matter," and remarks that "such exhibitions of professional folly may do for fifty years ago, but in this part of the nineteenth century we recognize no such substance as 'insoluble matter' in our nomenclature. In this same insoluble matter may be hid the very pabulum of vegetable life."

The term "insoluble matter," as applied to soils and fertilizing agents, is an eminently proper one to employ, as it expresses clearly and decidedly the difference between what yields readily to ordinary separating or decomposing agencies, and what does not. In a bag of ordinary "superphosphate," we get a mixture of silica, carbonate of lime, unchanged and changed or dissolved bone, with various kinds of animal matter. In speaking of the component parts of this mixture, we should say that the first two agents are "insoluble" in their nature, and of little benefit to agriculture. In the chemist's laboratory, under the agency of acids, alkalies, heat, etc., they are easily soluble; while in the soil they are practically insoluble, as centuries may elapse before any essential portion of them disappears. There is inexcusable pedantry in the remark attributed to Prof. Johnson, — in fact it is *silly*. But it is a remark which the grinders of "insoluble" rocks, recommended for fertilizing uses, employ to increase their sales, and therefore it is deserving of notice.

PROGRESSION OF PRIMARIES.

The *Journal of Applied Chemistry* has an article supporting at great length Prof. Mapes's doctrine of *progression of primaries*, — which we suppose is not well understood by many of our readers. Briefly, it may be stated thus: minerals that have once passed through a vegetable organization are better adapted for plant food than those derived directly from the rock. He brings up in support of his argument the cases of bone dust and apatite, saying very justly that the first is suitable for the nourishment of plants, while the second is not, evidently considering them as having the same composition. Now in fact they are totally different, the apatite not being a simple phosphate of lime like the bone, but a compound formed from phosphate of lime and fluoride of calcium. If, however, the apatite is treated with strong sulphuric acid, having been previously ground to a powder, it then becomes as suitable plant food as the bone. The simple fact is that phosphate of lime in combination with fluor spar is insoluble in carbonic acid water, while bone dust is soluble to a considerable extent.

A condensed "philosophy of farming": Feed your land before it is hungry; rest it before it is weary; and weed it before it is foul.

WHAT THE HEBREWS KNEW OF FARMING.

In his laws Moses made agriculture the basis of the State. According to this principle he apportioned to every citizen a certain portion of land, marked by fixed boundaries. Land-grabbing speculations were prevented by the law, which required all lands in the commonwealth to revert to the heirs of the original owners on the jubilee year. The occupation of the farmer was held in honor from being thus protected by the fundamental law of the State. None were so rich or noble as to disdain to put their hand to the plow (1 Kings xix. 19; 2 Chron. xxvi. 10.) Various means were resorted to by the Hebrews to increase the fertility of their soil. The stones were gathered and built into walls, water was brought in aqueducts from great distances, and many kinds of manure were used. The hills were terraced to the very tops, and platted with vineyards and gardens. They cultivated wheat, barley, millet, beans, and perhaps rice. (Isa. xxviii. 25.) In agricultural implements the Hebrews were not so far behind the present age as we are prone to think. Isaiah lived 700 years before Christ, yet in his day iron plows were in use, for he prophesied of the time when swords should be turned to plowshares and spears to pruning hooks. This passage shows too that they had instruments for pruning vines and trees. The animals used in plowing were cattle and donkeys. Horses were not in common use among the Hebrews. The original method of harvesting grain was to pull up by the roots, but sickles were used among the Hebrews from the time of Joshua. Harvest among them was a time of rejoicing, cheerful songs being heard in every field. Threshing was effected by flails, the feet of animals, or by drags or rollers. Vineyards and olive groves were extensively and carefully cultivated. Culinary plants and fruit-trees were among the first objects of attention. Palestine was said to flow with milk and honey. Bees were highly esteemed. Their hives were made of clay mixed with straw, but stores of honey were often found in hollow trees and fissures of the rocks. (Psalm lxxxi. 16.) One remarkable provision of the Mosaic law in regard to agriculture was the Sabbatic year. (Lev. xxv. 1–7.) Every seventh year was a year of rest, not so much to the farmer as to the farm. Nothing was sown, and nothing was reaped; the vines were not pruned; there was no gathering of fruit. The object of this regulation seems to have been to preserve the wild beasts, to let the land recover strength, and to teach the people to be provident and look out for the future. But the year was not spent in idleness. The people could hunt, fish, look after their bees and flocks, repair their buildings or furniture, manufacture cloth, or carry on commerce.

THE COW'S INTELLIGENCE.

The London *Milk Journal* remarks: That cows have memory, language, signs, and means of enjoying pleasant associations, combining for aggressive purposes, has been recognized, but scarcely to the extent the subject merits. Travelling in Italy many years ago, we visited some of the large dairy farms in the neighborhood of Ferrara. We happened to stop at a farmhouse one fine autumn afternoon when the cows were about to be milked. A herd of over one hundred was grazing homewards. The women took their positions with stool close to the house, and as the cows approached, names were called out which at first were, we thought, addressed to the milkmaids. Rosa, Florenza, Giulia, Sposa, and many names, which were noted by us at the time, were called out by the overseer, or one of the women, and we were astonished to see cow after cow cease feeding or chewing the cud and make direct, sometimes at a trot, for the woman that usually milked her. The practice we found was not confined to one farm; all the cows on each farm knew their respective names, and took up their position, just as readily as the individual members of some large herds in this country, turning from their fields to take up their places in the sheds.

NOTES FOR THE FARM.

Cooked Food for Cattle. — Experiments made by MM. Raspail and Biot, of the French Academy of Sciences, seem to have resulted in establishing the following points: —

1. That the globules constituting meal, flour, and starch, whether contained in grain or roots, are incapable of affording any nourishment as animal food until they are broken.

2. That no mechanical method of breaking or grinding is more than partially efficient.

3. That the most efficient means of breaking the globules is by heat, by fermentation, or by the chemical agency of acids or alkalies.

4. That the dextrine, which is the kernel, as it were, of each globule, is alone soluble, and therefore alone nutritive.

5. That the shells of the globules, when reduced to fragments by mechanism or heat, are not nutritive.

6. That though the fragments of these shells are not nutritive, they are indispensable to digestion, either from their distending the stomach, or from other causes not understood; it having been found by experiment that concentrated nourishment, such as sugar or essence of beef, cannot long sustain life without some mixture of coarser or less nutritive food.

7. That the economical preparation of all food containing globules or fecula, consists in perfectly breaking the shells and rendering the dextrine contained in them soluble and digestible, while the fragments of the shells are at the same time rendered more bulky, so as the more readily to fill the stomach.

Greasing Wheels. — Many a wheel is ruined by oiling too plentifully. A well made wheel will endure constant wear for ten to twenty years if care is taken to use the right kind and proper amount of oil; but if this matter is not attended to, the wheel will be used up in five or six years, or perhaps sooner. Lard should never be used on a wagon, for it will penetrate the hub, and work its way out around the tenons of the spokes, and spoil the wheel. Castor oil is a good material for use on an iron axle; just oil enough should be applied to a spindle to give it a light coating; this is better than more, for the surplus put on will work out at the ends, and be forced by the shoulders and nut into the hub around the outside of the boxes. To oil an axletree, first wipe the spindle clean with a cloth wet with turpentine, if it won't wipe without it. On a buggy or carriage, wipe and clean off the back and front ends of the hubs, and then apply a very small quantity of castor oil, or some especially prepared lubricator near the shoulders and point.

Gypsum for Leaf Blight. — A correspondent of the *Rural South-Land* recommends the use of gypsum for leaf blight in pear-trees. He says: "In July last I sprinkled it freely on the trees affected, early in the morning, when the few leaves remaining and twigs were wet with dew, and succeeded in checking the disease in some, and completely renovating the entire foliage in a very short time in all. The kinds most subject to leaf blight with me are Glout Morceau, Seckel, Flemish Beauty, Swan's Orange, and one or two others."

Mr. Greeley says that people who have owned grazing lands and stock in Texas have grown rich of late years without effort, and almost without thought.

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, AUGUST 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of ·e Journal, remittances, etc., must be addressed, Boston Journal of Chemistry, 150 Congress Street, oston, Mass."

All correspondence relating to editorial affairs ould be addressed to the Editor, 150 Congress reet, Boston.

ANALYSIS OF BOSTON STREET DUST.

WITH the view of ascertaining the composition f he ordinary dust or dirt found in the streets ur city, we have collected specimens from us points and subjected them to chemical ysis.

he following table indicates the nature of the mens and the localities from which they taken: —

	Organic matter.	Inorganic matter.	Insoluble in nitro-muriatic acid.	Sesqui-oxide of iron.
No. 1,	30.60	69.40	53.02	7.15
No. 2,	15.34	84.66	76.56	6.85
No. 3,	26.43	73.57	61.33	7.83
No. 4,	13.39	86.61	76.70	7.76
No. 5,	14.83	85.17	73.45	7.64
No. 6,	22.13	77.87	73.45	
No. 7,	18.51	81.49		
Averages,	20.19	79.82	69.08	7.44

No. 1. State Street, in front of the Post Office.
No. 2. West Boston Bridge.
No. 3. In front of 150 Congress Street.
No. 4. Corner of Congress and Purchase Streets.
No. 5. Broad and Pearl Streets.
No. 6. Beverly and Causeway Streets.
No. 7. Court Street (Nicholson pavement).

T specimens were carefully dried at 100° C. d ve off all moisture, and weighed portions hen taken and ignited until they ceased to veight. The residue was weighed and with aqua regia, and the portion insolu- acid was again weighed. The iron was tated and weighed as sesquioxide.

T organic or vegetable and animal matter omposed of various substances, such as animal excrement, hair, filaments of cot- ool, and leather, etc., the hair and excre- oming principally from horses, the cotton, wool, and leather from the clothing and boots and shoes of pedestrians. The inorganic parts contained, beside the iron and sand, considerable quantities of lime, chloride of sodium, traces of phosphoric acid and other substances. The iron came from the shoes of horses, the tires of wheels, and the nails in the heels of boots and shoes.

Some curious and instructive facts are learned from this investigation, the most prominent of which are, first, the low value of street sweepings as manure. Estimating pure horse excrement at eight dollars the cord, or two dollars the ton, four tons to the cord, the value of street sweepings, counting all the volatile matter as equivalent to horse manure, would not go above *forty cents a ton,* when perfectly dry. The dirt of streets, as collected in most localities, would probably go considerably below this in manurial value. We learn upon inquiry, both here and in New York, that farmers and gardeners have found that street sweepings exert but little fertilizing influence upon crops. There is a vast difference in value between the sewerage or liquid waste of a great city, and the dust above ground.

Second. It is curious to observe the uniformity with which the metal iron prevails in the different streets. It falls off a little in specimen No 2, taken from West Boston Bridge. The abrading, disintegrating influence of paving stones upon iron is very clearly shown in the investigation. The dust taken from the Nicholson pavement in Court Street contained more rocky or inorganic material than that from some of the paved streets of the city. Doubtless this had been removed from contiguous streets by wind, and in the form of mud, upon wheels and horses' hoofs.

The bearings of the investigations upon public hygiene are not unimportant. We learn regarding the nature of the impalpable powder which is hurled in our faces and into our mouths on windy days. The filthy excrementitious matter, associated with filaments of animal and vegetable waste, and minerals, and mineral salts, constitute a compound neither healthy nor pleasant to inhale into the lungs or take into the stomach. Contact with this street dust is, however, to a great degree unavoidable in a city, and, do what we may, we must continue to swallow it so long as business or pleasure inclines us to a city life.

POROUS CONE FILTERS.

IN Bunsen's paper on filtration by means of the water-pump, he mentions the use of cylinders of glass closed at their lower ends by plates of porous earthen-ware. Mr. C. E. Munroe, late of the Lawrence Scientific School, has with the aid of Messrs. A. W. and H. C. Robertson of Chelsea, Mass., improved upon this suggestion. At his instance they have experimented upon and at last succeeded in making cones of porous earthenware that answer every purpose of the paper filter. These cones are not sufficiently porous to admit of being used without the Bunsen pump, but with it they answer admirably. After being boiled with strong hydrochloric acid, washed with water, and dried, their weight remains perfectly constant, even after repeated filtrations and dryings. This property will be appreciated by those who have used paper filters for such purposes as the estimation of arsenic and antimony, and such other substances as require the use of filters dried at 100° C.

In order to use them they are placed inside of an ordinary glass funnel, a narrow section of seamless rubber tube having been first stretched over the mouth of the funnel; this forms a perfectly air-tight joint. The funnel is then connected with the Bunsen pump in the ordinary manner.

Mr. Munroe, in his very interesting paper on this subject in the *American Journal of Science and Arts,* for May, gives a number of analyses made by the use of these cones, which are remarkable for their accuracy. He also suggests their use in manufacturing operations, for draining crystals and filtering corrosive liquids.

THE BIG TREES OF CALIFORNIA.

REV. DR. SEELEY of Haverhill, Mass., who has recently visited California, sends us the following observations regarding the big trees in Calaveras County: —

I venture to send you a few words concerning the giant "Redwoods" of California. These trees are unlike the common red cedars of the Eastern States in the texture of the bark, which is thick and spongy; in the color of the wood, which is a brownish red throughout; in the formation of the leaves, which, though round and scaly, are much larger in proportion, and do not grow in triplets; and in the character of the fruit or seeds; for while the *Juniperus Virginiana* is bacciferous, the Redwood is coniferous.

The name "Arbor Vitæ" is sometimes given to the "Redwood," and I noticed a sign attached to one of the monsters in Calaveras County, containing the words "Arbor Vitæ Queen." It is a misnomer, however. For while the Sequoia is like the *Cupressus thyoides occidentalis* in being coniferous, and in the *color* of its foliage, the latter is dissimilar in other respects, — being round instead of flat, and not so ramose, having none of that peculiar appearance which, I suppose, gives to the white cedar the name of *Arbor vitæ.*

The "Redwood" also differs from the Cedar of Lebanon in the formation of both leaves and branches, and in the general shape and growth of the tree. Those specimens which I have seen of the latter throw out numerous, strong, horizontal branches, which from quite low down on the trunk to the top of the tree, form a succession of broad, flat, table-like surfaces or terraces. The Redwoods, on the contrary, rise from the ground somewhat like the cypress of the Southern States, pyramidally, and tower frequently more than a hundred feet without a limb; while the tops are smaller and more compact than those of most other trees in proportion to their size.

While the Redwoods thus form a species by themselves, which has been named the "*Sequoia gigantea sempervirens,*" they are much more widely removed from all others by their enormous proportions in height and in diameter of trunk. Several groves of the species have been discovered in California, as at Mariposa, Fresno, "the Calaveras grove," another six or eight miles distant, and still others. Indeed the wood is used by the Californians in house-building, very much as the white pine is with us at the East. Of these groves, that at Mariposa contains the greatest number of trees, and that mentioned above as near the Calaveras grove, presents specimens, the trunks of which are larger in diameter than any others yet discovered; but for both height and size those of the latter stand preëminent.

This grove is about seventy-five miles east, or

northeast from Stockton, in a valley on the western slope of the Sierra Nevadas, and so situated that while it receives the full benefit of those climatic influences which are most favorable to vegetable growth, it is greatly sheltered from strong winds. When I was there, in the latter part of April last, the temperature and state of the atmosphere were those of a well regulated hot-house.

This grove contains nearly one hundred of the large Sequoias. Among them are ten whose trunks are each equal to thirty feet in diameter (near the ground), and seventy that are between fifteen and thirty feet in diameter. Many are over three hundred feet in height. Several have fallen. Of these, "*The Miner's Cabin*" * — blown down in 1860 — was three hundred and nineteen feet in length, and twenty-one and a half feet in diameter: "*Hercules*" — blown down in 1862 — was three hundred and twenty-five feet long, and at the upturned base, ninety-seven feet in circumference: while "*The Father of the Forest*" — also down — is estimated by Hittel to have been *forty feet* in diameter, and *four hundred and fifty* feet in height, or twice as high as Bunker Hill Monument.

I took a fancy to test the size of this tree at one hundred and fifty-four feet distant from its base; and by my rude measurement it proved to be more than eleven and a half feet without the bark.

One of these monsters was felled in 1853, five men being engaged twenty-five days, and achieving the feat by the use of large pump augers. The diameter of the stump measured nearly twenty-four feet across without the *bark*, which would have added two and a half or three feet to the measurement. The end of a stick cut from this tree contains twenty-four "rings" to the inch. If the stick had been taken from the section next the stump, this would give from the centre to the outer edge, next the bark (*i. e.* one half the total diameter) 288 $\times$ 12 = 3,456 "rings" in the tree; and according to the ordinary method of reckoning, this tree would be three thousand, four hundred and fifty-six years old.

But since the stick may have been taken from an upper section of the trunk, where the dimensions were less and the distances between the rings were less, this method of calculating the age of the tree is not reliable. But even if the actual count of rings on the stump were three thousand four hundred and fifty six, *it is doubtful whether the age of the tree is greater than half that number of years.*

My reasons for this doubt are the following: These trees grow in a region where other species of trees are very thrifty, — the Sugar Pines and Yellow Pines in the Calaveras grove being, in many instances, two hundred and fifty feet high, and from eight to ten feet in diameter. The Redwoods themselves evidently are fast growers; but unlike thrifty trees with us, these giants exhibit a closeness of the rings which does not betoken thrift. I suspect, therefore, that each tree makes two growths in a year.

This suspicion may not appear entirely absurd when we reflect on the peculiarity of the seasons in California. The spring rains fall in March and April, after which there is no more moisture until October, when the autumnal rains commence; and by the early part of December (if I am rightly informed), the winter, with frosts and deep snows, takes possession of the mountain districts, where the colossal Sequoias flourish, not to withdraw its reign until April. Consequently these trees have that short season which intervenes between the October rains and the commencement of winter for an *autumnal* growth, and another season between the disappearance of winter and the time when they feel the summer drought for a *spring* growth. For while they may find abundant moisture long after plains, hills, and mountain sides equally exhibit their brown sandy hue, and the lesser forms of vegetation are completely parched, yet since the roots of these cedars seem to run rather horizontally than deep, they also must finally feel the drought, and cease to make any growth till autumn.

The correctness or incorrectness of this supposition can be demonstrated by cutting down a tree in one of the "groves," the exact age of which is known, and comparing the age with the number of its rings. Until this shall be done, I must regard the supposition as sufficiently plausible to warrant us in reckoning the age of the Sequoias at only half that which has commonly been attributed to individuals of the species.

* Many of the large trees bear the names of distinguished individuals, *e. g.*, of George Washington, Andrew Jackson, Daniel Webster, Abraham Lincoln, Generals Grant, Sherman, McPherson, and Sheridan; of the poets, Longfellow and Bryant; of the savants, Humboldt, John Lindly, Professor Asa Gray, and Dr. John Torrey.

ANALYSIS OF A CLAM SHELL.

From whence does the clam obtain the lime needed to form its shell? This is an interesting question, and one we have often asked ourself when observing the bivalves in salt and fresh water basins. As considerable lime is found in sea-water the question is not so puzzling in its connection with the clams, oysters, etc., of the ocean, as with those of our fresh water lakes.

In order to obtain light upon the matter we took from Lake Kenosa, upon which our farm borders, a *Unio* or blue shelled muscle, and separating the shell submitted it to chemical analysis. The amount of lime contained in it, in the form of carbonate, was 14.75 grams, with a trace of phosphate. We also subjected the water of the lake to analysis, and found that each 1,000 grams of the water held 0.0268 grams of lime, principally in the form of carbonate. These results show, if the clam obtains its lime wholly from the water which passes through the organs of assimilation, that 532 litres would be required, or in other words more than *four barrels* of the water of the lake were needed to supply the lime which the clam derived from some source. We have thus far investigated the matter strictly from the chemist's stand-point, and having but little knowledge of the nature of the food required by the clam, or its habits, etc., we would ask some of our naturalists to enlighten us upon these points.

THE LAWRENCE SCIENTIFIC SCHOOL.

At the close of the term ending June 25, 1871, the Chemical Department of the Lawrence Scientific School ceased to exist.

This was the oldest school of Chemistry in this country, and its many graduates will hear with sorrow the news of its discontinuance. The number of students has never been very large, not averaging more than ten or twelve for the last five years; the aim of the school being rather to give thorough instruction to a few students, than general instruction to a large number. During the twenty-three years of its existence it has been under the charge of but two professors, Prof. Horsford and Dr. Gibbs, although Mr. C. W. Eliot was temporarily in charge of it between the administrations of the two gentlemen above named.

Dr. Gibbs still continues at Cambridge as Rumford Professor, and has been assigned to the department of Physics. He will lecture during the coming year on the subjects of Light and Heat.

ANOTHER FATAL CASE OF ZINC POISONING.

The wife of Col. Horton, of Attleboro, Mass., recently died from the effects of the salts of zinc, contained in water used for culinary purposes. The case is described by the attending physician, J. Bronson, M. D., of Attleboro, who is a gentleman of high standing in the profession, a member of and, we believe, one of the Councillors of the Massachusetts Medical Society. Dr. B. says: "That Mrs. Horton was poisoned by water drawn through galvanized iron pipes is, I believe, fully demonstrated by physical evidence. The salts of zinc were doubtless eliminated before death, but they primarily induced the disease of which she died." This adds one more to the list of those who have fallen victims to the insidious influence of a metallic poison introduced into the system through the medium of bad water pipes.

A heavy responsibility rests upon those who are advocating the continued use of the galvanized pipes for water conduction. We have discharged our duty in calling attention to the great evil, and warning our readers against it.

LIEBIG ON GERMANY AND FRANCE.

At a recent meeting of the Royal Bavarian Academy of Sciences, Baron Liebig spoke thus of the future relations between Germany and France: "The Academy seizes this moment to declare openly that there exists no national hatred between the German and Latin races. The peculiar character of the Germans, their knowledge of languages, their acquaintance with foreign people, the past and present state of their civilization, all tend to make them just towards other peoples, even at the risk of often becoming unjust towards their own, and thus it is that we recognize how much we owe to the great philosophers, mathematicians, and naturalists of France, who have been in so many departments our masters and our models. I went forty-eight years ago to Paris to study chemistry; a fortuitous circumstance drew upon me the attention of Alexander Von Humboldt, and a single word of recommendation from him caused M. Gay Lussac, one of the greatest chemists and physicists of his time, to make to me, a young man of twenty, the proposal to continue and finish with his coöperation an analysis which I had commenced. He introduced me as a pupil into his laboratory; my career was fixed after this. Never shall I forget the kindness with which Arago and Thenard received the German student, and how many compatriots, physicians, and others, could I not name, who, like myself, gratefully remember the efficacious assistance accorded to them by French men of science in finishing their studies. An ardent sympathy for all that is noble and grand, as well as a disinterested hospitality, form some of the most noble traits of the French character."

EDITORIAL NOTES.

Editorial Excursion. — We were prevented by a press of duties from joining the excursion of the editors and publishers of Massachusetts, New Hampshire, Maine, etc., in July. It would have been a great pleasure to have met our editorial friends, with whom we passed some pleasant hours at Lakeside last autumn. The excursion was a complete success, and full of enjoyment.

The Hay Crop. — The complaint comes from all sections of New England and from New York that the hay crop this season is a partial failure. It will not probably prove to be two thirds as large as usual, which is a serious matter to farmers. Our hay crop at Lakeside is larger than ever before from the same area of land. Our reclaimed meadows gave immense crops, fully three tons of timothy to the acre; and our uplands, notwithstanding the drought, supplied heavy swarths to the mower. It is certain, high cultivation renders lands, in unfavorable seasons even, productive. The influences of drought, cold, wet, etc., upon properly tilled fields is much less than upon those impoverished or n-

ected. The farmer cannot afford to imperfectly ultivate his tillage lands, as any disturbing weather nfluences cut short his moderate or scanty crops, nd destroy his courage and his hopes.

Some Ugly Bugs. — A friend in Illinois has ent us some living specimens of the Colorado Potato Bug, which is now ravaging the potato fields of our Western cultivators. We have placed the insects n a glass bottle, and guard them against escape ith as much vigilance as the warden of a penitenary guards his prisoners. It is hoped that no one's uriosity will lead to the introduction of the detestble bugs into the Eastern States, for they are comg upon their own account fully fast enough. The otato bug has a wonderful tenacity of life, and but w of the ordinary insect poisons affect him. He ill burrow through a heap of carbolate of lime as woodchuck does through a clover patch, and a satrated solution of the agent appears to afford him agreeable bath. Arsenic and arsenical compounds heck him when fairly brought in contact with em, and so do the salts of mercury. It should be id that carbolate of lime is evidently very offenve to the insects, but it does not destroy them. Vhen placed on glass inclosed in a ring of the rbolate, they are greatly disturbed, and will not aproach it at any point. It may be that it will drive em from a field, and some experiments with it are orth trying. The arseniate of copper, or what is nown in commerce as Paris Green, has been found effective antidote to the bug, and inquiries are nstantly made of us regarding the safety of the ent. It is indeed a vile poison, and if any subtute can be discovered it should be discarded. great has been the demand for it of late that ere is great activity manifested in its manufacture. ut it is very destructive to the health and lives en of workmen, and it is difficult to find men who ll aid in its production. Arsenic and copper are o unpleasant minerals to be associated, and it is estionable whether it should be used as a paint. regards potato fields we incline to think that no ury can result to the crop where it is used. here is danger in handling it, but if our own fields re being devoured, we should use it if we could d no substitute.

The destruction of the potato crop is an evil of pendous magnitude, and nothing must be left unne to avert it. It cannot be a great while before depredator will reach our borders, as from last ounts he was advancing East by forced marches. insects destructive to vegetation increase in num and in new varieties as rapidly during the next rter of a century as they have during the last, shall only be able to raise a few fruits, grains, l roots, and these will have to be cultivated under ss.

Bradford Academy. — We have never atded a school exhibition of so pleasing and satisory a character as that at Bradford in July last. is is a young ladies' school, and is made up of ils from all parts of the country, the number at sent being about one hundred and twenty. The rcises were of a high order, and everything was racterized by good sense, and a refined and al tone, which gave great pleasure to the parents he young ladies and the numerous friends of the itution. In saying that we regard Bradford demy as a model school, we repeat what we have re said in the Journal. The elegant, spacious, venient building standing as it does in one of most charming localities in New England, gives dvantages hardly possessed by any other. The rd of Trustees, embracing such men as Dr. us Anderson, E. S. Tobey, Ezra Farnsworth, ner Kingman, S. D. Warren and others of this , Dr. Cogswell of Bradford, Dr. Durfee of Fall er, etc., is a guarantee that its interests will be cared for, and that parents can safely place their daughters in such charge. Miss Abby Johnson, the principal is now in Europe, but will reach home in season to take charge of the school in September.

The Sandwich Islands. — One of our subscribers at Honolulu writes as follows, under date of June 8, 1871. "Please find enclosed two dollars, for which I wish to renew my subscription for *two years in advance*. At this great distance from the United States and from opportunities for literary and scientific improvement, there is no periodical which better meets our needs, or is more prized than the Boston Journal of Chemistry." Similar letters come to us by every mail from all parts of our own country and from foreign lands, and we have to thank our friends for their kind partiality and words of commendation.

Be Just. — We are pleased to have our articles copied by exchange journals, when due credit is given, but we dislike the dishonesty of some who appropriate our articles as their own, or who forget to give credit when copying them. We can hardly take up a paper without noticing instances of this character. An article of ours upon "Dangerous Burning Fluids" is now going the rounds of the press credited to the *Indiana Journal of Medicine*. Every word of the article is taken from the Journal, and we learn that it was copied into the *Indiana Journal* and no credit given. The last number of the *Druggists' Circular* copies it, giving credit to the *Indiana Journal of Medicine*. We are sorry to have to call attention to this matter.

Scientific Expedition. — Professor Agassiz, who will be accompanied by Ex-President Hill of Harvard University and Mr. Pourtalis of the Coast Survey, proposes to start in the autumn on a trip around Cape Horn. They will sail in a vessel that is being built for the service of the Coast Survey on the Pacific Coast. Mr. Nathaniel Thayer, with his accustomed liberality, has offered to defray the scientific expenses of the party. They expect to make dredgings at various points, and to make a full examination of the Straits of Magellan, paying particular attention to marks of glacial action.

ATOMS.

A French inventor proposes a composition of glue, honey, water, and glycerine as a vehicle for the colors used in printing-ink, instead of the ordinary oil or varnish. — It is stated that the only establishment for the manufacture of plate glass in this country is at Lenox, Mass. — Last year we imported more than nineteen million pounds of jute, at a cost of three millions of dollars, though the plant could readily be raised at the South, where it is used extensively for bale-cloth. — Oiling the points of nails will enable one to drive them into hard wood more easily. — Bees are now sent by mail, confined in a square block of wood, with auger holes bored in it and covered with wire gauze. — French gold leaf does not exceed the 480,000th of an inch in thickness. — Dr. Luther, in the *Medical Press and Circular*, states that he reduced strangulated hernia by causing to be applied, over the part, extract of belladonna rubbed up with glycerine. — The leather interest in this country amounts to more than two hundred millions of dollars annually, exceeding every other industrial pursuit except agriculture. — An inch of rain falling upon an acre of ground supplies it with about a hundred tons of water. — The Commissioner of Internal Revenue has decided that the dust produced in the tobacco manufactories, which cannot be made into snuff or put into any other shape absorbable by the human system, may be disposed of to farmers for fertilizing purposes. — In Montana farmers have been unable to plant all their grain on account of the scarcity of help. — It has been calculated that the fences of the United States have cost an amount equal to the present national debt, and that the annual repairs of the same absorb some two hundred millions of dollars. — Speaking of fences, the Chicago and Alton Railroad has about one hundred and fifty miles of Osage orange hedge along its line, and is steadily adding more. — Professor Boettger of Germany tests the genuineness of silver plating on metals in the following manner: the metallic surface is carefully cleaned, and a drop of cold saturated solution of bichromate of potash in nitric acid is placed upon it, and immediately washed off with cold water; if the surface is silver, a blood-red spot of chromate of silver is formed, whereas on German silver or Britannia metal the stain is brown or black. — Mr. Whitehead, the inventor of the "fish torpedo," has sold his device to the English Government for seventy-five thousand dollars. — Peter the Great was born on the 9th of June, 1672, and an industrial exhibition is to be held next year at Moscow, in honor of the bicentennial anniversary of the event; and among the articles exhibited will be the famous boat made by the Emperor, which is still in a good state of preservation at St. Petersburg. — Europe has 450,000 miles of telegraph wire, and 13,000 stations; America, 180,000 miles of wire, and 6,000 stations; India, 14,000 miles, and 200 stations; Australia, 10,000 miles, and 270 stations; and the extension throughout the world is at the rate of 100,000 miles of wire per annum; to say nothing of 30,000 miles of submarine cable now in successful operation. — The Pennsylvania State Medical Society has rescinded its resolution denying recognition of female physicians, or of medical men who consult with women or teach female students. — Photography is used in the United States Pension Bureau to detect those who attempt to get a double share of pension money. — In England, the extent of land covered with trees has increased forty thousand acres in the last thirty-five years, and tree planting is encouraged among landholders by liberal premiums. — In Italy, seaside hospitals for poor scrofulous children have been established by charitable persons; and of 290 children treated last year at these establishments, 102 were cured, and 79 materially benefitted. — After more than a year of careful investigation, a Government Commission in British India has decided on a gauge of three feet and three inches for the railways there; which extends the narrow-gauge system to nearly ten thousand miles of road. — Chignons and kindred vanities of the hairdresser's art have recently been made of spun glass, which has the advantage of being cleaner than any of the materials hitherto used. — A party from the Massachusetts Institute of Technology, headed by President Runkle, and consisting of Professors Ordway, Rockwell, Richards, and Hyatt, with fourteen students of mining and metallurgy, has started for Colorado and the adjacent regions, where they will be occupied in scientific research and practical work until about the first of October. — Massachusetts has one mile of railway for every five square miles of her area. — Dr. W. H. Searles recommends poultices of tea-leaves, moistened with hot water, as preferable to all other remedies in the first stage of burns and scalds.

ANSWERS TO CORRESPONDENTS.

Druggist, Portland, Me. Cundurango is a plant or tree growing in the province of Loja, Ecuador, specimens of which were sent to Washington for analysis and trial as a medicinal agent. A great noise has been made regarding it by correspondents of newspapers, which we suppose is a new way of advertising a nostrum which it is in contemplation "to put on the track" as a sovereign cure-all for *cancer* and other malignant affections. Dr. Antisell, of Washington, has subjected the plant to chemical examination, and finds it to present no unusual characteristics. He is inclined to class it among the "aromatic bitters," and states that what little medicinal virtue it has resides in the bark. Mr. Speaker Colfax is giving the thing a notoriety by alleging that it has "cured his mother-in-law of

cancer." This sounds very absurd to intelligent physicians, who know that cancer is not a local trouble, but a disease affecting the system generally, and of a most malignant nature. We advise our readers not to invest very largely in *cundurango*, or any other nostrum claiming to have extraordinary virtues.

S. T. V., HARTFORD, CT. If your zinc-covered iron pipe has been in the well for three years, as you state, it may as well remain, as undoubtedly the zinc has entirely disappeared, and you have iron surfaces in contact with the water. The zinc coating is usually removed from iron pipes, where water is passing through, in from four to six months, and it is then like ordinary iron pipe, and ceases to be dangerous. In some cases, we have known patches of the zinc to remain upon the iron for two or three years, but such instances are rare.

L. M., UTICA, N. Y. A razor is kept in good condition by stropping it after it is used. We have one which has been in constant use for fifteen years, and it has never been in contact with a hone or stone of any kind; it is always passed over the strop before it is put away.

J. M. W., WATERBURY, CT. You can hardly afford to use potash at ten cents a pound for fertilizing purposes. Ashes, unleached, are cheaper at forty cents a bushel.

W. H. R., OLANTHE, KANSAS. Water in freezing rejects most impurities. The ice collected from a mud puddle, as you have doubtless observed, is free from dirt or filth. In collecting ice for domestic uses, it is preferable to obtain it from clear ponds or springs, if they are accessible.

H. C., PROVIDENCE, R. I. We have found ashes, bone dust, and Peruvian guano to be excellent fertilizers for strawberries. Good, well seasoned barn-yard manure is used by many of the successful cultivators of the berry in the vicinity of Boston.

M. N. O., BOSTON. We quite agree with you, that unless some varieties of strawberries other than the Wilson's Albany are cultivated for market purposes, the sales of the berry will be small in the future, for it is quite too acid and flavorless for most consumers. It is a good berry to keep and to transport, and it is productive, but for table uses it is almost unendurable.

P. N. S., PROVIDENCE, R. I. It is doubtful if you can destroy the canker worm by placing saltpetre around your trees. It is an expensive salt, and it has not been proved that it will destroy the grub or worm when brought in contact with them.

J. N. S., ST. ALBANS, VT. If you sprinkle carbolate of lime in the rear of your horse stalls, it will serve to keep away flies, and render your stable sweet, and healthy for the horses.

C. P., BOSTON, MASS. The water cans made for holding ice water, and used in hotels, public rooms, and sometimes in private dwellings, are filthy and unsafe vessels, and should be abandoned. We refer to those made of zinc, painted on the outside, with a sheet zinc lining inside. They have a metallic faucet, and as found in the market are labelled in paint "Ice-water." There is often a metallic taste conferred upon the water by these cans, which is distinctly observable. No more dangerous or uncleanly vessel for holding ice-water has ever been devised, and we advise thirsty ones to give them a wide berth when in pursuit of cooling drinks.

Medicine.

ABORTIVE TREATMENT OF FELONS.

ONE of the most painful afflictions from which any one can suffer is a felon or whitlow; and as I have had great success in the treatment of these distressing forms of disease, I will, with your permission, give your readers an idea of the method adopted.

It is well known by physicians that pressure causes absorption, and in view of this fact, ten years ago I adopted the plan of applying several coatings of collodion over the finger or place where the pain is felt on its first appearance. On drying, the collodion contracts with an even pressure, and if kept on for twenty-four hours the symptoms will usually entirely disappear.

Of late I have been in the habit of soaking the affected part in quite a strong solution of carbolic acid for a few minutes before applying the collodion.

The pain for some hours will be quite severe, but an anodyne will afford relief. J. H. S.

AUGUSTA, ME.

REMARKS. — We have to thank our correspondent for suggesting a remedy for a distressing affection. The sufferings experienced from whitlow are very great, and if the simple plan of treatment described above proves effective he deserves the thanks not only of the medical profession but of every one. Our correspondent is a medical gentleman of high respectability.

TYNDALL ON DUST AND SMOKE.

WE find in our English exchanges, reports of a lecture delivered by Prof. Tyndall, at the Royal Institution, on the 9th of June. The theme was "Dust and Smoke," and the discourse may be viewed as supplementary to the famous one on "Dust and Disease," delivered January 21, 1870. It is quite as interesting as its predecessor, and will probably attract quite as much attention.

Having shown some introductory experiments illustrating the polarization of light by floating dust, and by smoke of various degrees of density, the speaker proceeded to show the practical bearing of these investigations. After admitting that in themselves the curious phenomena he had been showing are "worth nothing," that "they will not enable us to add to our stock of food or drink or clothes or jewelry," he went on as follows: —

But though thus shorn of all usefulness in themselves, they may, by leading the mind into places which it would not otherwise have entered, become the antecedents of practical consequences. In looking, for example, at this illuminated dust, we may ask ourselves what it is. How does it act, not upon a beam of light, but upon our own lungs and stomachs? The question at once assumes a practical character. We find on examination that this dust is organic matter — in part living, in part dead. There are among it particles of ground straw, torn rags, smoke, the pollen of flowers, the spores of fungi, and the germs of other things. But what have they to do with the animal economy? Let me give you an illustration to which my attention has been lately drawn by Mr. George Henry Lewes, who writes to me thus: —

"I wish to direct your attention to the experiments of Von Recklingshausen, should you happen not to know them. They are striking confirmations of what you say of dust and disease. Last spring, when I was at his laboratory in Würzburg, I examined with him blood that had been three weeks, a month, and five weeks, out of the body, preserved in little porcelain cups under glass shades. This blood was living and growing. Not only were the Amœba-like movements of the white corpuscles present, but there were abundant evidences of the growth and development of the corpuscles. I also saw a frog's heart still pulsating which had been removed from the body (I forget how many days, but certainly more than a week). There were other examples of the same persistent vitality or absence of putrefaction. Von Recklingshausen did not attribute this to the absence of germs — germs were not mentioned by him; but when I asked him how he represented the thing to himself, he said the whole mystery of his operation consisted in keeping the blood *free from dirt.* The instruments employed were raised to a red heat just before use, the thread was silver thread and was similarly treated, and the porcelain cups, though not kept free from air, were kept free from currents. He said he often had failures, and these he attributed to particles of dust having escaped his precautions."

Prof. Lister, who has founded upon the removal or destruction of this "dirt" great and numerous improvements in surgery, tells us of the effect of its introduction into the blood of wounds. He informs us what would happen with the extracted blood should the dust get at it. The blood would putrefy and become fetid, and when you examine more closely what putrefaction means, you find the putrefying substance swarming with organic life, the germs of which have been derived from the air.

Another note which I received a day or two ago has a bearing particularly significant at the present time upon this question of dust and dirt, and the wisdom of avoiding them. The note is from Mr. Ellis, of Sloane Street, to whom I owe a debt of gratitude for advice given to me when sorely wounded in the Alps. "I do not know," writes Mr. Ellis, "whether you happened to see the letters, of which I enclose you a reprint, when they appeared in the *Times.* But I want to tell you this in reference to my method of vaccination here described, because it has, as I think, a relation to the subject of the intake of organic particles from without into the body. Vaccination in the common way is done by scraping off the epidermis, and thrusting into the punctures made by the lancet the vaccine virus. By the method I use (and have used for more than twenty years) the epidermis is lifted by the effusion of serum from below, a result of the irritant cantharidine applied to the skin. The little bleb thus formed is pricked, a drop of fluid let out, and then a fine vaccine point is put into this spot, and after a minute of delay it is withdrawn. The epidermis falls back on the skin and quite excludes the air, and not the air only, but what the air contains.

"Now mark the result — out of hundreds of cases of re-vaccination which I have performed, I have never had a single case of blood-poisoning or of abscess. By the ordinary way the occurrence of secondary abscess is by no means uncommon, and that of pyæmia is occasionally observed. I attribute the comparative safety of my method entirely, first, to the exclusion of the air and what it contains; and secondly, to the greater size of the apertures for the inlet of mischief made by the lancet."

I bring these facts forward that they may be sifted and challenged if they be not correct. If they are correct it is needless to dwell upon their importance, nor is it necessary to say that if Mr. Ellis had resigned himself wholly to the guidance of the germ theory he could not have acted more in accordance with the requirements of that theory than he has actually done. It is what the air contains that does the mischief in vaccination. Mr. Ellis's results fall in with the general theory of putrefaction propounded by Schwann, and developed in this country with such striking success by Prof. Lister. They point, if true, to a cause distinct from bad lymph for the failures and occasional mischief incidental to vaccination; and if followed up they may be the means of leaving the irrational opposition to vaccination no ground to stand upon, by removing even the isolated cases of injury on which the opponents of the practice rely.

It will be recollected that Tyndall was severely criticized in some quarters for the introduction of the germ theory of disease into his former lecture. He now declares that these criticisms have not led him to regret having spoken as he did; and he thus concisely and forcibly states "the grounds on which the supporters of that theory rely:" —

From their respective viruses you may plant typhoid fever, scarlatina, or small-pox. What is the crop that arises from this husbandry? As surely as a thistle rises from a thistle seed, as surely as the fig comes from the fig, the grape from the grape, the thorn from the thorn, so surely does the typhoid virus increase and multiply into typhoid fever, the scarlatina virus into scarlatina, the small-pox virus into small-pox. What is the conclusion that suggests itself here? It is this: That the thing which we vaguely call a virus is to all intents and purposes a *seed:* that in the whole range of chemical science you cannot point to an action which illustrates this perfect parallelism with the phenomena of life — this demonstrated power

of self-multiplication and reproduction. There is, herefore, no hypothesis to account for the phenomena but that which refers them to parasitic life.

In this connection the lecturer quotes a letter addressed to him by Dr. Wm. Budd, well known n England for his activity in the cause of sanitary reform. After remarking that he is fully atisfied that "the specific cause of contagious evers must be living organisms," Dr. Budd dds: —

"It is impossible, in fact, to make any statement earing upon the essence or distinctive characters f these fevers, without using terms which are of ll others *the most distinctive of life.* Take up the ritings of the most violent opponent of the germ heory, and, ten to one, you will find them full of ich terms as 'propagation,' 'self-propagation,' 'reroduction,' 'self-multiplication,' and so on. Try s he may — if he has anything to say of those iseases which is characteristic of them — he canot evade the use of these terms, or the exact quivalents to them. While perfectly applicable living things, these terms express qualities which e not only inapplicable to common chemical gents, but as far as I can see actually inconceivble of them."

The remainder of the lecture is devoted to the ibject of *respirators,* which had been recomended in the former lecture as a safeguard gainst miasmata and infectious diseases. There n be little doubt of their value for this purose; but, however that may be, they are cerinly useful in many cases which do not involve e "germ theory" at all. They may be emoyed by stone-cutters, to exclude from their ngs the dust which has been shown by Dr. reenhow to be deposited there as a stony grit; colliers, as a preventive of the "black lung" used by coal dust; by printers, as a protection ainst the dust arising from the sorting of type, hich Professor Tyndall says "is very destruce to health." These are but a few out of many ides in which life is shortened by the introection of matter into the lungs that might be sily kept out of them. By the use of cottonol respirators the workmen at these trades uld be enabled to breathe "air more free from spended matters than that of the open street." e following case, mentioned by the lecturer, is urious one: —

Over a year ago I was written to by a Lancare seedsman, who stated that during the seed son of each year his men suffered horribly from tation and fever, so that many of them left his vice. He asked me could I help him, and I gave 1 my advice. At the conclusion of the season s year he wrote to me that he had simply folded ittle cotton-wool in muslin, and tied it in front of mouth; that he had passed through the season comfort and without a single complaint from one is men.

It has been objected to these respirators that cotton becomes wet and heated by the air athed out; but this difficulty has been obvid in a form of the instrument invented by a . Carrick, of Glasgow. Two valves are so anged that the air, inhaled through the cot, is exhaled without passing through it.

Professor Tyndall himself, after many experiuts, has succeeded in devising another form respirator which is specially designed for fire. By its aid they can remain for hours in densest and most pitchy smoke, without the st discomfort. The essential part of this restor is thus described: —

Mr. Carrick's arrangement of two valves, the one for inhalation, the other for exhalation, is preserved. But the portion which holds the filtering and absorbent substances is prolonged to a depth of four or five inches. On a partition of wire gauze at the bottom of the space which fronts the mouth, is placed a layer of cotton-wool, moistened with glycerine; then a thin layer of dry wool; then a layer of charcoal fragments; a second thin layer of dry cotton-wool, succeeded by a layer of fragments of caustic lime. The succession of the layers may be changed without injury to the action. A wire-gauze cover keeps the substances from falling out of the respirator. In the densest smoke that we have hitherto employed, the layer of lime has not been found necessary; in a flaming building, indeed, the mixture of air with the smoke never permits the carbonic acid to become so dense as to be irrespirable. But in a place where the gas is present in undue quantity, the fragments of lime would materially mitigate its action.

This respirator was thoroughly tested by Professor Tyndall and his assistants, and also by Captain Shaw, the chief officer of the Metropolitan Fire Brigade of London. A small room was filled with smoke so dense and pungent that a single direct inhalation of it was unendurable, and in this room the experimenters remained for half an hour or more without the slightest inconvenience, and they believed they could have remained there all day.

The conclusion of the lecture was as follows:

"Thus have we been led from the actinic decomposition of vapors, through the tails of comets and the blue of the sky, to the dust of London; from the germ theory of disease down to this fireman's respirator. Instead of this trivial example, I could, if time permitted, point to others of a more considerable kind in illustration of the tendency of pure science to lead to practical applications. Indeed those very wanderings of the scientific intellect which at first sight appear utterly unpractical, become in the end the wellsprings of practice. Yet I believe there is a philosophy embraced by some of our more ardent thinkers (who I fear on many points commit the well-intentioned, but fatal mistake of putting their own hopeful fancies in the place of fact) that would abolish these wanderings of the intellect, and fix it from the outset on practical ends alone. I do not think that that philosophy will ever make itself good in the world, or that any freedom-loving student of nature could or would tolerate its chains."

COD LIVER OIL IN ECZEMA.

A HIGHLY respectable gentleman residing in Charlestown, Mass., writes as follows regarding the use of Cod Liver Oil in this affection: —

I have reason to be deeply grateful for the valuable information with which your journal abounds. My child, 22 months old, has been afflicted with eczema for 19 months. During that time it has received the attention of several skilful physicians, all of whom have pronounced it an uncommonly obstinate case. At the time I read the article on "Cod Liver Oil" in the May number of your journal, the child appeared worse than at any previous time. Its entire body was covered with the eruption. I suggested the use of the oil, dropping other treatment, and the child is now nearly well. Scarcely a trace of the disease remains. This has been accomplished during dentition.

ALCOHOL AND EYESIGHT. — M. Galezowski recently, at a sitting of the Paris Academy of Medicine, pointed out how many cases he had seen among the poorer classes of loss of vision from the chronic use of alcohol. The form of loss of sight is that of amblyopia.

MEDICAL MEMORANDA.

TREATMENT OF CROUP BY INHALATION OF GLYCERINE. — Dr. Stehverger recommends the treatment of croup by the inhalation of pure glycerine through any form of atomizing apparatus. He was led to try this remedy for croup from observing its good effects in case of hoarseness and loss of voice. After application the cough becomes more free and moist, and children are enabled to sleep almost immediately upon being relieved by the inhalation. It is, however, believed to be of importance to make use of the remedy early and frequently, as, if delayed, it may have no effect whatever. If the glycerine be pure, it may be used unmixed; if not, it should be diluted with a little water. The inhalations are repeated, according to the necessity of the case, at intervals of from half an hour to an hour and a half, and for about fifteen minutes at a time. The effect of the glycerine in this case is supposed to be due to the fact that the secretions of the mucous membrane are thereby increased, and tumefaction reduced.

CHLOROFORM IN ROBBERY. — "The availability of chloroform and similar agents in facilitating robbery," was the subject of the lecture delivered before the Medico-Legal Society, of New York, at a recent meeting. Dr. Stephen Rogers, the speaker, took the ground that chloroform cannot be effectively used in aid of robbery, or in stupefying persons against their will for any felonious purpose whatsoever. He believed that no well authenticated case of robbery, effected by means of chloroform, was extant, and cited numerous cases in which burglaries, said to have been effected by its aid, proved afterwards to have been facilitated by the very incorruptible guardians of property who were declared to have been put under the influence of the anæsthetic. He gave it as his opinion that no anæsthetic could be effectively used unless sufficient force were present to hold the subject while the anæsthetic was applied. In the first place, the long time invariably required for the gradual overpowering of the victim would of itself be a great objection to the use of the anæsthetic among thieves. Moreover, the patient always got into a wild state when coming under the benumbing influence. He got into a state of chloroformic intoxication, singing, dancing, and shouting, in a way which would alarm the sleepiest household. Moreover, when in a lethargic state, the patient was seized with violent vomitings, which would be likely to terminate life, if no aid were at hand, adding to the probable danger of detection, and the severity of punishment to the culprit. Even in case of sleep, the choking and retching would probably wake the patient up before the process of stupefaction was complete.

A NEW MERCURIAL PREPARATION. — Dr. Müller, of Breslau, states that corrosive sublimate and chloride of sodium combine to produce a preparation which does not precipitate albumen. Dr. Stern tried the preparation medicinally. Two to two and a half parts of sublimate and twenty to twenty-six of salt are put in 1,000 of water. Sugar and acid drinks are interdicted, as they might destroy the combination. A rather salt diet is best. Out of fifty-four patients only two were salivated by this treatment, which Dr. Stern reports as very effectual in syphilis. As much as from one to two centigrammes of sublimate may be taken in the course of two days without giving rise to gastric disturbance.

CINCHONA IN INDIA. — If the Indian Government have been successful in the cultivation of cinchona bark, they have not been equally happy in their mode of dealing with the product of their plantations. The substance issued by the superintendents of the Darjeeling plantations, for distribution to the hospitals as the product of the bark,

seems to have been of a bright green. As this is not the usual color of quinine or any of the alkaloids of bark, it led to inquiry. The superintendent explained that he had not attempted to isolate the various active principles — quinine, cinchonine, quinidine, etc. — but wished them to employ this extract *en masse*. But when this mixture of alkaloids was analyzed, a very unsatisfactory explanation was afforded of its surprising greenness. It was found to contain 20 per cent. of the poisonous carbonate of copper. If it had actually been used in ordinary doses for the patients, poisonous effects could not have failed to follow. The operators had shown considerable skill in bringing into solution the copper of the vessels which they had employed. On investigation it appeared that the delicate operations involved in the manufacture of the alkaloids had been entrusted "to a European gardener assisted by Booteah coolies!"

Hypodermic Injection of Calomel. — The *Revista Clinica di Bologna* relates eight cases of syphilis affecting the eyes, in which Dr. Soresina injected calomel suspended in glycerine. Six out of the eight cases were cured, and the other two somewhat improved. The successful cases included iritis, keratitis, retinitis, and paralysis of the third pair. The case in which the least effect was produced was thought to be due to atrophy of the optic nerve.

The Replanting of Teeth. — Most persons who have had teeth filled would probably have considered it a relief to have the carious molar taken out, filled, and put back again, instead of keeping the mouth on the stretch, while the dentist worked upon it *in situ*. It appears from the following paragraph, which we take from the *Pacific Medical and Surgical Journal*, that there is some hope that the process of filling may come to be performed in this very way: "Dentists are now testing a plan proposed by Mr. Coleman, an English dentist, as follows: Extract the tooth, clear away caries and the contents of the pulp cavities and canals, wash out with carbolic acid, fill the canals with cotton dipped in carbolic acid, fill the cavity, scrape off all diseased periosteum and cementum, leaving the healthy portions of the mucous membrane attached to the neck of the tooth; bathe alveolus and the tooth in a solution of carbolic acid, and return the tooth to its socket. Out of fourteen cases Mr. Coleman succeeded with nine; operating on bicuspids and molars."

The Nature of Life. — A Philadelphia journal refers as follows to one of the "new lights" of "protoplastic" science: —

"Professor Poey, of Lycoming County, in this State, has been trying to tell us what 'life' is. According to Poey, 'Life results from a double molecular motion, general and continuous, of composition and of decomposition, in relation to the organism and the inorganic medium. The medium is the combination of external agents, physical and chemical, proper to furnish to the organism the principles necessary for its nutrition, and the manifestations of the properties of the anatomical elements.'

"Strange how Error fastens itself in the human mind, and by its rank growth chokes the tender plant of Truth! During all the fourscore years of our existence we have cherished the fond delusion that Life was rather an immorigerous outgrowth of a retiary paradox, which engrafted upon the persiflage a mephitic diapason, causing it to permeate the neurosthenic rhomboid, and so producing isothermally protoplastic vitality. That is what *we* thought life was. But we see the mistake now, since Poey mentions it! It is hard, though — very, very hard — to see the idols of our youth thus thrown down and broken one after the other. And by a man named Poey, too!"

VALUABLE FORMULÆ.

A New Styptic. — Collodion, 100 parts; carbolic acid, 10 parts; tannin, 5 parts; benzoic acid (from gum), 5 parts.

Mix the ingredients in the order above written, and agitate until perfect solution is effected. This preparation has a brown color, and leaves on evaporation a strongly adherent pellicle. It instantly coagulates blood, forming a consistent clot, and a wound rapidly cicatrizes under its protection.

Bromide of Potassium in Intermittent Fever. — Repeated trials in Guy's Hospital have shown the very great value of the bromide of potassium, given in ague. The following formula is recommended: —

℞ Bromide potassium . . . . ʒv.
Tr. cinchonæ, yellow . . . ℥iijss.
Spts. ammoniæ aromat. . . . ℥ss. M.

S. A teaspoonful in half a wineglassful of water, three times a day.

Carbolic Acid in Flavus and Crusta Lactea. — Dr. F. K. Bailey highly recommends (*Nashville Journal of Medicine*) the following formula for these diseases: —

℞ Hyposulphite sodæ . . . . ℈j.
Carbolic acid . . . . grs. v.
Aquæ . . . . . . ℥i. M.

S. Apply to eruptions three times a day. Should the stools be green and slimy, and bowels disordered, he gives the one twentieth of a grain of proto-iodide of mercury, morning and night.

Local Application to Burns. — Dr. Binikerd (*Med. and Surg. Reporter*) applies to burns, when seen early, carbolic acid and glycerine in the proportion of from 5 to 10 drops of the former, to ℥ii. of the latter. This is spread upon the burn by camel-hair pencil or feather, then a layer of white cotton retained by a roller bandage. For the suppurative stage, he employs the following: —

℞ Yellow wax melted and strained . . . ʒi.
Raw linseed oil . . . . ʒiij.
Tannin . . . . . . ʒj.
Subnitrate bismuth . . . . grs. xx. M.

First melt the wax, add the oil, and stir the whole; then add the tannin, and lastly the bismuth. The ointment should be applied on pieces of lint.

Carbolic Acid in Scarlet Fever. — Dr. Cleaver (*Iowa Medical Journal*) has used the following formula with decided advantage in this disease: —

℞ Carbolic acid . . . . . ℥ij.
Alcohol dilute . . . . . ʒij. M.

S. Mix a teaspoonful of this to a tablespoonful of water, used either as a gargle or with a mop, depending upon age and ability to gargle — say once every two hours. Also give ten to twenty drops of same in muc. g. acaciæ at same intervals — dose depending upon age of patient. This treatment was employed in 70 cases, with the most marked success.

Solution of Santonin. — Dr. John Harley, in *The Practitioner*, gives the following formula for a solution of this ordinarily insoluble remedy: —

℞ Santonini, in pulvere . . . grs. xij.
Sodæ bicarbonatis . . . grs. xx.
Aquæ destillatæ . . . . f℥iij.

Put the soda and water into a flask, keep the fluid near the boiling point, adding, as it disappears, about two grains of the santonin at a time, until the whole is dissolved. Solution is effected in about half an hour, during which time the water is reduced to f℥ij. If need be, reduce by boiling to this bulk, when f℥i. will contain a full dose, — six grains of santonin. If an alkaline reaction be objectionable, neutralize with acetic acid.

FRENCH COMMUNISM FROM A MEDICAL POINT OF VIEW.

M. Francisque Sarcey reports in the *Gaulois* a conversation he has had with "an illustrious physician who had left Paris for a few hours, and was about to return," and who expressed the opini that one of the chief causes of the terrible sce which accompanied the final suppression of t Communist outbreak was "a contagious men alienation." The minds of the Parisians, he sa were gradually unhinged by the privations of t siege. The revolt of the 18th of March gave t last blow to brains which were already shaken; a at length the greater part of the population w raving mad. "This epidemical insanity is one the most surprising cases that physiologists ha ever witnessed. . . . You are astonished seeing women, young girls, and children throw p troleum and lighted matches into private hous This fanaticism is attributed to their having be paid ten francs a day for their horrible work. C anything be more improbable than that they sho expose themselves out of mere thoughtlessness the almost certain prospect of being shot down our troops for such a miserable sum? They w simply under the epidemical influence of the ma of incendiarism. . . . They acted under a h lucination which is as incontestable as it is diffic to understand and explain. This is not the fi time that a whole population, attacked by a sort vertigo, ran about with torches and set fire to ever thing in their way. The records of the Middle Ag are full of similar examples. . . . Women a under such circumstances fiercer and more reckle than men. This is because their nervous system more devoloped, their brains are weaker, and th sensibilities more acute than those of the strong sex; and they are consequently far more dangero and do much more harm. . . . None of the knew exactly what they were fighting for; th were possessed by one of the various forms of t religious mania — that which impelled the Jansenis to torture themselves, with a strange delight in pa of the acutest kind. . . . The men who thre themselves on the bayonets of the soldiers in a p oxysm of passion were seen ten minutes after utter prostrate and begging for mercy. They were r more cowards in the last state than they were h roes in the first; they were simply madmen. . . Look at the citizens who did not take part in t insurrection; they are immovable and stupid, li men struck with paralysis. Yet they have on man occasions given proofs of uncommon vigor and cou age; but the air of Paris is at this moment poi oned by deleterious miasmata which make so people furious madmen and others helpless idiot I have seen the strongest intellects stagger und this pernicious influence, and I have myself fr quently felt as if my reason were going."

FAMILIAR EQUIVALENTS FOR METRI WEIGHTS AND MEASURES.

Weights. One milligramme is equal to $\frac{1}{64}$ grai nearly; one centigramme is equal to $\frac{1}{6}$ grain nearl one decigramme is equal to $1\frac{1}{2}$ grains nearly; on gramme is equal to $15\frac{1}{2}$ grains nearly; one dec gramme is equal to 154 grains nearly; one hect gramme is equal to 1,543 grains nearly; one kil gramme is equal to 15,432 grains nearly.

Measures of Capacity. One millilitre is equa to $15\frac{1}{2}$ grain-measures of water; one centilitre i equal to 154 grain-measures, or 3 fluid drams nearl one decilitre is equal to 1,540 grain-measures or 3 fluid ounces nearly; one litre is equal to 15,40 grain-measures, or $2\frac{1}{10}$ pints nearly; one cubi centimetre of water at its maximum density weig $15\frac{1}{2}$ grains nearly, and is $\frac{2}{7}$ths of a fluid dra nearly.

Measures of Length. One millimetre is equal t $\frac{1}{25}$th inch nearly; one centimetre is equal to $\frac{3}{8}$th inch nearly; one decimetre is equal to $3\frac{9}{10}$th inches nearly; one metre is equal to $39\frac{1}{3}$ inche nearly: $\frac{91}{100}$ths metre is equal to 36 inches, or 1 yard nearly.

Boston Journal of Chemistry.

VOLUME VI. BOSTON, SEPTEMBER, 1871. NUMBER 3.

Familiar Science.

THE GREAT MYSTERY.

THERE are many mysteries connected with e natural world which may justly be termed eat, but there is one class of phenomena which of a nature so deeply mysterious that it may ll be called the great mystery. It is now at-acting public attention to a large extent, from e circumstance that three eminent scientific ntlemen of England have recently attempted to vestigate it, and after devoting considerable time the matter, have published some extended state-nts of an important nature. Prof. Crooks, the inent chemist, and editor of the London *Chem-al News*, Mr. Huggins, whose spectroscopic and tronomical researches have rendered his name mous in the scientific world, and Mr. Sergeant x, a prominent member of the English bar, ve had Mr. Home, the "medium" so called, in eir hands and under their control for a consid-able time, and have made, in connection with m, a large number of experiments with the ew of discovering the nature of his "tricks," the source of his extraordinary powers.

The conclusions reached by these eminent entific gentlemen are not surprising or disap-inting, inasmuch as we were certain when the vestigation was entered upon that they would brought in contact with phenomena which ey could neither understand nor explain. The st important conclusion reached is, that the hts, sounds, and physical disturbances generally, ich are produced in connection with Mr. Home, *no tricks of his devising*, and that he is not an postor or charlatan, as is charged by many. . Crooks and Mr. Huggins claim to believe t there is an element of force surrounding or veloping the human organization, which is of raordinary nature, and capable of accomplish-g marvellous things. But all this explains thing. The terms used by the gentlemen in tting forth their theory are as meaningless as e sentences in which they are found, and so as the nature of the mystery is concerned, are as much in the dark as ever.

The truth is, the men known or recognized as entific investigators are no more competent investigate or explain this mystery, than rewd men from other classes, or other pursuits life. Gentlemen devoting their lives to scien-tc research acquire habits of close observation, d are usually ingenious in devising mechanical d other aids for the elucidation of the princi-es and laws of nature, and hence are prop-y regarded as teachers in matters of sci-ce. But the phenomena exhibited through e man Home, and hundreds of others in ferent parts of the world, manifestly do not within the domain of any of the sciences, and nsequently, scientists have no data, no experi-ce, no precedent upon which to base investiga-ns.

During the past quarter of a century we have many times been called to investigate phenomena corresponding with those which have recently come under the notice of Messrs. Crooks, Huggins, and Cox, and we confess to have been baffled and confounded by what we have seen and heard. Probably few experimenters have had a wider, or a more diversified experience in the various departments of scientific research, and in the mechanical arts, and yet we have found no appliances, no experimental tests, which afforded any clue to the mystery.

It is believed by a very large number of men and women in this and other countries, that the physical disturbances and extraordinary phenomena connected with light, sound, etc., are produced by "spirits" or disembodied intelligences from an unseen world. We certainly have no way at present of proving to these persons that their views are erroneous, and we cannot engage in any controversy upon the subject. Our knowledge of "spirits" and their capabilities is very limited, and until we can secure some insight into the actual condition of things beyond the "dark river," we prefer to believe that the phenomena are somehow, or in some way connected with life in this mundane sphere.

Contradictory, uncertain, capricious as the phenomena generally are, they yet seem to be governed by some laws or conditions, which if not fixed, approximate to that condition. "Mediums" tell us that they have no control over the demonstrations, that they appear and disappear independent of their wills. This is virtually saying that the phenomena are spontaneous, or independent of human volition, and such appears to be the case. It is certain the "tricks" are not absolutely at the command of any one. We have waited with much impatience for hours in the houses of friends for the demonstrations, and it was not until we were upon the point of departure, that the strange antics commenced. In these instances the impatience, desire, and anxiety of the family, whose guest we were, were greater even than our own. We do not know why this is so, in fact we know nothing whatever about it. But this affords no reasonable ground for concluding that we shall always remain in ignorance. An electrical machine, put in the best possible condition, refuses to afford sparks and reports when worked in a damp atmosphere, but transport it to a cool and dry one, and the most brilliant phenomena are at once witnessed. If we originally constructed the machine, and had many times witnessed its capabilities, but were ignorant of the fact that certain meteorological conditions were necessary to success, we might summon our friends to an exhibition on a wet night, and utterly fail to produce a spark. If the visiting parties had never seen an electrical apparatus, and the experiments were new, they would leave the house, as do the disappointed wonder-seekers the rooms of "mediums," convinced that "the whole thing is a humbug." It is the ignorance of the conditions upon which the phenomena depend that leads so many to regard them with suspicion and distrust. Whenever we understand the laws under which this strange power acts, then we may be able to experiment at will, and subject it to careful study.

Manifestly there are invisible, imponderable agencies of great power in this world, other than those which modern science recognizes, and it is a source of no little annoyance and mortification that thus far we have failed to bring them within the field of scientific investigation. At present the whole matter is involved in doubt and perplexity, but we have faith to believe that a future age will find means to solve the great mystery, and roll away the dark clouds which obscure our vision.

THE SPECTROSCOPE IN CHEMICAL ANALYSIS.

THE spectroscope has attracted a great deal of attention within a few years, principally from its use as a means of astronomical research. Its more obvious use as a method of chemical investigation seems to have been very much overlooked, and many of our text-books on qualitative analysis either ignore it altogether or merely allude to it in a superficial way.

Having used the instrument for several years both in our own work and in instructing students, we think our experience will not be without interest.

We have tried several forms of instruments, with prisms varying in number from one of flint glass to six of bisulphide of carbon, and as the result of these trials we have concluded that an instrument furnished with good telescopes and a single flint glass prism is all that is necessary for chemical use. A piece of apparatus that requires much adjustment or delicate manipulation is altogether out of place in the laboratory. The best of the single prism instruments that we have ever seen is the one manufactured by Alvan Clark, of Cambridge. It is light, portable, easily changed from a position in which the lines are vertical to one in which they are horizontal. The prism and telescopes are all rigidly fastened to a brass box, so that there is no liability of displacement. All the spectrum is in the field at once, which is a great advantage for ordinary work. For use in iron works or other metallurgical operations, it can be readily detached from its stand, and either held in the hand or attached to a convenient post.

A common fault with the ordinary spectroscopes is, that they are made too small in all their parts. We should prefer for our own use, — were it not for the expense, — an instrument which had telescopes of two inches aperture, although those of one inch aperture do very good work. But with the large instrument we have

been enabled to detect potassium and rubidium in substances in which our small instrument did not show a trace.

The scales with which almost all spectroscopes are furnished are of but little use except to the beginner, and we have even then found them to be of a positive disadvantage. The eye may soon be educated to know the relative places and the colors of the lines given by the various elements. It is much less liable to err than when an arbitrary scale is used that may become displaced. The sodium line is always present, and serves as a standard of reference. The scales on no two instruments that we have ever seen were precisely alike, and therefore in referring to scale numbers it is always necessary to reduce them to some known standard. For chemical work it is generally sufficient to speak of a line as being near some other well-known line.

The elements most easily detected are sodium and lithium, the sodium giving its characteristic yellow line. Lithium gives a bright red line half-way between the potassium line and the sodium line. The potassium line is at the extreme red end of the spectrum; potassium gives another line in the violet, but this can only be seen when the light is very strong and the substance is nearly free from other elements. The characteristic lines of cæsium are two bright blue ones; this metal has also a number in the red which are only seen under favorable circumstances. Rubidium gives two dark red lines which are almost coincident with the potassium red, and are therefore of little value as a means of identification; it also gives two violet lines intermediate in position between the potassium violet and cæsium blue; these are the most characteristic. Strontium has a number of green, orange, and red lines, none of them being very characteristic, but it has a single line in the violet which is very characteristic. Calcium gives a broad orange band on one side of the sodium line and a green band on the other side. Barium is distinguished by a great number of lines in the green, some of them being very near the blue portion of the spectrum.

Many minerals will not give the lines of the elements which they contain without some previous treatment. Some of these may be analyzed by taking a small fragment in a coil of platinum wire, heating it red-hot, and dipping it into hydrochloric acid; it is then placed in the burner before the slit of the spectroscope. A few repetitions of this process will generally enable us to detect calcium and potassium in a feldspar. If this method fails we can replace the hydrochloric acid by hydrofluoric; this succeeds very well with mica.

For the detection of the traces of the rarer elements that exist in some minerals, we must first adopt some means of concentration. We have been very successful in detecting cæsium and rubidium by treating the mineral with hydrofluoric acid mixed with an excess of sulphuric acid. The pasty mass is evaporated to dryness and then ignited until all the hydrofluoric acid and silica are driven off; the residual mass is boiled with water with the addition of a little sulphuric acid. The solution obtained is filtered from any residue that may remain, and mixed with a solution of aluminic sulphate. It is then evaporated until it commences to crystallize; the first crystals deposited will contain rubidium and cæsium; these may be redissolved and recrystallized several times, and then examined with the spectroscope. Cæsium is most readily detected by adding to the original solution, which should be concentrated to a small bulk, a solution of stannic bichloride, and then a large excess of hydrochloric acid. The cæsio-stannic chloride is precipitated in large crystals which are almost pure. An examination with the spectroscope will confirm the presence of cæsium. Thallium is found in many specimens of pyrites. It may often be detected in the flue dust from furnaces in which coal containing pyrites is burned. The readiest method of detecting it is to treat the suspected dust with nitric acid, evaporate to dryness to get rid of the silica, and then add a little nitric acid to the mass and filter. The filtrate is treated with hydrosulphuric acid, and the precipitate, if one is formed, is examined with the spectroscope. Thallium gives a very characteristic line in the green. Indium is found only in combination with zinc. It may be detected by dissolving the dust from the prolonges in hydrochloric acid until the acid is saturated, and then inserting a strip of metallic zinc in the liquid. If indium is present it forms a black coating on the zinc. This should be examined by the spectroscope for the indigo line of this element.

GEYSER SPRINGS, CALIFORNIA.

BY E. CUTTER, M. D.

I LEFT San Francisco for this place on Monday, the 8th inst., at 4 P. M., by steamboat for Vallejo. I then took cars and rode 38 miles, to Calistoga — the Saratoga of this coast. Here I slept till morning. I rose early; found the place situated in a lovely valley green with rich verdure. The hotel consists of a pavilion for eating, offices, etc., while scattered about are a large number of beautiful cottages, commodious, isolated, and very nicely fitted up. Around the area of the domain are various sulphur springs. One, in front of the hotel door, appeared to be down in a sort of stove funnel. I dipped in a tumbler, and on tasting came near burning my lips, it was so hot, but innocent-looking! There were besides a large number of sulphur springs, some steaming like a boiling cauldron. These are arranged to give steam and mud baths, and are probably quite useful in rheumatic affections. At 7 A. M. our party started in wagons for this place. It numbered about fifty. It was the largest party that ever went over the road at one time, except one. We rode 28 miles, and arrived here at 2 P. M. The route was over a mountain road, built two years ago by Chinamen in four months' time. It excels the White Mountain driveway. I think I never went over a more "skittish" road. After arriving at the summit of the mountain, our way was down steep grades cut in the sides of the ranges. On the left you could not see the top of the mountain, and on the right you could look down dizzy, almost perpendicular heights of 500 to 1,000 feet. Added to this the horses cantered down at a good speed, and sometimes the turns were so short that it seemed as if we should tip over. A man named Foss is the famous Jehu of this coast. He is a sort of D. D. Hart, and of equal physical proportions. He drives six horses. Stories are told of him that are appalling. For instance, he drove down a mountain road to this place, — not the one we came, but a worse, — a distance of two miles, in seven and a half minutes, descending 1,900 feet in that time! He whipped his horses down the incline, and yet accomplished the journey in safety. It is a big story, but I believe it is true.

The Geyser hotel is peculiar in that it has no plastering — the ceiling is made of canes, whitewashed. This is a remarkable place. It is hard work to describe it, but I will make an attempt. Imagine a deep cañon or gully cut from east to west in a mountain country. Its depth is 3,000 feet; its width at the top three miles. In this cañon flows the Pluton River noisily. Just opposite the hotel, which is on the south side of the cañon, there is another gulley running from the north at right angles to the great cañon. This is the seat of the most wonderful collection of natural chemical phenomena in the United States. You go down from the front of the hotel, and stop at a sulphur and soda spring. The guide scrapes off the scum from its surface, dips in a cup, and you drink a nasty warm liquid. Passing on over the Pluton you enter the secondary cañon. The first they show is the Devil's Office, a grotesque space hollowed from each side and covered with trees. Gypsum salts in crystals adorn the sides. Now you smell the sulphur. As you go on, you come to boiling hot springs of alum, iron, copper, and lead. The surface of the ground is spongy and hot, so as to be uncomfortable. You see black ink springs, green crystals of copperas, white of Epsom salts. Underneath you are noises of boiling liquids, sounding like a large machine shop at work. This is the Devil's Workshop. Here and there are excavations called the Devil's Nose, Ear, and Mouth. The latter is a sputtering, stinking, seething, and steaming cavern, fitly named. Red, green, yellow, and white incrustations abound, while the presence of free sulphurous acid and ammonia gives an odor which is not pleasant. Further on is the Witch's Cauldron — a cavity seven feet in diameter and of unknown depth, filled with a dirty black liquid at a temperature of 220° Fah. — an awful place; seething, bubbling, boiling, steaming — sure death by scalding to fall there. The ground is spongy and hollow; you can easily run a cane in three feet anywhere, and the hole will smoke on withdrawal. Beyond were the Steamboat Geysers, fitly named, belching forth a steam-cloud forty feet high, and singing like a steamboat. At the upper end was the Devil's Pulpit, a high projection, from which you can look through the whole cañon and have a fine view. In the vicinity is a well marked crater of an extinct volcano. Near by is seen a torrent of scalding steam, called the Indian Sweat Bath. Altogether the Geysers are a deeply interesting evidence of the internal heat of the earth. You don't feel safe near them. They may burst out any day.

DIAMONDS.

IN a lecture which Professor Tennant, of King's College, gave several years ago before the Society of Arts in London, he stated the principal object of his lecture was to point out the means of distinguishing artificial stones from real ones, and of discriminating between a precious stone of one kind, and another. One means of doing so was by knowing into what figures

e different gems crystallized. The diamond, · instance, assumed various geometric figures, t it was remarkable that it was never found as six-sided *prism.* Had this been known, the lowing incident, which Professor Tennant re-ed, would not have occurred: —

"A person was offered £200 for a stone hich the lecturer exhibited) that he had ked up in California, under the impression it it was a diamond; and the possessor of it, ing under the same opinion, refused to part th it for that sum. It was a six-sided prism; minating in a pyramid at each end. Neither them knew that diamonds never assumed that m, and accordingly the one refused the £200 ered by the other, for what was only a piece crystallized quartz, not worth more than half rown."

But an equally simple and conclusive test uld be the specific gravity of the stones. In Russian department of the Exhibition of 151, was a beautiful blue stone. Much doubt s entertained of its nature. On one occasion eral scientific gentlemen were brought to ex-ine it. Almost every gentleman present gave different opinion as to the real nature of the ne; only one called it by what turned out to its real name. The proprietor maintained it s a blue diamond, and offered to submit it to y test that might be suggested. Professor nnant suggested that the simplest and safest t would be to ascertain its specific gravity. being allowed so to test it, he weighed it inst a topaz in its natural state, and found the ecific gravity to be precisely the same.

THE UPAS TREE.

A YEAR or more ago, in reply to an inquiry m a correspondent, we gave some facts con-ning this tree, which is far from being the tiferous thing that the fables of the early trav-ers made it.

The tree is found occasionally in other islands n Java, and a writer in *Appletons' Journal* es an account of one in Borneo which he vis-l during the East Indian cruise of the United tes ship *Plymouth.* The following is an ex-t from the article: —

Following our native guide-boat, we sheered in g-side of a grassy bank, the summit of which was out in small plots like children's gardens at e, each plot surrounded by a border of shells, carefully kept walks between them. Nothing grass and flowers were growing there, but these e luxuriant; for this was a graveyard, and we e even then standing under the shadow of the ible poison tree, near which these people bury r dead, which may partially account for the derful stories told by early travellers. The tree f measured eleven feet in circumference five above the ground, and, instead of scattering th and destruction, was girded round with creep-vines and many-colored parasites, that wound r way to the topmost branches, which were ier than any of the surrounding trees, and alled, if not surpassed, those of our loftiest forest s at home.

An incision was made, after the manner of tap-g maple-trees, and the sap, which is reported to a deadly poison, commenced flowing drop by . It was of a yellowish white color, thick and inous, resembling in its general appearance l rich cream. There was no unpleasant odor ceptible from it, nor did any of us experience any disagreeable sensations, though standing near by while the sap was being discharged. This was so slow an operation that it required nearly an hour to fill a half ounce vial. Meantime it was desirable to procure some of the leaves and branches, but these were beyond our reach, as the lowest branch was at least 100 feet from the ground, and although the men could easily have climbed up by the vines, the surgeon in charge of the party refused to let them make the attempt, fearing that their hands and feet might become poisoned."

THINGS WORTH NOTING.

GREEK FIRE. — Modern Greek fire is a solution of phosphorus in bisulphide of carbon. When this solution is poured on paper, rags, or shavings, the bisulphide evaporates rapidly and leaves the phosphorus in a state of very fine division — so fine that it takes fire spontaneously. It furnishes the means of performing a very pretty lecture-room experiment, but, as an incendiary agent, it is worthless, for the simple reason that it does not set fire to even the thinnest and driest boards. The phosphorus, in burning, produces a fusible and non-volatile compound, and this glazes over all objects in its vicinity, and protects them from the action of the flames.

EAU DE COLOGNE. — Competent authorities declare that the excellence of the perfume almost entirely depends upon the purity of the spirit employed as its basis. Spirits made from malt and other materials *not* vinous will never produce Eau de Cologne of a high character, owing, it is believed, amongst other causes, to the odor of fusel oil in the first and to œnanthic ether in the second. Neroli, without which neither genuine Eau de Cologne nor a good imitation of it can be made, is an essence obtained from orange blossoms (the bitter species, *Citrus bigarradia*), and hundreds of tons of flowers are plucked and consumed for the purpose.

SWEEPING CARPETS. — Persons who are accustomed to use tea-leaves for sweeping carpets, and find that they leave stains, will do well to employ fresh-cut grass instead. It is better than tea-leaves for preventing dust, and gives the carpet a very bright fresh look.

TO COLLECT THE ODORS OF FLOWERS. — Roses, and all flowers containing perfumed oils, may be made to yield their aromatic properties by steeping the petals or flower leaves in a saucer or a flat dish of water and setting it in the sun. The petals should be entirely covered with the water, which, by the way, should be soft or rain water. A sufficient quantity should be allowed for evaporation, and the vessel should be left undisturbed a few days. At the end of this time a film will be found floating on the top. This is the essential oil of the flower, and every particle of it is impregnated with the odor peculiar to the flower. It should be taken up carefully and put in tiny vials, which should be allowed to remain open till all watery particles are evaporated. A very small portion of this will perfume glove-boxes, drawers, apparel, etc., and will last a long time.

TO CRYSTALLIZE FLOWERS. — Construct some baskets of fancy form with pliable copper wire, and wrap them with gauze. Into these tie to the bottom violets, ferns, geranium leaves — in fact, any flowers except full-blown roses — and sink them in a solution of alum, of one pound to a gallon of water, after the solution has cooled. The colors will then be preserved in their original beauty, and the crystallized alum will hold faster than when from a hot solution. When you have a light covering of crystals that completely covers the articles, remove the basket carefully, and allow to drip for twelve hours. These baskets make a beautiful parlor ornament, and for a long time preserve the freshness of the flowers.

HOUSEHOLD RECIPES.

RASPBERRY JAM. — Let the raspberries be thoroughly ripe. Mash them with a wooden spoon. To every pound of raspberries add a pound of sifted sugar. Boil well half an hour, stirring it continually, lest it should burn. When of a good thickness, put it into pots, let it cool thoroughly, and cover with brandied paper.

BLACKBERRY JELLY. — Gather the fruit when perfectly ripe, and in very dry weather. Put the blackberries into a jar and place the jar in hot water, keeping it boiling until the juice is extracted from the fruit. Pass it through a fine sieve or jelly-bag without much pressure. For every pint of juice add fourteen ounces of sugar, and boil in a clean preserving-pan about five and twenty minutes, carefully taking off the scum as it rises to the surface. Place it hot in small jars and cover it with thin tissue-paper, dipped in brandy, and brown paper over it. Keep it in a cool, dry place.

RASPBERRY VINEGAR. — A very superior raspberry vinegar is made by taking three pounds of raspberries, two pints of vinegar, and three pounds of sugar. Put the raspberries into the vinegar without mashing them, cover the pan close, and let it remain in a cellar for seven or eight days; then filter the infusion, add the sugar in powder, and finish in the water-bath. It is an advantage of this process that the beautiful aroma of the fruit is not lost, as it is by the ordinary method of boiling.

A SUBSTITUTE FOR MILK OR CREAM. — Beat up the whole of a fresh egg in a basin, and then pour boiling tea over it gradually, to prevent its curdling. It is difficult from the taste to distinguish the composition from rich cream.

SOFT CHEESE. — Take milk just as it begins to turn sour; pour over it about one fourth its bulk of scalding water, beating the milk with a spoon at the same time to cause the whey to separate. Then strain off as much of the liquid as possible, finally washing the curd with clean water. Add a little salt, and you have a palatable and very nutritious article of food.

A GOOD BREAKFAST DISH. — The following is as good as it is easy to prepare: Take four eggs, three quarters of a pint of new milk, and a piece of butter the size of a walnut: salt (and pepper it if you like it) to suit the taste. Beat the eggs, add the milk and butter, and pour all together into a hot frying-pan containing half a spoonful of lard or butter. Stir constantly for three or four minutes, when it will be ready for the table.

MOCK VENISON OF CORNED BEEF. — Cut the beef in thin slices, and freshen by soaking for three or four hours in tepid water. When sufficiently fresh, lay the slices on a gridiron, and heat through quickly. Make a gravy of drawn butter; add a little pepper, and the yolk of an egg chopped fine, and pour over the meat; or butter, pepper, and salt, like beefsteak. This will be found a savory dish when only salt meat can be procured, but it is better with fresh beef.

OUT OF THE DEPTHS. — A remarkable illustration of the power of modern science to wrest spoils from the depths of the ocean is now afforded at Galle Head, on the Irish coast, off which point the *Crescent City* sunk some months ago. The diving operations have been so conducted that $10,032 in specie have been recovered, together with four hundred and sixty bales of cotton, valued at $55 per bale. It is expected that the whole of a valuable cargo, both specie and cotton, will be recovered.

According to the Virginia papers, the powder-tanks found by the wreckers in the Confederate iron-clad *Richmond*, now lying in thirty or forty feet of water off Chapin's Bluff, are in good condition, and the powder as dry and ready for use as before its submersion six years ago.

The Arts.

THE FIRST PHOTOGRAPHER.

It has been generally taken for granted that the discovery of photography dates back only to the year 1839, when Daguerre in France and Talbot in England published the results of their investigations. It appears probable, however, that the art was discovered and practically applied by Matthew Boulton, partner of the celebrated James Watt, as long ago as the close of the last century, and was then allowed to fall into neglect, and to be forgotten. Boulton belonged to a secret scientific society, which was accustomed to meet at his house. He died in 1809; and, on the subsequent examination and removal of the vast collection of documents stored in his library, there were found a number of crumpled and folded sheets of paper with pictures on them of the most puzzling kind. On smoothing out these pictures, they were found to consist of copies, on large sheets of very coarse paper, of certain well-known designs by Kauffmann — the porous water-marked paper being thickly coated with some varnish-like substance, on the surface of which the picture had been produced. All the sheets found in the library, as well as others afterward discovered, presented the same characteristics — a glossy surface, with minute varnish-like cracks, the drawing of the figures most elaborately finished, the lights and shades so fully rendered as to give much the effect of a mezzotint, and an invariable reversal of the position of the figures. Further research also led to the discovery of two silver-metal plates, about the size of a sheet of note paper, precisely resembling in appearance those used by Daguerre in the early days of photography. On each of these plates was a faint image of Boulton's house, so unmistakably taken from nature, and so evidently produced by the aid of light, that experts at once pronounced them to be photographic pictures, taken directly by means of a camera. Attached to these plates was a memorandum stating that they were "sun pictures," representing the house prior to certain alterations made in 1791. All these facts lead to the inevitable conclusion that the discoveries of Daguerre were anticipated by Boulton. Watt, as is well known, was the true father of the steam-engine, which in his hands first became a machine of real practical value; and it is a curious fact that a discovery of almost equal importance, in a wholly different field of scientific research, should have been made by the man associated with him as a partner in business.

NON-INFLAMMABLE DRESSES.

Scarcely a season passes that we do not hear of injury to some unfortunate girl, whose dress has caught fire and instantly wrapped her in flames. The fall of a lamp, the coming too near to an open fire-place, the careless use of matches, and many other apparently trivial causes, have produced accidents which have resulted in death. The footlights of the stage and the rostrum have, in this way, caused injury and death to thousands.

With a desire to mitigate the evils arising from this source, Queen Victoria some years ago commissioned the late Professor Graham, then Master of the Mint, to investigate the subject for the purpose of selecting some means whereby, without injuring the quality or appearance of the fabric, the material of most dresses might be rendered uninflammable, if not incombustible. Professor Graham confided the investigation to the care of Dr. Oppenheim and Mr. Frederick Versmann, whose elaborate report on this subject deserves the most careful attention.

Of all the salts experimented upon by these gentlemen, only four appear to be applicable to light fabrics. These salts are, 1, phosphate of ammonia; 2, a mixture of phosphate of ammonia and chloride of ammonium; 3, sulphate of ammonia; 4, tungstate of soda. The conditions required to be fulfilled in this case are, 1, that the salt shall not injure the strength of the fabric; 2, that it shall not stain or interfere with the color; 3, that it shall not leave the fabric when the latter is washed, or, if this be the case, that it shall be easily applied in the laundry; 4, that it shall not interfere either with the character of the finish or with the ease with which this finish is produced; 5, that it shall be cheap; 6, that it shall be efficient. No salt was found that would adhere to the fabric and bear washing without injuring the color. Salts of tin, it is true, could be applied so as to bear washing and yet remain efficacious, but their action upon the color unfitted them for all but the coarsest fabrics. The phosphates are efficient, but unfortunately are too expensive. The sulphate of ammonia is by far the cheapest and most efficacious salt, and it was therefore tried upon a large scale. Whole pieces of muslin (eight to sixteen yards long) were finished, and then dipped into a solution containing ten per cent. of this salt, after which they were dried in the hydro-extractor. This was done with printed muslins as well as with white ones. They had a good finish and none of the color gave way, with the exception of madder purple, which became pale. But even this change may be avoided, if care be taken not to expose the piece while wet to a temperature higher than ordinary. Unfortunately, however, sulphate of ammonia is not adapted for use in the laundry, as it acts on the irons and produces spots of iron-mould. This might perhaps be avoided by covering with paper or cloth the article to be ironed, but this device is not always available; so that, on the whole, tungstate of soda is the only salt that can be recommended for family purposes. After having tested various salts and solutions intended for the purpose, this is the only one found to be neither injurious to the texture or color, nor in any degree difficult of application in the washing process. The iron passes over the material quite as smoothly as if no solution had been employed. The solution increases the stiffness of the fabric, and its protecting power against fire is perfect. This salt offers only one difficulty, namely, the formation of a bitungstate, of little solubility, which crystallizes from the solution; but it was found that a very small percentage of phosphate of soda rendered the tungstate quite stable. The best way to prepare a proper solution is to dilute with water a concentrated solution of the tungstate until it indicates 28° (spec. grav., 1.140) and then mix it with three per cent. of phosphate of soda. The goods are moistened with this solution just before being starched, and they may be afterwards ironed and finished without the least difficulty.

Articles prepared in this way are perfectly uninflammable. They may be charred by exposure to fire, but they do not burn readily unless there is some extraneous source of heat, and they cannot be made to burst into flame. By aid of this discovery, a lady, dressed in the lightest muslin, might walk over a row of footlights, and the only result would be that the lower part of her dress would be injured. Unless her person actually came in contact with the gas flames, she herself would suffer no injury.

It is estimated that America, when her productive power is fully developed, will be able to feed four times as many persons as there are now on the face of the earth.

ELECTRICAL RAILWAY SIGNALS.

A perfectly trustworthy system of railway sign[als] has long been a desideratum; and Robinson's inv[en]tion, recently patented, appears to supply the wa[nt]. The apparatus works automatically, and works [so] effectively that a switchman or engineer, drunk [or] asleep, cannot evade it. A train approaching [a] switch or drawbridge in either direction, when d[is]tant a half-mile, more or less, will press upon a le[ver] arranged in proximity to the track. This le[ver] controls an electric circuit, which, being closed [by] the train, remains closed. When the switch [or] drawbridge is in place, and safe, a white flag [is] brought into view in a signal-box placed by the si[de] of the track, a short distance in advance of the lev[er] — thus notifying the engineer that he can go ahe[ad] without danger. When, however, the switch [or] drawbridge is out of place, the pressure of t[he] wheel on the same lever as before, brings into vi[ew], in the same signal-box, a red or danger signal, a[nd] rings two bells loudly at the same time — one at t[he] signal-box, and one at the misplaced switch [or] drawbridge. These bells keep up a continu[ous] alarm until the wheels pass another lever, whi[ch] operates a circuit-breaker, located at a short dista[nce] from the switch or drawbridge.

As will be perceived at once, the engineer, [by] this arrangement, cannot fail to be positively [in]formed of the exact condition of the switch or dra[w]bridge which his train is approaching, while t[he] switchman, also, is informed when a train is a[p]proaching an open switch, and warned to close t[he] same. As the whole operation is automatic — t[he] passing train closing and opening the circuits, a[nd] operating the signals — the safety of a train is [n]ot left to a possibly negligent or perhaps intempera[te] watchman. The bell can be heard at the distan[ce] of a mile.

MEMORANDA IN THE ARTS.

Explosive Harpoons. — A correspondent [of] *Land and Water*, who has been on a trip to No[r]way, gives an account of the whaling establishme[nt] of Herr Foyen, in the Veranger Fiord. He emplo[ys] two small steamers of about seventy tons eac[h]. The special apparatus used consists of a harpoo[n] inclosing in its head half a pound of gunpowde[r], and with jointed or hinged bars containing so[me] percussion-powder between them. When the wha[le] is within gunshot, this harpoon, attached to the e[nd] of a long cord coiled around a drum, is fired in[to] the animal from a cannon about the size of a fou[r]-pounder. As the flukes penetrate the side of t[he] whale they are naturally brought together [and] pressed down towards the shaft, and in so doin[g] ignite the percussion-powder, which sets fire to th[e] gunpowder, causing an explosion in the body o[f] the animal that usually produces a mortal woun[d]. The whale, of course, starts off under the stimul[us] of the pain, and the rope is carried out for a tim[e], being uncoiled from the drum precisely like a fis[h]ing-line from the reel of a fishing-rod, the steame[r] following after so as to prevent any undue strai[n]. If necessary, a second discharge takes place, whic[h] almost invariably produces death.

Petroleum Fuel for Locomotives. — I[n] France, a model engine heated by petroleum ha[s] been exhibited, which appears to be a complete suc[]cess. This locomotive carries 2,000 litres, or abou[t] 500 gallons of oil in the tender, a hand pump forcin[g] the oil into a small reservoir near the boiler. Th[e] process of lighting the oil is said to be neither dif[]ficult nor dangerous, owing to the oil being kept i[n] compartments, a small quantity only being lighte[d] at one time, then another division, and so on, unti[l] the whole furnace is alight. This engine consume[s] its own smoke perfectly, and it is said to be ex[]tremely easy to drive, on account of the simplicity of the apparatus. A larger locomotive, with slight

provements, has since been built, and successful als made of its working qualities. The consumption of oil was 35 per cent. less by weight, than that good patent compressed coal.

Leather Guns. — An English paper states that e Cuban rebels have resorted to the use of leather ns, a species of artillery used by Gustavus Adolus and other European commanders in times ar and remote. The leather while wet is tightly tched round a wooden core or mould, in successive ckets, the under one being allowed to dry before e next is put on. A close and tight coil of good pe or cord completes the tube, the breech being de of hard wood, lined with tin. Such guns ll fire some twenty rounds before giving way. eir advantages are cheapness and ease of conuction.

PRACTICAL RECIPES.

To Clean Gilt Jewelry. — Take half a pint boiling water, or a little less, and put it into a an oil flask. To this add one ounce of cyanide of tassium, shake the flask, and the cyanide will disve. When the liquid is cold, add half a fluid nce of liquor ammonia and one fluid ounce of tified alcohol. Shake the mixture together, and will be ready for use. Gilt articles which have come discolored, may be rendered bright by ushing them with the above mentioned fluid. must be borne in mind that the cyanide of potasm is a deadly poison, and should be used with ution.

To make a Good Mucilage. — The best qual- of mucilage in the market is made by dissolving ar glue in equal volumes of water and strong vinar, and adding one fourth of an equal volume of ohol, and a small quantity of a solution of alum water. The action of the vinegar is due to the etic acid which it contains. This prevents the ue from gelatinizing by cooling; but the same sult may be accomplished by adding a small quany of nitric acid. Some of the preparations offered sale are merely boiled starch, or flour, mixed th nitric acid to prevent the gelatinizing.

Red Ink. — To 12 grains of carmine add 3 nces of aqua ammonia, and heat gently, without iling, for seven or eight minutes; then add 18 ains of gum arabic, stirring constantly. It must kept well corked.

Another recipe is as follows: add 2 ounces of powred Brazil wood to a pint of water, and boil it wn to one half the quantity; then add ½ ounce m arabic, 1½ drachms of tincture of cochineal, and ounces of alcohol.

Violet Ink. — Take aniline violet, half an nce, and digest it in five ounces of alcohol in a ass or an enamelled iron vessel for three hours; en add a full quart of distilled water and heat ntly for several hours, or until the odor of the irit has disappeared; then mix in two drachms gum arabic dissolved in half a pint of water, and ow the whole to settle. Experiment will deterne the precise quantity of coloring matter that ll be required.

Gold Bronze. — Pure gold bronze powder may made as follows: Grind leaf gold with pure ney until the leaves are broken up and minutely vided. Remove this mixture from the stone by a atula and stir up in a basin of water; the water ll melt the honey and set the gold free. Leave e basin undisturbed until the gold subsides. Pour f the water, and add fresh instead, until the honey entirely washed away, after which collect the gold filtering pans and dry for use. A cheaper sort ay be made thus: Melt one pound of tin in a ucible and pour it on one half pound of pure merry, when this is solid grind it into powder with ven ounces of flowers of sulphur, and one half und of sal-ammoniac.

Agriculture.

FARM PENCILLINGS AT LAKESIDE.

Those who heard or have read the Address which we delivered before the Massachusetts State Board of Agriculture at Framingham, last December, will remember that we gave the results of our experiments with manures at Lakeside, up to the close of the season of 1870. Considerable interest has been manifested in various quarters to learn regarding the success of the experiment as continued during the present exceedingly dry and unfavorable summer. It gives us pleasure to be able to state that the crops have been good; indeed, we are obliged to say that they have never been so prosperous and abundant, and the success of our treatment of soils is fully established. The position we have always taken has been, that no farm experiments are of any practical value which have not been carried through more than a single season; as different meteorological conditions — such only as are met with in three, four, or five consecutive summers — are needed to establish the reliability of any special or general plan of soil treatment.

Some methods of soil improvement are well enough in a wet season, but continued through a dry one, they fail. The great question we have been endeavoring to settle is, whether fields of ordinary quality, embracing uplands and lowlands, can be put in good tilth, and continued in that state through wet and dry seasons, by the use of fertilizers outside of animal excrement. Having conducted experiments of this nature through eight consecutive seasons, we are now prepared to declare *that they can be*. The season of 1870 was remarkably dry, but the severity of the drought did not commence until the latter part of June, when the hay crop was secure, and hence nothing was learned regarding its influence upon this crop; but the present season its full force was felt in the months of May and June, embracing the period when grass first starts into life and continuing until it reaches full maturity. Scarcely any rain fell in May, the rain gauge indicating less than three fourths of an inch during the month. In spite of this extraordinary drought, we cut in July three and a half tons of cured timothy hay per acre, upon some of our fields which we believe had never received a dressing of farm dung, or animal excrement of any kind.

The increase of our hay crop on the same area this year, over last, has been fully 25 per cent., and the quality has been decidedly better. This increase has not been confined to low lands, but extends to fields which under ordinary conditions feel drought sensibly. The low lands which we seeded to grass last autumn, after thorough spading and pulverization, were put under the scythe as early as the 20th of June, the grass being lodged from heavy growth. The crop was a fine one, and at the time of writing, another crop is ready for the mower, which we think will prove fully as large as that removed in June. This field measures nearly two acres, and one portion was dressed with Peruvian guano, another with fish pomace, another with cow dung. The cost of each was very nearly the same, and the resultant crops did not vary much in value, the fish pomace giving the poorest returns. We place a high value upon Peruvian guano of *standard* quality, when applied to meadow lands. After repeated trials of the fertilizer, extending over a period of six years, we have proved it to have a value deserving the farmer's attention, who has bog lands to reclaim. The price in this city during the past ten years has been excessive, or greater than its actual value for ordinary soil purposes; but the dealers during the past season have been able to reduce it about twenty-five per cent., and this reduction brings it within the possibility of economic use. In recommending this powerful agent, we are met with the same embarrassing circumstances which meet us whenever we call attention to any commercial fertilizer. The matter of the *purity* or genuineness of any specimen is the all-important point to be settled, before purchases are made; and how shall this be met? The only way it can be reached is by securing chemical analysis of each parcel, but this work does not come within the reach of ordinary purchasers, and therefore it must be bought solely upon one's faith in the knowledge and integrity of the vender. That which we have examined and purchased of one party in this city has been found to be remarkably uniform in character, and the nitrogenous and phosphatic principles present gave it a satisfactory or standard value. We presume it can be procured of fair integrity in other cities.

At Lakeside we have this year taken into the barns sixty-seven loads of hay from fields which six years ago did not give twenty, and this result has been brought about by good culture, and the application to the soil of those fertilizing agents which the rich grasses demand. If lands are in good tilth, well drained, and worked, so that air can penetrate into them, dry weather affects them much less than those which are neglected. The advantages we have secured the present season are due to several causes. Upon our well tilled fields the grasses started earlier than upon others, and hence the roots were placed in shade earlier, and the dry winds and hot sun were in a measure prevented from injuring them. The vigor of the plants was sustained after growth commenced by a supply of nutriment, and hence there was no faltering in the process of the growth. The soil bed was comparatively light and porous, so that air, during the night time, when it deposits moisture, could enter and leave the condensed products around the roots of the grasses. It has been proved that concentrated fertilizers like bone meal, dissolved bones, bone and ashes, guano, etc., etc., do not tend to "burn the soil" and increase the evils of drought as many suppose. Our best crops have been taken from fields which have been for years fertilized by no other agents, and we have learned to trust them under all meteorological conditions.

SOUTHERN FARMERS.

Formerly, in speaking of the cultivators of cotton, rice, tobacco, corn, etc., in the Southern States, they were called "planters," and this was the general designation employed throughout the country. Now, the term "planters" has, to a considerable extent, fallen into disuse, and the good old wholesome word *farmers* is used to designate the class whose business it is to cultivate the soil. We like this better; it smacks of the soil, it implies personal participation in the cares

and labors of planting and harvesting; it is a term implying independence, industry, health. Our Southern patrons, in writing to us, frequently speak of themselves as "farmers," and we are pleased to notice it. It is a source of much gratification to learn through the Southern agricultural press, and through correspondence, of the great zeal and industry manifested by the farmers of that section in improving their lands and developing their immense resources. The journals devoted to agriculture which reach us from the South are wide awake, and we read them attentively. The young men, particularly, are full of zeal and hope, and if there are any improvements in machinery, or farm implements, or fertilizers, by which their interests are likely to be promoted, they seek for them. Soil cultivation is being studied as a science, and cotton will soon be raised so as to afford a larger profit than heretofore. The neglected rice fields of the Carolinas are receiving attention; and if the "heathen Chinee" can be introduced into the rice swamps successfully, this splendid crop will soon attain an importance greater even than in the times prior to the "late little unpleasantness." We wish our Southern friends the most complete success in their agricultural labors, and we are confident they will attain it, in the path they are now pursuing.

LIME AS A FERTILIZER.

Manures may be classed under three principal heads: first, those which supply some essential element to the plant; second, those which act as mere stimulants; and lastly, those which do not act directly on the plant, but act on substances already in the soil, rendering them more suitable for plant life. Lime belongs to this last class almost entirely, as there are very few soils that do not contain sufficient lime for any direct demands that plants are likely to make on them.

In order that a plant may feed on the inorganic matter in the soil, or, indeed, on any matter, it must be brought into a soluble state. Plants feed only on liquids and gases; they have no power of assimilating solid food.

The inorganic portions of plants are built up chiefly of potash, soda, lime, magnesia, combined with silicic, sulphuric, phosphoric, and hydrochloric acids, as well as with many organic acids. The carbonates, so generally found in the ashes of plants, rarely exist in the plants themselves, being mostly formed from salts of organic acids during the process of burning. A small portion of the above-mentioned bases already exist in the soil in a soluble state, but are much more abundant in the insoluble condition.

If, however, we add caustic lime to a soil, it renders these insoluble substances soluble, and prepares them for the use of the plant.

All soils formed from the decomposition of granite contain an abundance of potassa and silica, the most important elements for the growth of the wheat plants. But these two elements are combined with each other, and with alumina, in the form of feldspar, which is almost perfectly insoluble. Caustic lime breaks up this combination; and accordingly, when the farmer finds that his wheat straw is getting too feeble to support its own weight, he applies lime to the soil, with the immediate effect of stiffening up the straw. Fifty or sixty years ago, the farms in New York, Pennsylvania, and Virginia, had almost run down, and were not considered worth fencing. These were called "old fields;" and such may still be found in abundance through Maryland and Virginia. They had been cropped through consecutive years with the same plants, until they would no longer yield enough to pay for the trouble. In some parts of Pennsylvania lime is abundant, and upon applying it to the worn-out soils the effect was remarkable. Farms that thirty or forty years ago could almost have been had for the asking, are now known as being among the best in the State.

But it is not on the inorganic portion of the soil alone that lime acts. It bears, perhaps, an even more important relation to the organic portion of the soil. In Norway and Sweden, every farmer has to pay a portion of his tax to the government in saltpetre. In order to prepare this, he heaps together old mortar or lime, manure, ashes, and earth, and keeps the heap moist. The lime and the nitrogenous matter of the manure react on each other, and form nitrate and carbonate of lime. Nitrate of lime is decomposed by the carbonate of potassa from the wood ashes, and saltpetre is thus formed. Precisely the same kind of reaction is going on continually in the soil when we apply lime to it; and thus the nitrogen of the decaying vegetable matter is brought into fit condition for the use of plants. For all these uses the more caustic the lime is, the better for the land. A heap of lime that has been long exposed to air and rain is much less valuable than that which is freshly slacked, as it has absorbed carbonic acid from the air. Carbonate of lime is of but little value as a manure, although, when it is finely divided, as when it is in the state of chalk, it may serve to neutralize the vegetable acids that exist in some wet lands. It is undoubtedly better to apply lime directly to the soil than to make a compost of it, with peat, or such substances, for we do not gain enough by the mixing to pay for the expense of the manipulation. We have been frequently asked how much lime should be applied to the acre. This is a very difficult question to answer, unless we know all about the soil to which it is to be applied. What would be an excessive quantity for some lands is too little for others. In some sections, or upon some lands, one hundred bushels to the acre may be applied with beneficial results; in others, fifty or sixty bushels are an abundance, while some lands will not bear more than twenty or thirty.

Lime should never be applied directly in association with manure, as it tends to drive off the ammonia, and thus lower its value. If we wish to apply it to corn or wheat land, it is best, perhaps, to top-dress the sod the year before we intend to plough. The manure may be then applied, and ploughed under in the spring, without much danger of loss, as the lime has been doing its work during the winter.

CANKER WORMS.

We hold firmly to the good old maxim that an ounce of prevention is worth a pound of cure. Sprinkling trees with carbolate of lime, with tobacco water, and the various other agents that have been proposed for the eradication of canker worms are well enough in their way; but the remedy is applied too late, for the real mischief comes from allowing the worms to be hatched. This we can prevent by keeping the insects from ascending the trees in order to deposit their eggs.

We may, to a great extent, prevent the mischief by keeping the ground beneath the trees well stirred, and we know of no way to accomplish this better than to turn into the orchard a few hogs. Give the orchard a good ploughing in the first place towards the latter end of August, and then let the hogs have their own way. They enjoy the work, and make a speedy end of all worms and insects that they find.

But even a good ploughing may do a great deal of good, without the hogs. An orchard came under our notice the present season which was saved in this way. Late last October the ground was ploughed for spring planting, and these trees escaped the pest altogether; while those only a stone's throw from them, on old ground, were entirely deprived of their foliage.

The insect may be prevented from ascending the trunks of trees by nailing a strip of roofing felt around the tree, a foot or two from the ground, and keeping this thoroughly coated during the fall and succeeding spring with printer's ink. Refuse ink can be readily obtained at most printing offices, and a little of it goes a long way. This is much superior to coal-tar, as it does not stiffen so readily in cold weather, and it keeps moist longer when exposed to the air.

FARMERS' CERTIFICATES.

The *Vermont Farmer*, after referring to our article on this subject, published several months ago, adds the following sensible remarks with regard to the *remedy* for the evil: —

"There is a large class of these 'certifiers' that are honest men, and fully believe the statements to which they affix their names. And yet the articles recommended really have not the value, even if they have any value, which those certifying believed that they possessed, and the consequence is a loss to those who put trust in them and their indorsers. In this way not only are fertilizers, seeds, and implements, but quacks and quack medicines, worthless books, and many other things floated on the market, and the people thereby taxed for the support of rogues.

"What is the remedy? We can see no other than a better education for the people. Farmers, with even a very moderate knowledge of chemistry and mechanics, would never be entrapped into recommending valueless manures or machines. If they were even puzzled by specious pretexts and saw some apparent plausibility in the claims of dealers or inventors, they would still have such intelligent doubt as to prevent them from making fools of themselves and misleading their neighbors. A little knowledge of botany would prevent them from planting horse beans under the supposition that they were 'coffee,' buying pears 'grafted upon the black ash,' chess as a valuable grass, Hungarian millet for 'Japanese wheat,' and also prevent them from being seduced into puffing such things, either by certificates or through the newspapers.

"Nothing is so expensive as ignorance, and when our people recognize the fact, and are willing to provide the means for a sound and useful education adapted to the times, in all our public schools knaves will not find so many tools ready to their hands, nor so many victims to gull and swindle."

Errata. — In our last number we stated that the respective diameters of Messrs. Cooke and Clark's telescopes were 24 and 25 inches. We should have said 25 and 26 inches.

HINTS FOR THE FARMER.

A Good Cistern. — A writer in *The Plantation* gives the following sensible directions for the construction of a cistern that will keep water both cold and pure: "Excavate in circular form (for economical reasons) to the depth of sixteen feet or more, wall up all round from bottom ten feet; at this point turn an arch for top, leaving a man-hole for the purpose of cleaning, and continue an opening or flue to the surface of the ground. The filter can then be built on the top of the arch, or at any convenient point near it. This filter is also under the surface, and contains, first, a layer of charcoal; second, a layer of gravel; third, a layer of charcoal, pounded fine, not dust; fourth, another layer of gravel; then a layer of sharp sand. A filter constructed in this way will arrest all vegetable and solid matter that may be washed off the roof. Rain water, if caught in this way, then stored sixteen feet deep under ground, with six feet of earth above the cistern, can develop no animal life, because the temperature is below that which brings animal germs to life.

"From sixteen to fifty or sixty feet below the earth's surface may be termed the region of invariable temperature, which is put down at, say, 53°. Now, if rain water in winter at 32° is allowed to enter a cistern at the depth mentioned above, it follows that it will soon become heated to 53°, or equilibrium. Likewise, if summer rains are allowed to enter the same cistern at a temperature of 85°, following the same law of equilibrium, they will soon be cooled to 53°, the temperature of well water. Every observer must have noticed that water may stand undisturbed during the whole summer in wells, without developing animal life, or becoming impure, but if brought to the surface, and exposed to the summer temperature, the organic matter in it soon decomposes, and life develops in it with astonishing rapidity. My attention was called to this matter by the superior coldness and purity of the water of a cistern located in a deep cellar, and investigation convinced me that its superiority was due, not to the shaded position of the cistern, but to the invariable temperature in which the water was stored."

Cheap and Durable Wrought Nails. — Every farmer probably understands the usual method of making cut nails flexible by heating them; but if, instead of allowing them to cool in the open air, they are thrown when red-hot into linseed oil, it will prevent their rusting almost as long as if they were "galvanized." Those who have occasion to use cut nails instead of wrought, should not forget this simple method of preventing rust.

Pickling Green Corn. — This is a much cheaper method of preparing corn for winter use than canning it. When the corn is a little past the tenderest roasting-ear state, pull it; take off one thickness of the husk, tie the rest of the husk down the silk end in a close and tight manner; place the ears in a clean cask or barrel compactly together, and put on brine to cover the same of about two thirds the strength of meat pickle. When ready to use in winter, soak in cold water over night, and if this does not appear sufficient, change the water and freshen still more. Corn prepared in this way is excellent, very much resembling fresh corn from the stalk.

Turnips for Milch Cows. — A recent English writer puts in a strong plea for turnips, accounting them considerably superior to carrots or mangel-wurzels for milch cows. The milk induced by mangels is large in supply, but of poorer quality and not nearly so productive of cream as that resulting from the use of turnips; and the taint given by the former roots is more objectionable and less easy to obviate or overcome to a passable degree. For carrots the only recommendation is the absence of all unpleasant taste in the butter, as the milk is neither so abundant nor so rich as that obtained by turnip feeding.

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, SEPTEMBER 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

EXPERIMENTS WITH PLATES OF GALVANIZED IRON.

The following are the results of some careful experiments made with the view of ascertaining the action of Cochituate water upon zinc-covered iron surfaces. The metal used was the plate iron, known in the market as "galvanized iron." The table below gives the weight and size of specimens, the number of hours they were exposed, the loss or gain from the action of the water upon the zinc, and the conditions under which the plates were subjected to water action:

No.	Weight of specimens in grams.	Gain or loss in hours.				Size in millimetres.	Conditions of experiments.
		24	48	72	120		
1	13.3767	0.7	1.4	1.7	1.7	35×61	Surface one half exposed to water.
2	14.5933	.8	.8	.8	3.3	43×50	Changed once in four hours.
3	11.9010	.0	.0	.0	2.0	30×61	Wholly immersed in water
4	17.8210	.3	6.0	8.0	9.5	39×67	Placed in running water.
5	16.0540	0	.0	.0	3.0	40×69	Alternating wet and dry
6	18.3600	1.5	2.5	4.5	8.5	41×65	Immersed in same water as No. 3.

A plate of the metal weighing 10.8480 was subjected to the action of caustic potash to remove the zinc coating. When action was complete, it was found to weigh 9.5590, having lost 1.2890. The percentage of zinc deposited upon the iron was thus found to be 11.89.

This investigation affords some interesting and important results, which cannot fail to attract attention. In the first place it proves that Cochituate water acts promptly and continuously upon zinc-covered iron surfaces. It is shown that the action is more energetic when the metal is partly exposed to air and when the water is changed frequently, and also that in running water the decomposition is most rapid.

The zinc-covered plate, when exposed alternately to the action of water and air did not lose weight during the first three days, and on the fifth it *gained* in weight as is shown in the table. By the action of water and air the insoluble oxide formed adheres to the plate and soon arrests action, and this explains why roofs and other exposed plates of zinc do not rapidly corrode and become worthless.

Specimen No. 3, wholly immersed in water, did not lose weight until the fourth day, when the action commenced with considerable energy, and two milligrams of zinc were dissolved. The specimen No. 6, placed in the same water, gave rise to active oxidation, and it was continued vigorously, so that at the end of the fifth day *eight and a half* milligrams were produced. This result is almost inexplicable, and shows the importance of a more extended knowledge regarding the action of water upon zinc.

The rate at which zinc is oxidized in running Cochituate water gives, for every eight square inches of galvanized iron pipe, 9.5 milligrams in five days. A one-inch pipe, fifty feet long, exposes 1887.5 square inches to the action of the water. This would remove six and nine tenths grains of metallic zinc each day, which corresponds to 8.6 grains of the oxide. It is probable from the results of the investigation that the action continues to increase in energy until the whole coating is removed. If the amount of zinc deposited upon pipes is as large as that found upon the iron plates, it would require two or three years for it to entirely disappear. Waters in their action differ in accordance with their peculiar characteristics, some corroding with great rapidity, others more slowly. *There cannot be a doubt but that the waters of all springs, wells, ponds, and rivers act upon zinc promptly and continuously, and hence the danger of employing the metal for water conduction.* The oxide is insoluble in water, but in pipes it forms a light, flocculent powder, which is almost permanently held in suspension, and easily and readily flows along with the water, and hence becomes mixed with articles of food into which the water enters.

STEAM BOILER EXPLOSIONS.

The amount of positive knowledge we have regarding the nature or cause of steam boiler explosions is certainly no greater than that possessed fifty years ago, and everything pertaining to the matter is at present involved in obscurity and doubt. The rigid and careful investigations made by seemingly competent parties into the dreadful casualties that occur so frequently, do not result in settling controverted points, or even in affording explanations which satisfy any one. This is indeed rather annoying and disappointing, and we may say further that it is humiliating to those who boast much of the progress of science and knowledge in this age.

The recent great catastrophe in New York by which more than two hundred men, women, and children were killed or badly injured, has awakened a wide-spread and deep interest in the subject of boiler explosions, and an immense amount has been written and said upon the subject. We have carefully examined into the circumstances connected with every boiler explosion which has

occurred within our reach during the past quarter of a century; and the numerous explosions of one kind and another which have occurred in our laboratory experience have also been studied with the view of ascertaining the cause and conditions under which they occurred. At the Montreal meeting of the American Association for the Advancement of Science, in 1858, we read a paper upon a remarkable explosion which occurred at a steam saw-mill in Haverhill, Mass., in that year. This paper provoked considerable discussion, in which Professors Henry, Bache, and Peirce participated, and it was singular to notice the wide dissimilarity of views expressed by these eminent gentlemen, regarding the cause of the explosion.

The suddenness with which the disruptive forces operate, and the complete wreck which is made of the steam apparatus and buildings, puzzles every one who is inclined to regard the results as due to the expansive force of steam alone. To account for the awful tearing and crushing effects, it seems to many necessary to suppose that some electrical forces, or explosive gases are concerned in promoting the casualties. Not a few reputable chemists and physicists cling to such ideas, and will admit of no contradiction in discussing the subject.

It is difficult, nay, quite impossible at the present stage of scientific knowledge, to understand how any such agencies can be present to cause, or to aid in causing boiler explosions. The theory so often proposed, that the gases, resulting from water decomposition, do the mischief, is manifestly untenable and unsound. We have no space at command in which to discuss this notion; indeed, it is not advisable or necessary to do so. No theory based upon this idea can be intelligently defended; at least this is the view we take of the matter. As to the electrical forces, and the possibility of their presence in these casualties, there is this to be said, that not a particle of proof can be offered in support of the theory, and it seems equally absurd with the other. Electricity always has been, and we suppose always will be a kind of pack-horse, astride of which any dark problem in science may be placed. We have met with explosions resulting from the accumulation of elastic vapors, as those of ether, chloroform, bisulphide of carbon, etc., and those from fulminating compounds, the gases, and gaseous mixtures, and a great variety of chemical agents which have often placed us in great peril, and from many of which we have not escaped without injury. Two heavy explosions of copper vessels in which was stored carbonic acid gas, have occurred whilst we were engaged in experimenting with the agent, and these we regard as more exactly representing the conditions under which steam boilers explode than any of the others. Boilers acted upon by steam gradually accumulated, and cylinders of metal subjected to pressure by carbonic acid developed under similar circumstances, are placed in conditions quite alike so far as the nature of the mechanical force is concerned. The decomposition of any of the alkaline or earthy carbonates with acids, enables us to develop the gas at will, and we can confine the agents in strong vessels and generate the gas slowly or rapidly, and thus graduate the pressure the same as the engineer controls pressure in his steam boiler. This is done in the ordinary way of manufacturing what is known as "soda water." It is well known, however, that these strong vessels often explode with great violence, and many lives have been lost from this cause. One of the vessels which exploded in our hands, was torn asunder in the middle, and the lower portion was forced through a double floor into the cellar, cutting off beams in its way, and making an orifice nearly four feet in diameter. The report was loud, and the destruction of the surrounding apparatus was well-nigh complete. In these cases we get violent explosive action from excessive gas pressure, and why should we not have a display of similar force from simple steam pressure? In the case of the gas, the supposition that it is aided by electricity or any extraneous suddenly developed agents, is absurd, and it is equally absurd to suppose that any other forces but steam are brought into play when boilers explode. The recent explosion in New York was undoubtedly caused by steam pressure, the force from within acting upon plates of iron probably weakened by having been long subjected to the strain. We are led to believe that the crystalline structure of metals is changed when they are subjected to constant pressure for several consecutive years, and consequently they are weakened and more easily ruptured.

The consideration of this important point requires more space than we have at command, and therefore it will be deferred to our next issue.

ANALYSIS OF LIMESTONE.

In the last American edition of Fresenius's "Quantitative Analysis" it is mentioned that small quantities, under half a gram, of lime may be determined by converting it into the oxide and weighing it as such. We have used this method constantly for some years, and have never restricted ourselves as to the amount taken. In fifteen minutes with a good blast-lamp we can drive the carbonic acid completely from one or two grams of any specimen of limestone or dolomite that we have ever met with. We have found the following method perfectly satisfactory for analysis of limestones and dolomites, free from pyrites.

For H_2O. Grind the mineral to a fine powder and dry it at 100° C. until it ceases to lose weight. A weighed portion is then heated to incipient redness and again weighed; the difference in weight, if any, gives the combined water.

The same portion is again heated for about fifteen minutes over a Bunsen gas blast-lamp. It is then weighed and ignited again for about five minutes. If at the end of the second ignition the weight does not differ more than a few tenths of a milligram, it may be regarded as constant. The loss of weight, less the amount of water, will be the weight of CO_2.

The residue is then dissolved in HCl, evaporated to dryness, moistened with HCl and again evaporated to dryness, in order to render the silica insoluble. It is then treated with dilute HCl, and the insoluble silica collected on a filter and weighed in the usual manner.

In the filtrate determine the Fe_2O_3 by precipitation with ammonia, having previously added a little bromine water to oxidize any ferrous oxide that may be present. If alumina is present, the iron and alumina may both be weighed together. The ignited residue is then treated by Deville's method as modified by Cooke.

In the filtrate from the iron determine th lime by precipitation with oxalate of ammoni The oxalate of lime is ignited over the blas lamp until it ceases to lose weight; from its fine divided state it is much more readily convert into the oxide than the native carbonate.

The magnesia is determined by precipitatic with hydro-disodic phosphate in the usual way.

We think that any one who has tried the co version of calcic carbonate into the oxide w never be persuaded to go back to the old meth of determination as carbonate.

In case the limestone contains organic matte the above method will have to be slightly mod fied, by determining the carbonic acid with son of the many forms of apparatus devised for th purpose. The difference between the amount acid found in this way and the loss of weig after having driven off the water, will give ve closely the amount of organic matter presen If P_2O_5 is present, it may be determined by th molybdate of ammonia method. We have ol tained very good results when the quantity w above half of one per cent. with Munroe's metho

OPPOSITION TO NEW INVENTIONS.

In an article on "The Spread of Inventions which appeared in the Journal for Augus 1870, and portions of which are still going th rounds of the press uncredited (we have see them within a fortnight in papers from Georg and from California), we gave some examples o the slowness with which valuable inventior travel from one country to another, and of th popular clamor that is often raised against the Among these examples were such every-da household comforts as chimneys, and table-fork both of which were at first ridiculed and decrie as marks of luxury or affectation; and even suc a plain, practical contrivance as the saw-mill, th introduction of which into England was ke back a full century by the opposition it encou tered.

The instances we mentioned are but few o many that might be drawn from the history o invention in modern times. Everybody know that Fust (or Faust, as his name is commonl given), one of the trio who invented printin was charged with being in league with the devi and that he and his coadjutors found it no eas task to overcome popular prejudice against the new way of making books. And it was no until three centuries later that the art of printin had become established in every country of Eu rope — if Turkey, where the first printing-pres was set up less than a hundred and fifty yea ago, is to be counted as a country of Europ and not rather as a part of Asia, overlapping th European limits. From 1726 to 1740, that firs press at Constantinople sent out only twenty three volumes. It was then stopped; and it wa forty years before another press was established at Scutari. After issuing about forty volume in some twenty-five years, that also was stopped in 1807, and it was not until 1820 that it re sumed operations.

The ribbon-loom was invented in the sixteent century, and on the ground that it deprived man workmen of bread, it was prohibited in Holland in Germany, in the Papal dominions, and in othe parts of Europe. At Hamburg, a loom was pub licly burned by order of the authorities. The stocking-loom was equally unlucky. In England

it was commended to the patronage of Queen Elizabeth, but her influence does not appear to have been exerted in behalf of the invention, if, indeed, it was not used against it. In France, it was brought into discredit by a contemptible trick of its enemies. A pair of silk stockings had been woven for presentation to Louis XIV., but the parties who supplied hosiery to the court caused several of the loops of the stockings to be cut, and the work of the new machine was condemned as imperfect.

The glazing of earthenware is effected, as is well known, by throwing common salt into the oven at a certain stage of the baking. This process was introduced into England, in 1690, by two brothers, who came to Staffordshire from Nuremberg. They kept it carefully secret, but their success excited the jealousy of rival manufacturers, and the persecution to which they were subjected soon compelled them to give up their works.

It is a familiar story that Galileo was led to invent the pendulum from watching the slow and measured swing of a large chandelier in the cathedral at Pisa. It may not be so generally known that so late as the end of the seventeenth century, when it was proposed as a standard of measure in England, it was ridiculed, and the nickname of "swing-swang" applied to it.

The spinning-jenny was invented by James Hargreaves, a poor weaver of Blackburn, England. He kept it a secret, and used it solely for his own work, but the matter leaked out through the indiscretion of his wife Jenny; and the result was that the weavers of Blackburn broke into his house, destroyed the machine, and drove the luckless inventor from the town. His is but a single instance out of scores of a similar character, connected with the introduction of labor-saving machinery in the manufacture of woven fabrics.

The nineteenth century can furnish more than one illustration of our subject. The world is slow to unlearn its old habit of stoning the prophets that come with the good tidings of a fresh blessing for the human race. The ignorance of the multitude, who imagine some mysterious danger in every marked departure from the ways of their fathers, and the selfishness of the few, who think more of the temporary loss their own craft may suffer than of the lasting gain the rest of the world will receive from the new device, are alike enlisted in warfare against it. When it was first proposed to light London with gas, the imaginary perils of the undertaking, in the eyes of the good people of that day, were not unlike the real ones that attend the use of bad kerosene in our own generation. If the pipes laid for the conveyance of the invisible vapor had been filled with gunpowder, the risk of being blown up could not have appeared more serious, nor could the outcry against the scheme have been louder. But we presume that it was not a great while before the frightened cockneys walked their native streets without fear of artificial earthquakes, and lit their gas-burners as fearlessly as if they had been the candles of the "good old times." "How use doth breed a habit in a man," even if he be ever so conservative!

☞ "Book Notices" and "Answers to Correspondents" have been crowded out of this number.

EDITORIAL NOTES.

A Railway Incident in England. — There are many excellent points in the management of English railways, but in some respects they are decidedly behind the times, looked at from a Yankee point of view. It is but very recently that English trains have been furnished with any means by which passengers could communicate with the conductor or the engineer in an emergency; and even now apparatus of the kind is the exception to the rule. So far as we know, the chief objection made to its general adoption has been that the exuberent vivacity of the British temperament would lead to playing tricks with the cords and bells; and so lest some sportive cockney should attempt a practical joke, the lives of thousands have been daily endangered. An English journal before us furnishes an illustration in point. "Last Wednesday," it says, "an excursion was organized in order to give a certain number of school children a trip from Selby to York and back. On the return journey, when about seven miles from York, by some means as yet unexplained, about 100 yards of signal wire got entangled with the train, which was then running at a high speed. This wire was lashed about in all directions at the rear of the train; it threw into the air quantities of gravel and stones, tore up the posts first on one side then on the other. If the train had passed a station or houses, the last carriages would probably have been jerked off the line, and any persons happening to be standing on the embankment, or at a crossing, might have been killed. The local papers state that the passengers, being alarmed at the unusual noise, looked out, and, perceiving something was wrong, contrived to secure the attention of the guard, whether by thrusting themselves or one of the school children well out of the window does not appear; but 'the guard failed to attract the attention of the engine driver.' So the train continued ploughing up the gravel, and lashing the posts with its wire whip, until by a happy chance the wire was disentangled and left behind."

Newspaper Science. — We find the following in a leading article in one of our exchanges: "We have no means of ascertaining the distance of the fixed stars. When, therefore, they are said to be in the Zodiac, it is merely implied that they are situated in that direction, and that they shine upon us through that portion of the heavens which we call the Zodiac. Whether the apparent difference of the size and brilliancy of the stars proceeds from various degrees of remoteness or of dimension, is a point which astronomers are not able to ascertain. Considering them as suns, we know no reason why they should not vary in size, as well as the planets belonging to them."

The writer does not appear to be aware that the distances of quite a number of the fixed stars have been pretty accurately measured, and that these measurements prove that some of the brightest stars are much farther off than others that shine with fainter light. Sirius, for example, the most brilliant of the heavenly host, is unquestionably more distant than the star known as 61 *Cygni*, which is barely visible to the unaided eye. The latter, by the way, as most of our readers do not need to be informed, was the first of the fixed stars whose distance was ascertained. A comparison of the brightness of stars whose distance is known with the light given by the sun proves, not only that these remote orbs "vary in size," but that some of them are vastly larger than the one which forms the centre of our own system. These facts, now familiar to schoolboys, ought surely to be known by any one who ventures to write newspaper articles on astronomical topics.

Here is another little paragraph which we cut from a paper which is rarely at fault on scientific subjects. "The *Seneca Falls Reveille* says: 'A son of Isaac Bishop, living near Ovid, about thirty years of age, has whittled out a wheel that will run until worn out. A rather singular coincidence, that at about the same date with the above, a man living near Bearytown has also produced a self-running machine. It may be held fast by the hand, and upon releasing the hold will start off itself and gradually accelerate until it gains its maximum rate of speed. It is thought by those who have seen it, that it can be applied to an almost endless variety of uses, and is consequently worth millions of dollars to the inventor.'"

Though it has been shown, again and again, that "perpetual motion" is a mechanical impossibility, since no machine can create power, or even apply power without losing or wasting more or less of it, it is hard to make some people believe it; and paragraphs like the above are continually appearing in the papers. It is a noteworthy fact, however, that these wonderful inventions which are going to do so much work without any motive power, and make so much money for their originators, are never heard of afterwards.

Galvanized Iron Pipes. — Those interested in furnishing these dangerous water-pipes appear to be zealously engaged in defending their wares in the newspapers. They have some worthy coadjutors and defenders among the doctors, and they claim to have a friend in no less a person than the Secretary of the Massachusetts State Board of Health. Dr. Derby is too respectable a gentleman to be found in such company, and for the sake of his reputation we hope he will explain himself before long. The text from which the newspaper gentlemen preach is that supplied by Dr. Winsor of Winchendon, whose *luminous*, *scientific*, and *exhaustive* "report" we have several times commented upon in the Journal. No facts, no experiments, the results of no investigations are presented by the doctors who prepare the newspaper articles in support of the pipes. They supply none because they have none to give. These men are not chemists, and in no proper sense are they physicians. It is to be expected that men engaged in a profitable manufacture will attempt to defend their interests; there is for them some apology, some excuse, but for the men who call themselves physicians, and presume to act as advisers upon sanitary matters, none whatever. They do not rise to an equal level of respectability with the quacks who advertise nostrums in the same newspapers in which appear their communications.

A Pleasant Affair. — The grand banquet given in July by the shoe manufacturers of Haverhill, Mass., to the trade throughout the country, was indeed a very pleasant and enjoyable affair. The tables were spread upon the shore of the lovely Kenosa lake, and a party numbering seven hundred assembled about them, and a more social, happy gathering has seldom been seen. There were representatives from nearly all the Southern and Western cities: from Charleston, Memphis, New Orleans, Savannah, Mobile, etc., from St. Louis, Chicago, Cincinnati, and all prominent points in all the States. Business matters were ignored for the time, and the day was devoted to kindly greetings, and social intercourse. The party represented patriotism, influence, intelligence, wealth, and we could not help feeling as we surveyed the company, that if the political affairs of our country could be placed in the hands of such business men for a single year, nearly all the sectional prejudices and animosities created and fostered by miserable politicians would be done away with. It is a pity business men cannot have a larger share in the management of our national affairs.

Prizes for Chemists. — The "Prussian Association for the Promotion of Industry," at Berlin, has offered several valuable premiums for certain *desiderata* in practical science. The gold medal of the association, or the value thereof in money, and in

addition thereto a sum of $750, will be given for a thoroughly reliable and ready method of determining the quantity as well as the quality of the various compounds met with in commercial aniline (aniline oil as it is also termed), and the influence which these compounds exercise upon the manufacture as well as upon the yield of fuchsine; it being also desired that the author should explain under what conditions aniline yields the largest quantity of coloring matter. The silver medal, or money value thereof, and a sum of $225, will be given for the preparation of an opaque red enamel on gold, silver, copper, or bronze. A donation of $185 will be given to the author of a concise and critical work upon the composition of cements in relation to the wants of industry. The silver medal, or the money value thereof, and in addition thereto a sum of $112, will be given to the author of an exhaustive essay on the industrial manufacture, mode of formation, and chemical constitution of coralline (also known as aurine, rosolic acid, and peonine), and on the blue pigment, azuline, derived from it. The silver medal, or its value in money, and, moreover, $375, will be given to the inventor of a yellow-colored solder which possesses the qualities and properties of the ordinary tinmen's solder. The aim of this solder should be to join brass, or similar alloys, in such a manner as to hide the joints from being visible by the different color of the solder.

ATOMS.

CHICAGO has just completed, at the expense of three millions of dollars, a unique and useful enterprise, in deepening the canal connecting the "Chicago River" with the Illinois, so that, instead of flowing with a sluggish stream into Lake Michigan, it runs the other way, through the canal to the Illinois, with a current strong enough to sweep away the filth that used to accumulate in its waters, making large portions of the city almost uninhabitable in summer. — A train on the Pennsylvania Railroad lately made the run of 132 miles from Altoona to Harrisburg, in two hours and fifty minutes, or at the rate of nearly fifty miles an hour. — Earthquakes are unusually frequent this year in all parts of the world, and some one suggests that "Mother Earth," instead of being called *terra firma*, is in danger of becoming known as *infirma*. — In painting the inside of wooden pails, no lead pigment should be used (as serious cases of poisoning have resulted from the contamination of the water by such pigments) but either whiting or gypsum, if a white color is insisted upon, or ochre, if the best material is desired, without regard to color. — The use of torpedoes for increasing the flow from oil-wells has been patented; the process consisting in sinking to the bottom of the well a water-tight flask, filled with explosive material and ignited by means of electricity. — A typographical error may sometimes lead to serious consequences, as in the case of the Bordeaux editor, who was arrested for stating in his paper that "some of the streets of the city have not yet been defiled by the German troops," and who was released only upon making it clear that he had written *fouillés* (searched) instead of *souillés* (defiled). — Fifteen thousand young shad from the Hudson have been "transplanted" to the upper waters of the Sacramento in California, where they appear to be doing very well. — It is rumored that the Duke of Sutherland, in connection with two other wealthy men, is about to buy the Suez Canal for six million pounds sterling, a little more than a quarter of its original cost. — More than half a million sewing machines were made in the United States last year. — It is stated on good authority that more oranges are exported from Mobile than from Messina. — "Ashberrium," a substitute for Britannia metal, invented by Ashberry, of Manchester, consists of 80 parts tin, 14 of antimony, 2 of copper, 2 of nickel, one of aluminium, and one of zinc. — Gum tragacanth mucilage can be prepared much more quickly and of a more uniform consistency by first rubbing up the powdered gum with a little glycerine before the water is added; as in this way the formation of lumps is entirely avoided. — The French and Austrian goverments have begun to raise sponges artificially; the former on the shores of the Mediterranean, and the latter on the coast of Dalmatia, and the cultivation is said to be perfectly successful and very profitable. — A soda lake has been discovered near the Union Pacific Railroad, several miles in circumference, and capable of supplying sixty-five thousand tons of soda annually. — Chloride of tin is much used for the purification of syrup, but unless prepared with great care it is liable to be contaminated with the lead which is almost always present in commercial tin, and lead poisoning may be the result. — Road steamers have been introduced into Brazil, and they appear to be growing in favor wherever they have become known. — The *gamins* of Paris have been doing a lively business in the sale of the teeth of dead Communists, having disposed of five thousand of Dombrowski's dentals at twenty francs apiece; but the market for Cluseret's was spoiled when it was discovered that the report of his death was false. — Tincture of guaiacum, half an ounce, and essence of gualtheria, one drachm, added to one pint of cod-liver oil, completely cover the taste of the latter. John Bull is always interested in questions of genealogy; and that may explain the fact that, since the publication of Darwin's "Descent of Man," there has been a marked increase in the number of visitors to the monkey-house of the Zoölogical Gardens in Regent's Park, London. — The oleander, so popular as a house and garden plant, is extremely poisonous; nearly fatal results having followed the eating of a few buds or leaves. — Despatches have been sent direct, without any re-transmission, between London and Bombay, a distance of six thousand miles by the Indo-European line of telegraph. — A saw-mill owner, at the celebration of his wooden wedding the other day, was presented by his workmen with ten thousand feet of lumber, while a neighbor contributed thirteen large poplar logs. — — The immense business done by some of the leading English railways may be inferred from the number of locomotives employed by them; the London and Northwestern having 1,527, the Great Western 867, the North Eastern 865, the Midland 683, the Caledonian 523, and seven others more than 200 each.

Medicine.

REMEDY FOR POISON BY IVY (RHUS TOXICODENDRON). — I send the following, which I have used for more than twenty-five years with great satisfaction. The tormenting burning pain is relieved instantaneously; and the worst cases are cured in one or two days: —

Bruise, slightly, a handful of White Ash leaves (*Fraxinus acuminata*); add new milk enough to cover; simmer ten minutes, and apply, *as hot as can be borne,* three times a day.

J. D. STEWART, M. D.

COILA, N. Y.

A CASE OF ZINC POISONING.

ON the last Monday of June, 1870, I was called to see Mrs. A. E. F. of this town, twenty-eight years of age, of full habit, and until within two or three weeks, of perfect physical antecedents. Since that time she had suffered from a variety of anomalous sensations which had increased in severity until this date. I will here transcribe her language, expressive of her feelings and condition: "I have pain in my head, feel drowsy most of the time, am sick at stomach, and have a dreadful sensation in my stomach; have to keep expectorating all the time, and the mucus has a disagreeable metallic taste; my limbs ache, I have pains in the knee and ankle joints, my right arm pains me and I cannot control my lower limbs nor my right arm. I have occasional diarrhœa, — no appetite, and when I lie down I am numb all over. I fear apoplexy." She had a peculiarly cadaverous, pinched, unnatural expression of face, a slow pulse, easily compressed under the finger, a moist surface, a dirty, moist tongue. Scanty urine, color not unnatural; and she was raising a large amount of mucus of a milky color. With this train of symptoms, singularly grouped, I came to the conclusion that she was suffering from narcotic or mineral poison, and at once commenced investigating the sanitary condition of the family. My attention was directed to the water-supply, with the following results: During the month of April or early in May a galvanized submerged pump was placed in the well from which all the water used on the premises was drawn, and in the absence of any other visible cause for these strange, incomprehensible phenomena, zinc was suspected. The next morning the pump was removed, and its condition inspected. The zinc coating over a portion of the surface was entirely removed, and over the remainder was thoroughly corroded, so as to be easily removed with the finger, and after drying deposited a fine white powder which I considered carbonate of zinc. Mrs. F—— continued in critical condition for several days. I was enabled, by active, efficient means, to improve the heart's action speedily, but the nausea and distress at stomach and glandular mucous secretion were obstinate in yielding to means administered; the power to use and control the lower extremities continued to embarrass her exceedingly for six weeks. On the 20th of August she was able to be removed to the seashore, and there she recuperated rapidly. She returned early in September, very much improved, though she still had some pain in joints of knees and ankles, and to this day her right arm gives her annoyance in failing at all times to respond to her demands. I have to apologize to the profession that I did not carefully note, as I should now do, all the developments visible and worthy of record, for I was incredulous somewhat in regard to the alleged danger of galvanized iron in water conduction, having never before seen a case where I could trace any effect from its action, and in short, did not comprehend so fully the situation as a subsequent study of the subject has convinced me its importance demands. I have since treated a case entirely unlike the aforesaid, both so far as the physical condition of the patient, and the effects as manifested thereupon are concerned, which I will report at an early day. The latter case has induced some discussion in the daily and weekly prints in this vicinity, and it is a matter of surprise to me that all the evidence that has been adduced through your columns and elsewhere has failed to so great an extent to impress the profession with the importance of this question.

J. R. BRONSON, M. D.

ATTLEBORO', MASS., *July*, 1871.

CHOLERA, ITS ORIGIN AND TRAVELS.

We make the following abstract from an ar-cle on Asiatic Cholera by J. C. Peters, M. D., the *New York Medical Journal.*

He commences with the statement that every atbreak of the disease beyond the confines of ritish India may be traced back to Hindostan, ther through a continuous chain of human be-gs affected with the disease, or through water ontaminated, or articles stained with their de-cta.

Cholera is endemic in Calcutta, where the eaths by it range from 2,500 to 6,400 in a year. he principal cause of cholera in India is the thy condition of the native towns and villages; ese consist of a mass of huts constructed ithout any plan or arrangement, without roads drains, ill ventilated, and never cleaned. Most the native towns are the abode of misery and th, and are nurseries of sickness and disease. hey abound in green, slimy, stagnant pools, full putrid vegetable and animal matter in a state decomposition, whose bubbling surfaces exhale, nder a tropical sun, noxious gases, poisoning e atmosphere, and spreading around disease d death.

These ponds supply the natives with all their ater for domestic purposes, and are also the ceptacles of their filth. Even the artificial nks are fed with water from the drains that unify over the villages and carry out the sewage the huts.

None of the villages possess a single road rough which the smallest cart can pass to re-ove the filth, which is all thrown out of doors.

From frequent heavy rains which occur from me to time, it is easy to imagine how frequently e tanks containing the supplies of drinking ater must be contaminated with all manner of purities contained in the filthy soil.

Dr. McNamara, whose monograph on cholera the principal source from which Dr. Peters aws his information, mentions one case in hich he had the most positive evidence that esh cholera dejecta had found their way into vessel of drinking water. Nineteen persons par-ok of this water — only once; and five of these neteen healthy men were attacked by cholera ithin seventeen hours. Observation has shown owever that this contaminated water may be wallowed with impunity during the process of gestion, the gastric juice being fatal to the infuso-a contained in it. But if it is taken some hours ter a meal, when the stomach is empty and e reaction alkaline, then the cholera matter will t up its destructive changes in the epithelium the stomach, which action speedily extends to e intestines, so that a robust person may easily d quickly succumb to the disease.

Hence persons with weak digestions, and ose suffering from depression of the nervous rce, whether following fatigue or a debauch, are pecially apt to be attacked. If cholera dejecta e cast upon dry ground and no rain occurs, en a high wind may drive clouds of cholera ıst here and there, which, in a few instances, ay be lodged in the mouths and noses of some ersons and thus give rise to the disease. Chol-a may be also spread by dry dust from clothes cholera patients, but a wide-spread epidemic itburst of the disease can only arise through e drinking water of a place becoming contam-nated with dejecta or other cholera matter.

The cholera, once started on its travels, finds plenty of means of locomotion.

The most powerful causes of its spread are the great religious pilgrimages that are continually taking place in India. Hundreds of thousands of pilgrims annually traverse the roads of India, visiting the various sacred shrines. Many of these, poor, ill fed, and diseased, start on their tedious journeys of 1,500 or 2,000 miles; some drop by the way, others arrive worn and exhausted at their places of destination, there to receive the seeds of cholera, and, returning, scatter them along their route.

Every twelve years the festival of Juggernaut has peculiar sanctity, and draws larger crowds from greater distances; and accordingly we find that these years are marked by the wider spread and greater severity of cholera. One of these festivals occurred in 1817, which was a marked year in cholera annals. 1841, 1853, 1865 were also strongly marked years. The spread of the disease, being better understood, was more fully studied during the attack of 1865. These attacks, or Juggernaut cholera as they are called, are supplemented by one occurring two years afterwards, which takes its rise at the great festival of Hurdwar. The last Hurdwar epidemic occurred in 1867. We may therefore expect another great outbreak in 1877 and 1879. The mouth of the Ganges is another sacred place of the Hindoos. From here the cholera is carried up the stream and communicated to the Mohammedans who are on a pilgrimage to their holy city of Allahabad. They carry it northward into Persia, from whence it extends to the Black Sea and Mediterranean, travelling thus far with bands of pilgrims. When it once comes into the Mediterranean it is then in the track of the commerce of the world, and does not often stop until it has reached Eastern Europe and America. Another great route is through Russia. It was by this route that the cholera of 1831 reached England; from there it was carried by British troops to Canada, from whence it passed to the United States, and finally disappeared in Texas. The cholera sometimes travels over two of these routes simultaneously, and sometimes a small portion of the route is reversed.

It has in many instances been carried by moving armies, destroying more men than fell in battle, and turning a victorious march into a disastrous defeat. This was the case in 1821, at which time a Persian army menaced Bagdad and defeated a Turkish force that was collected for its defence; but a few days after the victory, the Prince Royal of Persia saw his army devastated by the epidemic, and recoiled before this new enemy and carried the disease into the heart of Persia. He lost two thousand soldiers from cholera in one march.

MEDICAL MEMORANDA.

Sesquichloride of Iron and Glycerine in Diphtheria, etc. — Professor Clar, of Vienna, after using pure glycerine with great success in various catarrhal and slight diphtheritic affections, was led to try the addition of sesquichloride of iron in some cases of a more severe type, and the results were very gratifying. He first prescribes a gentle aperient, either in the form of a manna draught or of a few grains of calomel. The latter he considers a powerful antiphlogistic remedy, and of great value when properly used. At the same time cold compresses or cloths are applied to the neck or head, or even to the chest, with cold or iced water as drink. He then commences the use of the iron-glycerine, which consists of two ounces of pure glycerine and twenty drops of the liquor ferri sesquichloridi. Of this mixture half a teaspoonful is given every half hour throughout the day and night. As soon as the symptoms appear to be mitigated, the dose is diminished to a teaspoonful every second hour; and in the intermediate period, with the object of dissolving the exudate, a mixture of two ounces of glycerine and twenty grains of borax is similarly given by a teaspoonful at a time. The iron-glycerine is progressively given at longer intervals, and is gradually replaced by the borax-glycerine.

Aqueous Solvent for Sulphur. — To facilitate the use of sulphur in medicine, many attempts have been made to find an aqueous solvent for the substance, but without success. Dr. Pole, however, now announces that if flowers of sulphur, previously well washed and dried at 212° F., are mixed with an aqueous solution of pure carbonate of soda and the whole digested at 212° for 10 hours, considerable sulphur will be taken up. Linseed-oil is another solvent for sulphur, the amount dissolved increasing with the temperature.

Therapeutic Value of Glycerine. — Dr. Fanto (*Wiener Medicinische Zeitung*) remarks that leading dermatologists are coming to use glycerine, locally applied, as a substitute for many internal remedies that have been extensively employed in cutaneous affections. Glycerine has proved especially valuable in cases of abnormal secretion of sebaceous substances. This is caused by disease of the sebaceous glands, and has its seat, not, as was formerly supposed, in the subcutaneous connective tissue, but in the corium itself. Sometimes the complaint takes the form of a hypersecretion from these glands. This occurs for the most part in infancy, and is known as *seborrhœa*. It is most commonly seen on the scalp, on the face near the ear muscles, and, more rarely, on the extremities. In such cases glycerine acts excellently in softening the hardened masses of sebum on the surface of the skin, and in diminishing the irritation of the organs affected. In conjunction with borax, zinc, and acetate of lead, it also diminishes the amount of secretion. In many instances the treatment must be continued for a considerable time, in order to effect a cure.

Glycerine is equally useful in cases where there is a diminution of the sebaceous secretion, which may lead to pityriasis. In this harsh state of the skin, the softness and natural elasticity may be restored by rubbing glycerine into it. None but a perfectly pure article should be used.

A Refreshing Beverage. — Dr. Waller Lewis, in describing the precautions against cholera adopted at the General Post Office, in London, says: "The men employed in sorting letters and newspapers suffer much from thirst, especially in the hot weather, and consequently drink much water while engaged in their duties. Although the Post Office is supplied with excellent water, much diarrhœa was, nevertheless, the result of this practice. To remedy this the officers, clerks, and men of all classes have of late been supplied from the medical department with a most agreeable drink, which not only assuages the thirst, but has, moreover, strong antiseptic and anti-diarrhœa properties. It is called orangeade, and is thus composed: Take of dilute sulphuric acid, concentrated infusion of orange peel, each twelve drachms; syrup of orange peel, five fluid ounces. This quantity is added to two imperial gallons of water. A large wineglassful is taken for a draught, mixed with more or less water according to taste. The officers drank this with pleasure. It is being consumed in large quantities daily, and I am convinced it will be the means of warding off a great deal of sickness."

The Spread of Scarlatina. — Dr. Johnson, Professor of Medicine in King's College remarks

(*British Medical Journal*) that the spread of Scarlatina is in a vast number of instances the result of gross, culpable, and even criminal negligence. If a patient recovering from scarlatina should proceed to the seaside, it is his duty to inform the proprietor of his lodgings of the case, or the next occupants may take the disease should no disinfecting process be adopted. Infection frequently proceeds from sending the clothes of patients to the laundress without due warning. Dr. Johnson mentions the case of a child suffering from scarlatina, whose sister had died of the same disease a few days before. The father was a tailor, and his workshop opened into the room occupied by the sick child. This affords an illustration of the way in which new clothes may become infected. Medical attendants should be careful to avoid conveying the disease to others; washing or disinfecting the hands after touching a patient, and driving or walking in the open air, are obvious precautions. Dr. Johnson mentions a curious instance of the spread of scarlatina. A child was on a visit to a friend in the country, and died of scarlatina. More than a year afterwards another child came to the same house, took scarlatina, and died. In seeking for a source of infection, it was ascertained that a doll which had been nursed by the first child in her illness, and which had been put by in a drawer, had been taken out and given to the second child to play with some days before she became ill. The suspicion seemed confirmed by the fact that in the interval between the deaths of the two children, some older children who had visited the house and had not touched the doll, remained well.

SEASHORE RISKS IN ENGLAND. — *Apropos* of one of the causes of contagion mentioned in the preceding note, the *Pall Mall Gazette* remarks: "At this season of the year the courage of English parents is severely tried, but is seldom found wanting. It needs no small strength of nerve, even on the part of a bachelor, to face the imminent perils of seaside lodging-houses; but the man who ventures to a watering-place with his wife and a family of young children, and takes apartments without knowing who has occupied them before him, exhibits an amount of pluck which is highly to be commended. He knows that small-pox patients and scarlet-fever patients are generally sent to the seaside to recover their strength; he knows that school girls and boys, if attacked with fever, are immediately despatched to private lodgings; he knows that the hospitality, or the necessity, of lodging-house keepers prevents them from asking inconvenient questions, and yet he encounters the risk manfully, nor does his wife exhibit one sign of trepidation. The truth is, the danger is so common that paterfamilias must either stay at home altogether or shut his eyes to it."

CHLORAL WITH COD-LIVER OIL. — An Italian medical journal recommends the addition of chloral hydrate to cod-liver oil. It renders it much less nauseous, and prevents the night-sweats of the phthisical patient, induces sleep, and creates appetite. The pure chloral-hydrate crystals may be added to cod-liver oil in the proportion of ten grains of the former to one hundred and ninety of the latter.

USEFUL FORMULÆ.

COURT PLASTER. — Soak brushed isinglass in a little warm water for twenty-four hours; then evaporate nearly all the water by a gentle heat, dissolve the residue in a little proof spirits of wine, and strain the whole through a piece of open linen. The strained mass should be a stiff jelly when cool. Now, extend a piece of silk on a wooden frame, and fix it tight with tacks and packthread. Melt the jelly, and apply it to the silk thinly and evenly with a hair brush. A second coating must be applied when the first has dried. When both are dry, cover the whole surface with two or three coatings of Balsam of Peru, applied in the same way. Plaster thus made is very pliable, and never breaks.

TO PRESERVE THE OILS OF ORANGE AND LEMON. — C. Fruh, in the *American Journal of Pharmacy*, recommends adding to every pound of oil 1 oz. of pure alcohol, which having been thoroughly mixed with the oil, there is added to it 1 oz. of water, which again withdraws the alcohol from the oil, and collects at the bottom of the bottle as dilute alcohol. The *rationale* of this process appears to be that the alcohol, by removing foreign resinous and other matters present in the oil, retards the oxidation of the oil by the atmosphere.

HÆMASTATIC COTTON. — This is prepared by Dr. Ehrle, by first digesting the raw material in caustic soda, and afterwards saturating with chloride of iron. It has been thoroughly tried in the hospitals of Europe during the last six months, and is everywhere highly commended. It is applied in the same way as lint, and as it absorbs water, close bottles or packages must be employed for preserving it. It would be a good article to have on hand in every household.

GLYCERINE LYMPH. — In Prussia regular revaccination is very generally practised, the law making the precaution obligatory on every person, and the authorities conscientiously watching over its performance. As a natural result cases of small-pox are very rare. It has, however, been objected, there as here, that lymph is scarce. To make the most of such lymph as there is, government has tried its application mixed with glycerine, and the result has been so successful as to lead to a public recommendation of the mixture to official vaccinating surgeons. The manner in which the glycerine lymph is prepared is thus described by the *Reichsanzeiger:* The pustules of a healthy vaccinated person are opened with a needle, and the effluent matter carefully removed by means of a lancet, the same instrument being gently applied to assist the efflux. The lymph is then best placed in the hollow of a watch glass, and there mixed with twice its quantity of chemically pure glycerine and as much distilled water. The liquids are thoroughly well mixed with a paint brush. The mixture may be preserved for use in capillary tubes or small medicine glasses. The lymph thus procured is considered equal in effect to pure lymph; care must, however, be taken to shake it before use. As the same quantity that now suffices for one is thus made to suffice for five, the discovery ought to be extremely useful in crowded cities.

TREATMENT OF INTERMITTENT FEVER BY CARBOLIC ACID.

Translated by Dr. H. TUCK, from *Wien. Med. Presse*, March 19, 1871.

DR. TREULICH reports eight cases of intermittent fever promptly cured by carbolic acid. His formula is: —

℞.	Acidi carbolici	gr. iij.
	Inf. gent.	℥v.
	Syr. simpl.	℥i.
M.	Dose, ʒi. ter die.	

His article closes thus: —

1. Carbolic acid is an admirable remedy for intermittent fever, even for obstinate cases which have resisted quinine.

2. Its action is speedy and certain, and it requires such a small amount that it cannot possibly have any injurious effect on the system.

3. The average amount required was four and one eighth grains.

4. It costs only one thirty-fifth of what quinine does, and so is to be preferred for the poor.

5. This successful use of carbolic acid proves that the action of quinine in intermittent fever is antiparasitic.

6. It also favors the opinion that intermittent fever is the result of a blood poison. — *Boston Medical and Surgical Journal.*

APPROVED COSMETICS.

ALMOND BALLS. —.

Take Spermaceti	2 ounces
White wax (pure)	4 "
Oil of almonds	½ pint.

Melt them together in an earthenware pot by t heat of a water-bath, and when the mixture h cooled a little, add

Essential oil of almonds	1 drachm
Expressed oil of mace	1½ "

Stir the mixture constantly until it begins to co then pour it into slightly warmed moulds, which m be ounce gallipots or egg-cups with smooth bottom This will form hemispherical cakes. They may colored by adding the coloring material while t whole is in a fluid state.

CAMPHOR BALLS. — These are much employ to prevent chapping of the skin and chilblains.

1. Take Spermaceti,	
White wax (pure) of each,	2 ounces.
Almond or Olive oil	½ pint.

Melt them together by a gentle heat, and add

Camphor (cut small)	1 ounce.

Stir until it is dissolved, and then proceed as d rected for "almond balls."

2. Take Clarified suet	1 pound.
Spermaceti	3 ounces.
White wax	2 "
Camphor	1 ounce,

and proceed as before. [Whiteness is a recomme dation to camphor balls, therefore the materi should be as free from color as possible. They ma be perfumed according to fancy.]

CAMPHOR BALSAM. —

1. Take Spermaceti	2 ounces.
Olive oil	½ pint

Dissolve by a gentle heat and add

Camphor (cut small)	1 ounce.

Stir the mixture until nearly cold, and then p into short, wide-mouthed bottles, which should b kept well corked. [Less than the above quanti may be used.]

2. Take Curd soap	1 ounce.
Water	1½ "

Dissolve by heat, and stir in of

Camphor	½ ounce,

previously dissolved in

Olive oil (hot)	3 ounces.

When the whole is thoroughly combined and col add

Oil of origanum.	¼ ounce.
Strongest water of ammonia	½ "
Alcohol	1½ "

and proceed as in number 1. [These are stimulan and anodyne. The first may be used to preven chapping of the skin, to remove chilblains, and t stimulate the growth of the hair. The second i better for frictions in lumbago, rheumatic pain etc.] — *Druggists' Circular.*

OPPOSITION TO VACCINATION IN ENGLAND. — There is still a good deal of feeling against vaccination among the more ignorant classes of the population in Great Britain. Referring to the exhibition at the National Portrait Gallery, a London paper says: "Dr. Jenner, although now placed very high and in an unfavorable light, did not escape frequent observation. A woman pointing to it said to her girls, 'There's the one that's making such a lot of children suffer now from vaccination.'" Whereupon another journal remarks, "Poor Dr. Jenner! with his statue placed in a pond in Kensington Gardens, his picture hung in an unfavorable light, small-pox raging in the metropolis, and the Anti-Vaccination League calling him dreadful names, and casting mud at his memory, his punishment certainly exceeds his offence."

ABOUT 15,000 tuns of ammonia-alum are made annually in England. It is principally consumed in the dye works of Manchester and Bradford.

Boston Journal of Chemistry.

lume VI. BOSTON, OCTOBER, 1871. Number 4.

Familiar Science.

IKE SUPERIOR AND THE COPPER MINES.

Lake Superior has always been to us one the wonders of the world. Although it was overed by the Jesuits before Lake Erie or ke Michigan, a great portion of it still remains ost unknown and unexplored.

The white man has merely encroached on its thern and western shores, while the great ntry to the north of it still remains almost *terra incognita* that it was when the Jesuits nded their lonely mission at the entrance to "great sea water," the Gitchee Gumee of the ians. There, at the beautiful Sault de Sainte rie, the mission bell still rings its matins and pers, and the good fathers may still be seen he streets with their long gowns and broad s. The Indians still fish in the rapids for r favorite white fish, holding with the aid of ngle paddle their birch-bark canoes as mo- less as a vessel at anchor, while the current hes and boils around them. But the restless erican has been at work here, and a broad, p canal connects the water of the lake with quiet river below the rapids. This was con- cted by a company who received a land grant n the United States. The tonnage passing ugh this canal is every year becoming heav- for it conveys the products of the vast iron es near Marquette and the copper mines of eenaw Point, and soon the vessels bringing products of the new country opened by the thern Pacific road will begin to pass down.

rom the times of the earliest trappers it has known that there were great deposits of er somewhere around Lake Superior, but the ans, who were always willing enough to sell copper, refused to tell of its whereabouts. it is only within comparatively recent s that the mines have been opened and ed. A trip to these mines is an extremely sant excursion, and one that may combine a t deal of instruction with pleasure. Boats regularly several times a week from Buffalo, ping at Detroit, and going up the lakes as far uluth. The best point, however, for seeing copper business is Houghton, on Portage e, as this is in the centre of the mining re-

ortage Lake is a curious sheet of water. It Keweenaw Point almost in two, and formed ort cut for the Indians who travelled in their -bark canoes. They never ventured far from e, and this inlet saved them many weary s of paddling around the point. But to up for this, they had a "carry" of half at the head of the lake across to the west of the point; and from this the lake takes me. The white man has improved on this by cutting a ship canal through this half of sand, and the largest steamers now pass e once the Indian wearily carried his canoe.

The mines lie on both sides of the lake near Houghton, and extend along the point and westward toward Duluth. Some copper has also been found on the north shore of Lake Superior, but the principal deposits seem to be those of Keweenaw Point. The road from Houghton to Eagle River passes by some of the most interesting of these mines, and among them the Calumet Cliff and Phœnix. This latter mine is somewhat celebrated as being in the same predicament as the man who bought the elephant. A mass of copper was struck some years ago which has been estimated to weigh more than three hundred and fifty tons. It is pure metallic copper, in one single piece, and the question was what to do with it. They could not raise it in a single lump, and it was so compact that they could not blast it. They at last resorted to drilling off piece after piece; but this costs almost as much as the copper is worth. Nearly the whole of the copper mined here is found in the state of metal, and only needs to be smelted to free it from the rock and fit it for use.

The Cliff mine is one of the most interesting, as it penetrates deeper into the earth than any other mine in America. We selected this mine for examination, partly from this reason and partly because it was one of the best supplied with labor-saving appliances in the region.

It is an old saying that when you are in Rome you must do as the Romans do; and when you go into mines you must do as the miners do. So we took off our clothes, and arrayed ourselves in the coarse canvas apparel of the miners. It must be confessed it did not improve the appearance of the party. Each of us was provided with a coarse canvas hat furnished with a pad inside to protect the head from falling fragments of rock, and on the outside with a lump of clay in which to carry our candle. Thus equipped, we commenced our descent. A miner led the way, followed by the party, while another miner closed the procession, in order that there might be no stragglers. The descent for the first seven hundred and fifty feet was comparatively easy, as we went down on the "man engine," which is a curious affair made expressly for conveying the men to and from their work. Two beams of wood, a foot square and seven hundred and fifty feet long, are suspended along side of each other at the distance of about a foot. These beams are so connected with a walking beam that they have a perpendicular motion of ten feet. At distances of ten feet apart are fastened foot boards on which a man can stand, while four or five feet above the foot board is an iron handle which he can grasp. When a man wishes to descend he steps upon the foot board which is at the top of the shaft; he is then lowered ten feet by the motion of the beam, and finds himself opposite a foot board on the other beam, which is then at its highest point; he steps across to that board, which then commences its descent, while the one he has just left is ascending. When the second beam reaches its lowest point the first is again at its highest, and he steps back to another foot board on the first, which is then lowered in its turn. This process is kept up until he has gone down as far as he wishes, when he steps from the beam into a gallery.

Our party all safely accomplished the descent, notwithstanding the loss of a candle or two, which went flaming down into the depths below us. It is a dangerous piece of machinery, however, and a year seldom passes without some fatal accident. The miner makes a misstep in the dark, and is picked up a shapeless mass from the bottom of the shaft. After leaving the "man engine," we walked some distance along a gallery, and then began the real work of the descent; for it was yet nearly five hundred feet, or eighty fathoms, as the captain of the mine expressed it, down to where the men were at work. So we still kept on, down over ladders fastened to the rock, the wooden rounds being sometimes almost worn through, at other times gone altogether, while here and there one would be replaced by an old drill. But at last we found ourselves among the miners. Now and then we would be startled by the dull thud of an explosion, that told us they were blasting in other parts of the mine. We were introduced to the captain of the mine, who kindly offered to explain to us the whole process of mining. The vein of copper-bearing rock varies here in thickness from an inch to about two feet. A shaft is first sunk twelve fathoms deep, which may or may not be on the vein; in the latter case, a horizontal drift is extended until it strikes the vein. Galleries are then driven in both directions along the vein, which are called the *levels*. The mine is now ready for work, or *stoping*, as it is called. This is commenced by working away the top of the level, until it is about ten feet high, the men standing on the fallen rock to do the work. They first break away the rock, and having thus exposed a large surface of the vein, this is taken out. After they have thus got to some distance above the floor of the level, heavy timbers are put across from wall to wall, and on these are laid others lengthwise of the level. They then begin work again, throwing the rock on these timbers, and the copper upon the top of the rock. Openings are left at intervals of every two hundred feet in the timber roofs of the galleries, which are framed around with heavy timbers in the same way that log houses are built; these are called *mills*, and serve to conduct the ore to the level below, from whence it is removed in cars to the main shaft. This process of working obviates the necessity of raising much rock to the surface.

After spending an hour or two watching the miners at their work, we prepared to ascend to daylight once more, after securing specimens of copper as souvenirs of our visit. The copper

looked just as bright and fresh as if it had been burnished. The pieces varied in size from grains of sand to masses that would weigh fifty or sixty pounds.

The ascent was far more tiresome than the descent, and we were glad when we stood once more at the foot of the "man engine." This brought us quickly to the surface. After changing our clothes we proceeded to look after the copper that had already been brought up. We found that it was assorted into two sizes, at this mine, called respectively *barrel* and *stamp* work. The barrel work included pieces that were so large that they could be readily sorted out by hand and packed at once in barrels. The stamp work, or *metal*, was composed of rock and copper so thoroughly intermingled that it was impossible to pick out the copper by hand.

This was taken at once to the *stamps.* These vary in form, from the simple Cornish stamp, — which is a bar of wood or iron furnished at its lower end with a heavy shoe of cast iron, and having near its upper extremity a lug which engages in a tooth placed on a revolving shaft, like that of a trip hammer, — to the highly complicated steam hammer. But they all answer the same object, that is, to reduce the ore and rock to a fine state of division. As fast as it becomes sufficiently fine to pass through the screen in front of the stamps, it is carried off by the stream of water that is constantly flowing through them. The further separation of the ore and copper is now effected, on the principle that if you agitate two substances together in water, the one having the greater specific gravity will sink to the bottom, while the lighter will be carried away by the stream. Many curious and interesting devices have been invented for this separation, but they all depend on this same principle. By continuing this operation long enough, the ore is at last obtained almost entirely free from rock. It is then packed into barrels, and is ready to forward to the smelting works; for although it is now nearly pure copper, it is in too finely divided a state to be of any practical use.

A small amount of native silver is also obtained in these mines, but the most of it finds its way into the pockets of the workmen. Lake Superior copper is the purest that is mined in the world, the only impurity being a trace of silver.

At the smelting works, which we visited at Detroit on our way up the Lakes, all the complicated processes of the Swansea (England) works are dispensed with.

The copper when it comes to the works is already in the metallic state, and only requires to be melted. We found there, in addition to the barrel copper and stamp work, another description of ore known as *mass.* This consisted of huge masses of copper, some of them weighing eight or ten tons. The furnaces used are reverberatory, and resemble those in iron works, except that the top is movable in order to introduce the mass copper. After the copper is melted it is stirred with green wood poles, to reduce the oxide formed during the melting, which would, if allowed to remain, make the copper brittle. It is then dipped out in iron ladles, and run into ingot moulds. Notwithstanding the great excellence of the Lake Superior copper it can only compete with that of foreign manufacture by reason of the excessive duties levied on all imported into the country. The ore can be taken from Chili to Swansea, reduced, and brought to this country, at a lower rate than that for which the mine owners on Lake Superior can afford to work.

ANILINE COLORS.

ANILINE was first discovered in 1826, by Undervorben, who obtained the body while experimenting upon the destructive distillation of indigo. But if this were the only source of aniline, we should still be without the beautiful colors that are now so extensively used. If coal-tar is distilled by steam heat, and all the products that pass over below the temperature of 90° C. are collected, we obtain a colorless mobile liquid, having the odor of coal gas, and known as *benzol.* If this liquid is mixed with strong nitric acid, a violent reaction takes place, and *nitro-benzol* is formed. This is the well-known artificial oil of bitter almonds, which is used as a perfume for soap. When this body is distilled with acetic acid and iron filings, aniline is produced. This is the source of all the aniline found in commerce.

In 1856, Mr. Perkin, while experimenting with aniline in hopes of making quinine, treated it with potassic bichromate. He did not succeed in producing quinine, but he did produce a most beautiful purple dye, which was soon introduced to commerce under the name of *mauve.* A host of imitators at once sought to obtain the color without using potassic bichromate. As the only use of the latter was to oxidize the aniline, they reasoned that they might use any other oxidizing agent. Arsenic, among other substances, was tried, but instead of a purple, the red known as *magenta* was the result. The coloring matter, however, does not contain any arsenic; being a salt of a base called *rosaniline.* Magenta is manufactured on an enormous scale in England, more as a substance from which to obtain other dyes than for direct use in dyeing. A single firm produces twelve tons a week. The quantity of magenta furnished by one hundred pounds of coal, is very small; but this is compensated for by its intense coloring power, since it will color a quantity of wool, nearly equal in weight to the coal. In making magenta on the large scale there are considerable quantities of residual products. These of course have been examined with a view to further profit, and the result has been the discovery of a beautiful orange color called *phosphine.* This is much used to produce scarlet, by first dyeing the silk or wool with magenta, and then passing it through a bath of phosphine.

By treating magenta with aniline, a beautiful blue is obtained. This is insoluble in water, but it is rendered soluble exactly as indigo is, by treating it with sulphuric acid.

Another curious dye formed from aniline is known as *Nicholson's blue.* This is completely decolorized by alkalies, and the color is restored by acids. In dyeing with it, the silk or wool is first immersed in a colorless solution of the dye, and then dipped into dilute sulphuric acid, when the blue is at once developed.

If magenta is heated with iodide of ethyl or methyl, an excess of the iodide being employed, a most beautiful green is the result. If, however, this green is heated sufficiently to drive off the excess of iodide, a violet color is the result; so that it will not do for ladies wearing dresses dyed with this green to sit too near the fire. After all the coloring matter has been extracted from the aniline, a residue remains which has an intense black color and is largely used for making printing ink.

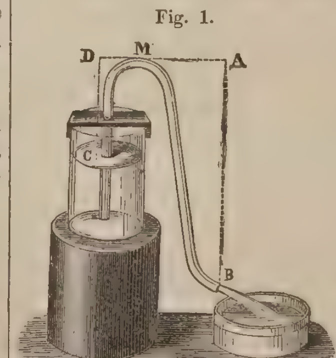
The aniline colors are not so well adapted for cotton and linen goods as for silk and wool. In order to dye the former some mordant is required, and for this purpose albumen is generally used. Very few of the aniline colors when in powder give a person any idea of the color which they will produce when moistened. Magenta, for instance, when dry, is a beautiful green with a bronze-like lustre. It is a pretty experiment to coat a sheet of glass with one of these colors, which is readily done by dissolving in alcohol (Hofmann's violet being one of the best for the purpose) and allowing a film of it to evaporate on the glass. When seen by transmitted light it is of a beautiful violet, but by reflected light it displays a tint rivalling in brilliancy the tail of a peacock. Dirt has been defined as "matter in the wrong place;" this is just what coal-tar was before the discovery of these colors, in the production of which it found its place, and became as valuable as it had formerly been worthless.

THE SIPHON.

THE siphon is as simple as it is useful, but the philosophy of its operation is often misunderstood, even by intelligent people. We have seen references to the instrument in print which showed that the writer had no clear notion of what he was attempting to explain.

If we take a tube bent into the shape of the letter U, with one arm longer than the other, fill it with water, and put the shorter end into a vessel of water, the liquid will flow out through the tube. Why does the water run up hill, as it evidently does in the shorter arm of the tube? It is not enough to say that the pressure of the air on the water in the vessel forces it up to fill the vacuum which the downward flow tends to form in the bend of the tube. The pressure of the air is exerted equally at both ends of the tube, and could not *of itself* make the liquid flow in either direction. If a bent tube with arms of equal length, filled with water, be carefully inverted, the water will not run out, being supported by the upward pressure of the air. But in the case of the siphon (figure 1) the pressure acting at C, and tending to raise the water in the tube, is the atmospheric pressure *less* the weight of the column of water $C\ D$. In like manner, the pressure on the end of the tube at B is the atmospheric pressure *less* the pressure of the column of water $A\ B$. But as this latter column is longer than $C\ D$, the force acting at B is less than the force acting at C, and consequently the water will be driven through the tube by *a force equal to*

Fig. 1.



ifference of these two forces. The greater the ifference of level between *C* and *B*, the faster ill be the flow.

The scientific toy known as *Tantalus's Cup* an application of the siphon. It is a cup, ith a siphon tube passing through the bottom, s shown in Figure 2.

Fig. 2.

f water be poured into e cup, it will rise oth inside and outside e siphon until it has eached the top of the ibe, when it will begin to flow out. If e water runs into the ıp less rapidly than e siphon carries it out, it will sink in the cup ntil the shorter arm no longer dips into the quid and the flow from the siphon ceases. he cup will then fill again as before; and so on.

In many places there are springs which flow t intervals, and which are therefore called *intermittent springs.* In some cases, their action is robably explained by the toy just described. cavity under ground may be gradually filled ith water by springs, and then emptied through n opening which forms a natural siphon. In ome of these springs the flow stops and begins gain several times in an hour.

The siphon affords a convenient means for mptying a vessel without agitating its contents. his is specially desirable when we wish to raw off a liquid without disturbing a sediment t the bottom. It is a very ancient invention, ating back much farther than any form of sucion pump. It was used by the Egyptians at east fifteen hundred years before the Christian ra, as is evident from the paintings found in eir tombs. Heron of Alexandria, who wrote ore than two thousand years ago, describes its se on a large scale for carrying water over a ill in draining lands. The very word *siphon,* hich we get through the Greek, may be of gyptian origin, as Wilkinson has suggested. Whatever its ultimate source, however, there an be no good reason for spelling it *syphon* as even some scientific writers have done), hich is inconsistent with its form in both Greek nd Latin.

COUNT RUMFORD.

Dr. Matthieu Williams, in a recent address efore the Royal Institution of Great Britain, On the Scientific Discoveries of Count Rumord," not only recognizes the distinguished serices which that great man rendered to the cause f science, but in closing takes occasion to enorce in very emphatic language the advantages o be derived from a general diffusion of sound cientific knowledge. He says: —

"The researches of Rumford are especially worhy of general attention, as his subjects literally ome home to all of us, the greater part of his life aving been devoted to studying and applying the hilosophy of common things; he may be in fact egarded above all others as the philosopher of common things, the science of feeding, clothing, warmng, and sheltering mankind having been his chief ursuit. The great characteristic of his whole caeer is that all his practical work was strictly philoophical, and most of his philosophical work was minently and directly practical. He was a great tatesman, a practical soldier, the greatest of practical military reformers, a skilful mechanic and engineer, and a successful philanthropist, besides being a distinguished philosopher. If, therefore, you would make your son a successful soldier, a successful lawyer, a successful statesman, successful in any business whatever, you should give him a sound, practical, scientific education; let him learn how to observe and investigate facts, to generalize them, and from such inductions to deduce sound rules for practical conduct. Modern science affords the best, the highest, and the most useful school of intellectual culture; the great business of the present day is to give to science that decided educational precedence to which it is entitled; and the whole career of Benjamin Thompson, Count Rumford, affords a striking example of the kind of intellectual results we may expect to obtain when sound scientific knowledge and training are afforded to every human being, male and female."

METEORITES.

An attentive and patient survey of the heavens, on any clear night, will not fail to reward the observer with a view of one or more so-called shooting stars, or *meteors,* which suddenly blaze out from one part of the sky and quickly pass across it, not unfrequently leaving a long, luminous train after them, which usually disappears after a few seconds. It has been calculated, on sufficient data, that the number of these bodies which pass through our atmosphere in twenty-four hours, and which would be visible to the unassisted vision, if night prevailed during that time, is not less than seven and a half millions, and that at least four hundred millions would be visible by the assistance of the telescope.

But on many nights the number of these has been so great that they might be compared to snowflakes falling through the air. On the 12th of November, 1833, during the space of three hours, not less than 240,000 were visible from a single point of observation.

In rare instances these bodies reach the earth's surface, where they are called by various names according to the appearance and composition which they exhibit, as meteoric stones, *aerolites;* meteoric iron, *aerosiderites;* the intervening varieties are called *aerosiderolites.*

Those meteoric bodies which reach the earth are probably not on that account different from those which only enter and pass through our atmosphere, or become dissipated in vapor by the passage, but they are only special cases which chance to be pursuing directions favorable to and resulting in final impact.

These bodies are undoubtedly, for the most part, very small, though sometimes weighing several hundred pounds, and they possess a proper motion about the sun precisely as do the planets. The planes of their orbits cutting that of the earth's, they are liable, of course, as a consequence, to be drawn to the earth by its superior attraction, whenever a near approach occurs, or they may possess sufficient velocity to enable them to pursue a modified but uninterrupted course through the upper regions of its atmosphere. In either case it is easy to see that the resistance and friction arising from their enormous velocity must result in raising their temperature to a glowing heat or in dissipating them in vapor. Hence the light and luminous trains which they so frequently leave.

The actual fall of meteorites, when observed, is generally accompanied with loud explosive reports. These find their explanation in the obvious fact that the air must be very greatly compressed in front of them by their rapid flight, and in rushing past them laterally, it quickly falls in and fills the more or less complete vacuum formed in their rear, thus producing the series of reports like musketry or artillery fired in rapid succession.

The reason why so few reach the earth is found in the fact that for the most part they do not exceed a few grains in weight, and hence become entirely dissipated in vapor before reaching us, or in the fact that their velocity and direction enable them to escape the earth's atmosphere before this result is reached.

The bodies which compose the November shower are for the most part exceedingly small, very few weighing more than a pound and most of them only a few grains. It is calculated they begin to burn at a height of seventy-four miles, and are burnt up and disappear at a height of fifty-four miles. Their visible paths are about forty-two miles in length.

Those which are of a sporadic character may be distinguished from those which have a close relation to each other by attending to their frequency, which is much less, and to their directions. Those which constitute the so-called showers occurring in August and November, have been found to be revolving about the sun, in either case in elliptical orbits. The November ones have their aphelion just beyond the orbit of Uranus, and their perihelion on that of the earth, and the plane of their orbit is inclined to that of the earth about seventeen degrees.

The points in the heavens whence these and other meteor showers seem to proceed are called *radiant* points. Upwards of fifty such points have been observed, thus suggesting that there may be upwards of fifty rings of these bodies in constant motion about the sun.

Chemical analysis has shown the presence of oxygen, hydrogen, nitrogen, sulphur, phosphorus, carbon, silicon, iron, nickel, chromium, tin, aluminium, magnesium, calcium, potassium, sodium, cobalt, manganese, copper, titanium, lead, lithium, and strontium.

Careful microscopic study has shown that the matter of which meteorites are composed was at one time in a state of fusion, and that proximately they are made up of small rounded globules, which have accumulated and been more or less fractured by mutual impact, and finally consolidated by the heat produced by their flight through resisting media. — *Bowdoin Scientific Review.*

HOUSEHOLD RECIPES.

To Keep Tomatoes without Canning. — The following is an approved recipe for keeping tomatoes the year round, so that they can hardly be distinguished from those fresh picked from the vines: Dissolve a teacupful of salt in a gallon of water. Pick ripe tomatoes, but not over-ripe, leaving a little of the stem on. They must be kept well covered with the brine.

Fruit Jams. — Boiling fruit for a long time and *skimming it well, without the sugar and without a cover* to the preserving pan, is a very economical and excellent way — economical, because the bulk of the scum rises from the *fruit* and not from the *sugar,* if the latter is good; and boiling it without a *cover* allows the evaporation of all the watery particles, so that the preserves keep firm and well-flavored. The proportions are three-quarters of a pound of sugar to a pound of fruit, — currants, strawberries, raspberries, or gooseberries.

To Keep Fruit. — Beat well together equal measures of honey and spring water in an earthen vessel; put in your apricots, plums, and peaches, freshly gathered; cover closely, and they will keep fresh for a year. When taken out for use, they must be rinsed in cold water.

To Make Good Coffee. — The following is the recipe of Professor Blot, of culinary renown: "Grind the coffee rather fine than otherwise. I think it is usually ground too coarse. I use a coffee pot with a filter. You can get them at any tin store. Mixed coffee is best. I prefer a mixture of Java, Mocha, and Maracaibo. Soft or spring water is best. Proportions, one quart of water to three

ounces of coffee. Of course it can be made stronger or weaker. Four teaspoonfuls make a quart of very good coffee for breakfast.

"In selecting a filter, choose one with a bottom of silvered gauze, instead of perforated tin, as the perforated bottom lets the finely-ground coffee through.

"When the water is boiling hot, put the coffee in the filter, and pour the water over it, and the coffee is made. If the water does not pass through fast enough, set the kettle on the fire again until the water in it boils, when pour it on again. If all the strength is not extracted at the first making, repeat the operation. The coffee may be dark, even black, when strong, but it must be clear. Each kind of coffee must be roasted separately, and it is better to roast it a day or two before using."

The Arts.

"CHROMATIZED GELATINE," AND SOME OF ITS USES.

It has been recently discovered that gelatine, in the presence of a salt of chromium, is rendered insoluble by the chemical action of light. It was at first supposed that the gelatine in this case is partially oxidized, but experiments have shown that it combines with the chromic oxide to form a compound insoluble in water. The fact thus stated might appear to be of little interest except as adding one more item to the interminable list of compounds catalogued by the chemist; but in reality it is a discovery of the highest practical importance. It has already been utilized in the arts in several valuable inventions, and it will doubtless prove useful in other processes yet to be devised.

The most important application of this "chromatized gelatine" thus far is in what is called the "heliotype process." This is virtually a new art of lithography, which promises wholly to supersede the old method. If paper coated with a solution of bichromate of potash and gelatine is exposed to the light, the gelatinous film becomes to all intents and purposes a lithographic stone, from which an indefinite number of copies of a photographic negative may be printed. The heliotype films are prepared by mixing a warm solution of bichromate of potash, gelatine, chrome alum, and water, pouring out the mixture in a pool on a level glass plate, and allowing the film or "skin" to dry. This part of the process was at first conducted in a room lighted only with yellow light; but it was discovered by accident that the film is not sensitive to light until it is *dry*. It is then exposed under a negative, whereby a scarcely visible picture is produced upon the skin, which is afterwards mounted upon a thick zinc plate and soaked in water to get rid of the superfluous bichromate of potash, and render the film insensible to the further action of light. In printing, the surface of the film is treated just like a lithographic stone, for where the light has acted it will take greasy ink, but does not absorb water; where the light has not acted it will absorb water, but refuses the ink; and where the light has partially acted it partly absorbs water and partly refuses the ink.

Some of the earlier prints made by this process were imperfect, but this was found to be due solely to the paper used; and the difficulty has been entirely obviated by the manufacture of a paper suited to the purpose.

This chromatized gelatine is also employed in a new process for rendering woven fabrics water-proof. Cotton and linen that have been soaked in a weak solution of gelatine or glue and bichromate of potash become water-proof on exposure to daylight, without becoming impervious to air. They can be made air-proof by using a solution thick enough to fill the interstices between the threads.

It can also be used for uniting two or more layers of cloth, and at the same time making the double fabric water-proof. The layers are spread with the chromed gelatine solution, put together, and exposed to the light. Leather, paper, and wood may be united in the same way, and rendered impervious to water.

Ordinary glue becomes insoluble in water upon adding a little bichromate of potash to the water with which it is mixed. If the preparation of the glue is conducted in daylight, no special exposure of the articles on which it is used will be necessary.

This insoluble gelatine has been used for making billiard balls, buttons, and a variety of useful and ornamental articles; and, as we have intimated, it is probable that its industrial applications, will be rapidly multiplied. It is certainly a very striking illustration of the important practical results to which the discovery of a single chemical fact may lead.

THE UTILIZATION OF WASTE MATERIAL IN MINING.

Immense heaps of refuse, or "tailings," as they are technically termed, accumulate where mining operations are carried. These contain a good deal of metal, but no way has yet been devised of extracting it economically. We have improved upon the ancients in that respect, and posterity may improve upon us, as is suggested in the following extract from an Australian journal: —

"In the year 4000 or thereabouts, when the Anglo-Australian race shall have been 'played out' on this continent, and our posterity shall have degenerated as the Greeks have done, will the New Zealander of the period, accomplished in arts which are unknown to us, and armed with scientific appliances such as we have never dreamed of, come over to Victoria and extract tons of gold from the tailings in our desolate and deserted gold fields? The question is suggested by what is actually taking place in Attica. About 300 years before the Christian era, the silver mines of Laurium were exhausted and abandoned; but seven years ago a Franco-Italian Company obtained a concession to treat the scoria and other refuse for silver, and their operations have been conducted on so large a scale that a town containing 4,000 inhabitants has sprung up on what was formerly a solitude; a railway has been constructed to the nearest port, and a small steam vessel plies twice a week between Argosteria and the Piræus for the transport of the argentiferous tailings to the roasting furnaces."

MEMORANDA IN THE ARTS.

Silk Spinning in China. — There are three methods of spinning; in two the cocoon is boiled, in the third it is spun raw. For the two first methods, four ounces of soda are put into the water in which a thousand cocoons are boiled, the water is then slightly drained off, the grub extracted, and the cocoons are dried and tied up in bundles. The first method of spinning is by a distaff, and the thread is then called neen-seen. In towns, men of the working-classes, shopmen especially, are seen twisting little distaffs, at every odd and vacant moment, and no small amount of thread is prepared in this way, and woven into cloth, for the spinners' own use. The second method of spinning is by means of a spinning-wheel, and the thread is called kwang-sze. For the third method, peeled rods are stuck in the ground in the form of a polygon, and the thread is wound round this by hand; it is called fang-sze. After the extraction of the grub, it is eaten by the economical and ingenious Chinese of the lower classes, who esteem it a great dainty.

Petroleum Shells. — A correspondent of the *Pall Mall Gazette* states that these explosive projectiles were formed from the ordinary shell, either spherical or cylindro-conical. A light perforated tube, about $\frac{7}{8}$ inch diameter and of a convenient length, filled with loosely packed powder and fitted with an ordinary percussion fuse, was introduced into the shell, which was then filled with petroleum. The powder charge was sufficient to explode the shell and to ignite the petroleum, which was scattered in a fiery rain on all sides around the point struck. The effect of a continuous discharge of such projectiles as these may be well imagined; and it was through their agency, say the Communists, that the Versailles troops, in attempting to gain possession of the Tuileries, set fire to the palace.

Buoyant Mattress. — This is an invention of Mr. J. Hunt, of Providence, R. I., and consists of two elongated sacks or pockets, which are filled with cork, either granulated, cut into shavings, or in large flat pieces, the edges thereof being connected with an apron, so that when the two sacks are folded together upon the apron they will just be covered smoothly thereby, and make a mattress, and when opened they will buoy up a considerable weight placed upon the apron between the cork-filled sacks. At one end is attached a smaller sack, which serves the purpose of a bolster, or, when detached, may be used as a life-preserver. Straps or bands are attached to the surface of the sacks, serving to seize hold of in the water. As a mattress, the sacks are made of any width, so that they will fit into the racks of steamboats or vessels of any kind, and are filled with cork, which is the best known filling on account of its great buoyancy, and, at the same time, is a good filling for a mattress, especially when granulated or cut into shavings. When the mattress is to be used as a life-preserver it is unfolded, and, when in the water, a person or any weight upon the apron within its power of resistance is kept afloat.

New Liquid Fire. — P. Guyot, in the *Comptes Rendus*, gives the following process of making liquid fire. He digests flowers of sulphur in excess with bromine for some time, and then filters the resulting liquid, which analysis shows to be protobromide of sulphur, through asbestos.

This liquid, when brought into contact with liquid ammonia, appears at first inert, but after a few minutes the mixture boils violently and bursts into flame.

Dynamite. — P. Guyot cautions users of dynamite in relation to the boxes and other envelopes containing this compound.

Having in his possession a number of cartridges, made of stout gray paper, he found that these after some time became moist and oily looking, and the pasteboard box in which the cartridges were kept was also found impregnated with a liquid, which on investigation turned out to be nitro-glycerine; dynamite being merely some inert substance saturated with nitro-glycerine.

A small piece of the paper exploded violently when brought into contact with glowing coals, and a like effect was observed when a piece was laid upon an anvil and smartly struck with a hammer.

It was also found that the wood of the boxes in which dynamite cartridges are kept becomes by slow degrees impregnated with nitro-glycerine, and forms a most dangerously explosive material, which

may give rise to serious accidents in warehouses where dynamite is kept.

PRACTICAL RECIPES.

Cheap Sealing-Wax. — The following recipe furnishes a cheap sealing-wax useful for many purposes: Melt together two pounds of common beeswax, six ounces of turpentine, and two ounces of olive oil; add six ounces of red lead, boil a little, and stir until it is almost cold; then cast it into cold water, and make it up into rolls or cakes.

Preserving Anatomical Specimens. — Dr. Ehrhardt says that the simplest means of preserving anatomical and pathological preparations is the use of the following solution: saturated solution of alum, 100 grammes; saltpetre, 2 grammes.

The article to be preserved is immersed in the solution, when it becomes decolorized; but in a few days the color returns, when it is taken out of the solution, and kept in a saturated solution of alum and water only.

Cleaning Fluid. — The *Manufacturers' Review* states that a fluid, called *Liqueur Bernhard*, is sold in Paris to dyers and scourers for removing grease spots, etc., composed of three ounces of beef marrow, one and a half ounces of potash, and a quart of water. It has but a faint odor, but is not applicable to delicate colors on account of the potash in it.

Cheap Lustrous Finish for Woven Fabrics. — The same excellent authority translates the following recipe from a German industrial journal: One pound of wheat starch is made into a paste with six pounds of water, and an ounce of ammonia stirred in. The paste assumes a faint yellow color, and swells up considerably. It is best diluted with five pounds of water, and boiled with constant stirring. After a quarter of an hour's boiling, the excess of ammonia is dispelled, and the yellowish, transparent mass forms a cheap paste as well as a very good finish. Instead of ammonia, half an ounce of caustic soda dissolved in four ounces of water may be used."

An Engineer of Resources. — The *Bethlehem* (Pa.) *Times* says that the "oldest locomotive engineer in the United States is Barney Butz, who now runs an engine on the Lebanon branch of the Reading Railroad. Barney was born in Conyngham, Luzerne County, Pennsylvania, and went on the Beaver Meadow Railroad about the year 1835 or 1836. In 1837 he was running an engine from Parryville to Weatherly, the planes being then in operation. The cars were drawn up the planes by a stationary engine, and were then drawn into the Beaver Meadow mines by a locomotive engine. A good story is told of Barney's readiness in case of an emergency. One day his engine would not make steam well, and he was likely to be overtaken by a passenger train before he could reach the turnout. Seeing a good sized porker beside the track, he jumped from his engine — the train was moving very slow — seized the pig, cut his throat, and stuffed him into the furnace. The fat of the pig was better than kindling wood, and in a very short time Barney had steam up and was out of danger."

Some experiments have been made in the Thames with Holmes's Self-lighting Inextinguishable Signal-lamp, with apparently much success. The lamp is a cylinder of tin, with a conical top; this is filled with a phosphide of calcium. When the lamp is thrown into the water, that fluid, entering the cylinder, effects the decomposition of the phosphide, and phosphoretted hydrogen with phosphorous vapor escapes in great quantities, takes fire spontaneously, and burns with a brilliant light.

England exported more than three million dollars' worth of steam-engines in the first half of 1871.

Agriculture.

A FIELD-DAY AT LAKESIDE.

On the 25th of August we invited about a hundred gentlemen interested in agriculture to visit Lakeside, look over the farm, and partake of our hospitalities. Hon. Simon Brown, editor of that excellent journal, the *New England Farmer*, was one of our guests, and has published the following account of the meeting. Some personal remarks of a complimentary nature we have omitted, and we have also corrected a few slight errors of statement.

PLEASANT GATHERING OF FARMERS.

Many times, in these columns, have we urged the importance of farmers coming together to find change of thought, make new friends, discuss topics relating to their business, and gain strength and wisdom by so doing.

Persons engaged in other avocations do these things, and find profit and encouragement in them. They have no more spare time than has the farmer, and they have fewer conveniences and facilities for social gatherings.

A few days ago Dr. J. R. Nichols, of Haverhill, Mass., invited the Trustees of the Essex County Agricultural Society to visit him at his farm, which is about one mile from the city. A few other gentlemen were also invited, the whole number being about a hundred. Some of the leading New Hampshire farmers were present from Exeter, Hampton, Epping and Hampton Falls. John B. Clarke, Esq., Editor of the *Mirror and Farmer*, Manchester, was also present, and some of the Boston daily papers were represented.

The weather was hot — one of the hottest dog-days; but in the cool shade of the charming oaks on the banks of Kenoza Lake, and fanned by the fresh breeze that came to us after rippling the surface of the sparkling waters, we found the temperature just right for an out-door gathering.

The objects sought in coming together were to know each other more intimately, and to learn of our host something of his new modes of fertilizing and cultivating the soil. The crops of the farm were examined by many persons competent to judge of them, and pronounced good, even for a highly favorable season. The corn was stout and tall, the ears large, and in many instances two perfect ones upon a stalk, and promises a harvest of near one hundred bushels to the acre, besides a large crop of excellent fodder.

The potato crop was carefully examined, and it was judged would yield three hundred bushels to the acre.

Standing in the midst of these crops, the inquiry was made, — "What was the condition of the land before the potatoes were put upon it?" The reply was: "Three years ago it was covered with young oaks. These were pulled out by the roots, the land thoroughly ploughed and pulverized, and last year planted with potatoes. Gypsum and ground bone were applied to the hill, and the crop was a large one. Last spring it was ploughed deeply again, pulverized finely, the same fertilizer applied, the weeds kept down, and here is the result. *They have had no stable manure whatever!*" The potatoes were large, fair, and as good-looking as potatoes could well be. The reader ought to know, however, that the potato field was on the edge of a meadow of a rich black soil, and that it received the wash of a narrow strip above on its whole length. These advantages would not, we should judge, bring such a crop of themselves.

The corn crop was carefully examined. The soil planted was treated much as was that for potatoes. Numerous questions were put, all of which were replied to minutely by the Doctor, stating the names of the fertilizers used, the quantity, and when applied.

The grass crop excited surprise. About twenty acres had been mown, and fifty tons, by measure, of as good hay as was ever stowed away, were upon the scaffolds and in the bays. It was bright, and as fragrant as a nosegay. We walked over the acres where this was cut, and found another crop which it was estimated would yield 1,500 lbs. per acre, or about seventeen tons more! Some of the acres would give a ton, as the thick herds-grass stood knee high!

The Doctor keeps five horses and some sixteen head of cows, and all the manure made in every way is used upon the farm. But where it has been employed the fact was stated. On one piece, a high and dry knoll, an experiment has been going on for seven years. Not a shovelful of stable manure has been added. Last year we saw the crop growing upon it, and estimated it at fully a ton per acre, but did not inquire what it was this year. It is the aim of the Doctor, and his advice to all is, to make all the manure possible, and use it on the farm. In most cases, this is not enough, — and here is where chemical fertilizers can profitably come in. By their aid, lands long languishing may be brought into a state of fertility, and gradually all the cultivated fields and the grazing lands be brought into a profitable condition.

THE DINNER, AND AFTER-DINNER TALK.

After a sumptuous dinner, the leading dish being a capital chowder, with fruits of the season, creams, ices, coffee, and tea, Dr. Nichols briefly explained his reasons for inviting his friends to meet him. They were *social* and *instructive*. He desired to learn of others, and in return to say something of his peculiar modes of cultivating the soil, and to show the growing crops to those present, in corroboration of the results of his practice. His remarks were received with demonstrations of approbation.

The Doctor then called upon Major Ben. Perley Poore, of West Newbury, who drew down "the Grove" by happy hits upon various practices. He dwelt mainly upon the progress and increased profits of scientific farming.

Upon being called upon, Gen. Sutton, of Salem, spoke in high terms of the effect of gatherings like the present upon the minds of farmers, and thought them of more importance than all the premiums paid out at the shows.

Mr. J. D. Lyman, of Exeter, late Secretary of State in New Hampshire, being called on, said farmers now acknowledge the relations of science with the practical affairs of agriculture, and continued for some minutes on this theme in his usual earnest and attractive manner.

The Editor of the Manchester *Mirror and Farmer*, John B. Clarke, Esq., responding to a call, said he knew no man to whom the farmers of New England are looking with so much interest as to our host of to-day. The attention he has called to the use of chemical agents as fertilizers for crops is universal among our people, and they are impatiently waiting for more light upon the matter. We have some results of chemical fertilizers about us to-day of the most gratifying character.

Hon. Allen W. Dodge, of Hamilton, spoke of the "hue-and-cry" against farming as being unprofitable. Farmers support all, he said, and with the aid of science will lead the nation on to an immense power and wealth.

Mr. Fay, of Chelsea, and Mr. Warren Ordway, of Bradford, made brief remarks, and then the party rode to a beautiful eminence on the farm, where they had a fine view of the city and surrounding country. From the farm they rode to the station, where the party separated, all highly gratified with the events of the day.

On the following day we had the pleasure of returning to the farm, and of looking over the buildings and crops in a more quiet way. We found all things in scrupulous order; every department of the buildings sweet and clean; the yards and roads inviting to man and beast. In the fields, weeds were underlings, and the whole presented an air of thrift and order which was worthy of imitation and refreshing to see.

Among the gentlemen who enjoyed this festive occasion, there were two who are quite extensive land-owners. Gen. Sutton, of Salem, has a large farm in the ancient town of Ipswich, and some three hundred acres, we believe, within the limits of the city of Salem.

Mr. Peirce, of the firm of Peirce & Bacon, Boston, has a farm at Ipswich, upon which he keeps one hundred head of stock, and is bringing it up to compete with the Garden of Eden as nearly as he can. He owns a very large extent of land in Texas, and now has 2,500 acres in corn, six hundred acres in cotton, and four hundred acres in sugar cane. He makes the town of Topsfield his home, and in his farm enterprises is endeavoring to ascertain what amount of crop an acre of land is capable of producing. This is just what New England farmers need; that men of financial, as well as of agricultural skill, shall make such experiments on New England soils as have been made by such persons on the soils of Old England. Skill and means to test the productive power of our soils, the best way to manage them, and the kind of crops to which they are best adapted, are wanted.

In the cold grapery of Dr. Nichols, we found eight varieties of grapes, now in the sixth year of their growth, and presenting a most luxuriant appearance. They *have never had any stable manure.* Most farmers can have one if they choose, and at little cost or labor.

BUTTER, CHEESE, AND MILK.

It requires about sixteen quarts of good milk to make one pound of butter, and ten quarts to make one pound of cheese.

It is often a question with farmers, how they can best dispose of their dairy products. If we consider that the pork produced from the butter-milk or whey pays for the extra trouble involved in the care of butter and cheese, the account will stand about as follows when butter is selling at forty cents a pound, cheese at eleven cents, and milk at three cents per quart: —

One pound of butter = 16 quarts of milk = 40 cents, or $2\frac{1}{2}$ cents per quart for milk.

One pound of cheese = 10 quarts of milk = 11 cents, or $1\frac{1}{10}$ cents per quart for milk.

In order to pay three cents per quart for the milk consumed, the pound of cheese would have to be sold at thirty cents, or one pound of butter at fifty cents.

In the neighborhood of large cities milk will command even better prices than the above, as it is frequently worth five cents per quart; this would bring the value of the pound of butter up to eighty cents and the cheese to fifty cents.

A farmer can easily judge from these figures which is the most profitable business for him, the prices being in all cases those which can be obtained on the farm. If the articles are to be delivered, the ratios may be somewhat changed.

For a person living a long distance from market, or where the means of communication are slow and uncertain, cheese will most likely be the only available means of reaching a market. For those living nearer to market, with good facilities for reaching it, butter is the best paying product.

In order to make milk pay, the market must not be over two or three hours' distance from the farm. Many railroads, however, equalize the rates of freight on milk, charging all their customers the same price, whether they live ten or thirty miles from the city.

THE "GRAFTON FERTILIZER."

A circular of the "Grafton Mineral Fertilizer Company" accidentally fell into our hands a short time since, and looking it over, the following affidavit attracted our attention: —

"*Whereas*, Dr. Nichols, of Haverhill, Mass., has recently read an essay before several large meetings of farmers and others in Massachusetts and New Hampshire, in which he pronounces the Grafton Mineral Fertilizer 'worthless, or nearly so.' Therefore we, the undersigned, farmers, and others of Grafton County, N. H., say, we have largely experimented during the past two years with this Fertilizer, and, as a manurial agent, have found it equal to superphosphates, and any other concentrated manures we have ever used, and have given our published statements in accordance with the above."

Appended to this document are the printed names of about *fifty* persons residing in the vicinity of the "mountain of manure" at Grafton, N. H., and the list is headed by Harry Bingham, a *lawyer*, of Littleton. This is so decisive and overwhelming, that there seems to be hardly a loophole for escape. If fifty men deliberately sign a document declaring that gold can be manufactured from lead, or that plants assimilate and thrive on dolomite rock powder, what is the use of declaring the thing impossible? The alternative is presented of believing the statement of fifty men, and declaring false and erroneous all that science and research have taught during the last century upon the nutrition and the food of plants, or doubting the verity of the statements and clinging to science. We intend no offence to the certifying gentlemen of New Hampshire, but our farm experience so decidedly verifies science, that we must follow its teachings a while longer.

A NEW BOOK ON MANURES.

It is seldom that we meet with a book on farming so well written, and containing so much that is really valuable, as "American Manures and Planter's Guide," by J. B. Chynoweth and W. H. Buckner, recently published in Philadelphia. The authors have given first a short practical treatise on the chemistry of the soil and of the plants growing thereupon, and have followed this by an examination of the various fertilizers for sale in the Philadelphia market. The chemical part of the work is well done, and is sufficiently full to give the farmer a tolerably good idea of what is really needed in the growth of plants. We notice some few errors that have crept into the text. On page 39, *marsh gas* is said to be the direct cause of the malaria of the ague. This we think is rather a broad statement, considering how little is really known upon the subject. On page 68, the authors, speaking of dolomite, call it "carbonate of magnesian lime stone;" it should be carbonate of magnesia and lime. On page 83, it is stated that "albumen and gluten enter into the composition of the bones." This they do only indirectly in the form of gelatine, which is an analogous proteine body. In giving the composition of the various plants raised for food, ammonia is spoken of as one of the constituents. This agent never exists in a free state in plants; it would have been much better to have given simply the amount of nitrogen. On page 115, it is stated that the origin of phosphoric acid in the soil is from the bones of animals. In reading this, perhaps some intelligent farmer might inquire where animals obtained their supply. There are a few other trifling errors of this kind which will doubtless be corrected in a new edition.

In the second part the preparation of special manures is treated of at length. We differ from the authors as to the value that should be put upon raw bones as a fertilizer. The value of bone phosphate depends almost entirely upon its mechanical subdivision; flour of bone, or bone in the form of dust, being almost as prompt in its action as superphosphate. They are not willing to assign them any value in the various fertilizers analyzed. We think, however, that their criticism is just, that when a manufacturer undertakes to furnish a certain article he should furnish that article, and not something else; and in estimating the value of the article furnished, no attention should be paid to the value of foreign ingredients. A strict reading of this rule would, however, throw ammonia out of the account in reckoning the value of a superphosphate of lime. The authors might allow the manufacturer of the various manures mentioned their price for insoluble phosphoric acid, and still make out a very strong case against him. We shall refer to these prices again in connection with some analyses upon which we are now engaged.

MANUFACTURER'S CATECHISM.

Every farmer desiring to purchase commercial fertilizers, will do well to commit to writing the following questions, which we copy from "American Manures," and present them to the manufacturer, and insist upon having them definitely answered. If the manufacturer will not give answers, he is either ignorant of his business or he is afraid of exposing the poor quality of the article furnished.

First. "What percentage of phosphoric acid, anhydrous, soluble in cold water, do you warrant your fertilizer to contain?"

Second. "What percentage of insoluble phosphoric acid, anhydrous, do you warrant your fertilizer to contain?"

Third. "What percentage of nitrogen as it exists in raw bone, blood, etc., do you warrant your fertilizer to contain?"

Fourth. "What percentage of actual ammonia do you warrant your fertilizer to contain?"

Fifth. "What percentage of potash do you warrant your fertilizer to contain?"

Sixth. "What percentage of water does your fertilizer contain?"

Seventh. "What percentage of *pure* potash is there in the 'salts of potash' contained in your fertilizer?"

Eighth. "What percentage of phosphoric acid is there in the 'soluble phosphate' contained in your fertilizer?"

To the above questions we would add one more. What is the source of the phosphoric acid — bones or mineral phosphate?

Having been furnished with true answers to

›e above questions, the farmer can easily deter-ne for himself whether it will be profitable to y or not, if he will inform himself of the value the agents as presented.

HINTS FOR THE FARMER.

To Keep Meat Fresh. — The following, from Rural American, will be useful to farmers who at a distance from meat markets: Cut the ›t in slices ready to fry. Pack it in a jar in lay- sprinkling with salt and pepper, just enough to ›e it palatable. Place on the top a thick paper ›loth, with salt half an inch thick. Keep this on the while. Meat has been kept perfectly good three weeks in summer by this method.

To Keep Ice. — Dr. Schwarz, a German chemist, › he has kept six pounds of ice for eight days by following simple recipe: Put the ice into a ›p dish, cover it with a plate, place the dish on a ›w stuffed with feathers (hen feathers will ›wer), and carefully cover the top with another ›w, thus excluding the external air. Feathers well-known non-conductors of heat, and thus ice reserved from melting.

Tanning Leather. — It is often a matter of ›convenience and economy in the household or ›he farm to be able to do a little tanning; so we here an approved receipt which may prove use- Soak the skin or hide eight or nine days in ›r, then put it in lime; take it out, and remove hair by rubbing it, and soak it in clear water the lime is entirely out. Put one pound of ›to three of salt, dissolve in a vessel sufficiently ›e to hold the hide; soak the hide in it three or days, then take it out, let it get half dry, and beat or rub it until it becomes pliable. Leather ›ared by this process will not do well for shoes, ›answers for hamstrings, back bands, and various ›r purposes on the farm.

Inspection of Agricultural Colleges. We find the following paragraph in one of exchanges: —

"Professor Gilman, of Yale, has, by the request ›e Secretary of the Interior, started on a tour ›spection of the Agricultural Colleges of the ›hern States, to collect information for the De-›ment of the Interior."

We hope that good dinners, and polite atten-›on the part of college officers, will not so ›the Professor that he cannot see the seri-›lefects in some of their institutions. If he ›mpetent and honest, we shall look for his ›rt with interest. If it is unfavorable, we the Department will hesitate to publish it, ›ereby some personal interests might be in-›red with.

Value of the Journal to the Farmer. — ›ers corresponding in statement with the one ›nted below are received by almost every mail, it is a pleasure to know that we are contribut-›o advance the great interests of agriculture: —

Dr. Nichols, — I inclose one dollar for the ›nt volume of the Journal of Chemistry. a most valuable help to the proper education of ›armer and mechanic. I am under great obli-›n to you for its pages, and I believe it has paid improved farm management *more than fifty its cost in a single year.* R. E. L."

Indiana dogs have carried sheep stealing to an extent, that the legislature has offered a ›ty on every dog-skin produced, and the honest ›ers now find puppies the most profitable crop can raise.

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, OCTOBER 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

Mr. A. D. Blanchard is no longer a Travelling Agent for the Journal. All money paid on Journal account should be sent directly to the office, 150 Congress Street.

STEAM BOILER EXPLOSIONS.

Since the article upon boiler explosions was published in the last number of the Journal, several of a very serious nature have occurred in various parts of the country. The explosion of a boiler in the neighboring city of Newburyport, by which seven persons were instantly killed, is a casualty as remarkable as it is sad and lamentable. This was comparatively a new boiler, made by a first-class manufacturer, and is reported to have exploded while under a steam pressure of only seventy pounds. We have not before us sufficient facts to enable us to discuss the casualty intelligently, and therefore we pass to the further consideration of causes of boiler explosions. The views expressed in our former article do not coincide with those of many intelligent and observing mechanics and engineers, and we were quite well aware that they would not, when we committed them to paper. The conviction that some other agent than steam is the immediate cause of the terrific explosions, remains firmly fixed in the minds of many. Until some *proof* is afforded that other agencies are present and acting in these occurrences, we must differ from our correspondents who have written to us upon the subject. The *fact* that a dead inorganic agent like carbonic acid gas, when gradually developed in a vessel as strong as a steam boiler, is found capable by simple mechanical pressure of rending such vessels, and producing all the violent and disruptive effects seen in the instances of steam boiler explosions, has an important bearing upon this question. We have seen copper vessels which withstood the hydraulic test of over three hundred pounds to the inch, torn into fragments by an explosion as instantaneous as that of gunpowder. No one can suppose for a moment, that any water decomposition, explosive gases, or electrical agencies had anything to do in causing these explosions. Why, then, is it necessary to suppose that any other agent but that of simple steam is involved in boiler explosions?

It is certain that explosions are not confined to old and defective boilers, neither are they always due to low water, or imperfect safety valves. We should feel a greater degree of safety in charge of a good, sound, strong boiler, with the usual connecting apparatus in good order, than with one of an opposite character; but under no circumstances should we feel that there was perfect exemption from danger. We believe that boilers are often greatly injured in passing through the testing process. The pressure is usually carried up to a point double of that which is required in the ordinary work with steam, and often this strain upon the boiler is carried to a still higher point. The effect of this upon the crystalline structure of the plates of metal is obvious; it is greatly disturbed, and the cohesive force is weakened, and hence when brought under the strain of suddenly evolved steam pressure, although exerting a force below the testing point, most disastrous results follow. A new boiler may be thus weakened, and it may be further weakened by excessive steam pressure often exerted upon it. Metals, as repeated experiments have proved, are singularly affected when subjected to a continuous strain, with and without the supplementary influence of heat. This subject deserves the most careful study, by intelligent and competent experimenters and engineers.

It is certainly curious how some old, rickety, condemned boilers will hold out under what are manifestly great abuses. We once took passage in a steamboat on one of our Western rivers, which was propelled by steam generated in a boiler apparently having not much greater strength than a section of ordinary stove-pipe. From a close inspection of the old rusty affair, we were convinced that a hole could have been made in it with a blow from a nail hammer, and yet the gauge indicated a pressure of seventy pounds to the inch. It is needless to say we felt relieved when that boat touched the wharf and we were safely on shore again.

We present the following extract from a letter received from a gentleman having charge of extensive iron works at Burlington, Iowa, as showing what the general feeling is regarding the cause of explosions, and also what recklessness prevails among those having charge of steam boilers: —

"That boilers are blown up and torn into strips by the pressure of steam alone, is hardly entertained for a moment by Western men generally. The West has been the great field of boiler explosions, and we have learnt by sad experience that something more terrific than even gunpowder is the agent of destruction. I examined to-day a boiler that was not in some places one sixteenth of an inch thick, yet it regularly carried one hundred pounds' pressure to the square inch, and at times higher. Not long since I saw (with not a hard blow) a centre punch driven

through a boiler so that steam escaped when it was carrying from ninety to one hundred pounds. It is no uncommon thing to cut out sheets from the bottom of locomotive boilers that are carrying one hundred and thirty pounds' pressure, that are so thin and frail that you can nearly punch them through with a jack-knife. I knew of an instance not long since where a man laid a bag of sand on the inside of his boiler over a crack in the shell, and wedged it down, fired up as strong as ever, running it several days, and carried more than twice as much steam as the *West-field.* The most terrible explosions that we ever experienced in this country have been with boilers comparatively new, carrying the ordinary amount of steam but a very few moments before the bursting. Whatever element it is that causes it, works with lightning speed, and your safety valve is as useless to relieve it as a gimlet-hole a keg of ignited gunpowder."

HARVARD UNIVERSITY.

QUITE extensive changes have been made in the college grounds, and several of the buildings have been altered since vacation commenced. Weld Hall is rapidly approaching completion. It stands between University and Boylston Halls, in line with the former. On the opposite side of the yard Matthews Hall is going up more slowly. This stands between the ends of Massachusetts and Dane Hall, which has been moved southward, in order to give room for the new hall. The Steward's office has been moved to the rear of the old "President's house." Boylston Hall has a new hat upon it in the shape of a Mansard roof. Part of this addition to the building will be occupied by the Peabody Archæological Collection; the remainder will be devoted to a laboratory for advanced students, to take the place of the Lawrence Laboratory. The roof of Holworthy has also been raised about two feet, thus increasing the height of the upper story.

And last, but not least, all the old brick buildings have received a coat of fiery red paint. We do not think this is an improvement, but are in hopes that it will soon wash off, or that its radiance will be somewhat mellowed with lapse of time. Outside of the yard, building has also been rapidly carried forward. The great dining-room of the Memorial Hall will be roofed in this fall, and the Holyoke House is ready for occupancy. This will make quite a valuable addition to the accommodations of the University, besides giving law and scientific students a chance to occupy college rooms. Lawrence Hall has been entirely remodelled. The main hall will be used exclusively for engineering and kindred branches, the room for drawing being located in the third story. The wing is devoted to the Rumford professorship; the upper portion being fitted up as a lecture room, while the lower part contains the professor's private laboratory.

THE LAWRENCE SCIENTIFIC SCHOOL.

SOME points connected with the history of this school may not be without interest to many of our readers.

In 1847 Abbot Lawrence erected and gave to the Corporation of Harvard College the building now known as Lawrence Hall, his intention being, so far as we have been able to learn, to found a school for educating young men in scientific pursuits. In order further to carry out this idea, the corporation obtained an order from the Supreme Court permitting them to pay the salary of the Professor of Chemistry from the fund left by Count Rumford for founding a professorship of "science applied to the art of living." E. N. Horsford, then a young man recently returned from Germany, was elected to this professorship, and held the position until the summer of 1863, although he occupied the chair only nominally for the last two years. In 1863, Dr. Gibbs was appointed professor, after a closely contested election. From this time the school steadily declined in numbers, not from any inherent defect, but from jealousies or animosities among those who had influence in its management. There had been disappointments on the part of some with regard to the choice of the Professor of Chemistry, and therefore encouragement was, it is alleged, withheld from the school, which was declared a failure at a time when it was paying all of its expenses from its own funds. At no time since 1863 has the school been in debt to the University, and at most times it has had a large surplus in the hands of the college treasurer.

Judging by the number of students in attendance, the school has not been a success, but judging by the standard of scholarship, and by the success of its graduates, it will compare favorably with any other institution in the United States if not in the world. Twenty-seven of its one-hundred and fifty-nine graduates hold, or have held, either professorships or assistant professorships; and this is certainly a distinguished record. Besides those who have graduated, there has hardly been a term since the school was organized when there were not among its members one or more professors of other colleges, fitting themselves for the better fulfilment of their duties. We have lately seen a letter from a gentleman connected with a college, in which he says, "I am very sorry that the school is removed from the care of Dr. Gibbs or changed in its organization. It was just what was needed; a place where a professor could go to brush up his rusty studies without being brought into contact with those who were studying merely because they had to do it." Under the changed organization it would appear to be brought into direct competition with the Institute of Technology, and the Sheffield Scientific School, and with the scientific departments in the various colleges scattered over the country. From having been a department of the University, it appears to be degraded into an appendage to the College. We fear little has been gained by the change, and perhaps much has been lost.

ECONOMY IN THE USE OF GAS BURNERS.

GAS is wasted in many ways, but the loss from the use of bad burners is in the aggregate probably greater than that from any other cause. A committee appointed by the London Board of Trade to examine into "the construction of gas burners with reference to the principle of gas illumination" have made their first report; and they estimate the amount that might be saved annually in London alone by the use of good burners as at least *two millions and a half of dollars*, or one fourth of the total expenditure. This is probably more than there is reason to expect will be saved, for many years to come, from any improvements in the manufacture of gas or any other reduction in the cost of supply. The committee sum up the results of their experiments as follows: —

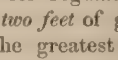
1. In the case of the bat-wing and fish-tail burners there is a point of consumption above which every increase in the rate of consumption produces a decrease of light relative to the quantity of gas consumed. 2. The point of consumption at which each of those burners gives its maximum of light relative to the quantity of gas consumed, varies enormously — two burners with which experiments were made giving most light from the gas when the rate of consumption is only $1\frac{3}{4}$ feet per hour. 3. With argands, on the other hand, the light from the gas steadily increases in a higher ratio than the consumption. In other words, the larger the quantity of gas consumed in argands (up to the smoking point) the greater the amount of light obtained relatively to the quantity of gas consumed. 4. Alike with argands, bat-wings, and fish-tails, whatever be the rate of consumption at which the maximum of light is obtained (in other words, taking each of the burners at its best), there is nevertheless a striking difference in the degree of light obtained from the same quantity of gas, some burners giving a light equal only to 20, while others give a light equal to 60, 80, and 100. 5. The best argands give a nearly equal amount of light relatively to the quantities of gas consumed, the experiments with them tending to show that within the ordinary range of consumption the illuminating power of gas remains the same. 6. Finally, even as regards very low rates of consumption (rates, indeed, at which gas is never burned for illuminating purposes) the application merely of a rude apparatus for regulating the air-supply suffices to make only *two feet* of gas give a light equal in proportion to the greatest amount of light obtainable from the gas when consumed at any higher rate in a really good burner.

LIME IN MUSSEL SHELLS.

WE are greatly obliged to Professor Morse for the subjoined interesting remarks upon an item which appeared in a former number of the JOURNAL: —

In the August number of your excellent journal there is a query as to where the fresh-water mussel obtains its lime, with an instructive analysis of the shell, and of the waters of Lake Kenoza whence the shell was obtained; the shell possessing 14.7 grams of carbonate of lime, and the quantity of water containing a like proportion amounting to four barrels.

When we understand the habits of the fresh water mussel, we shall readily understand how it is that the animal secures the lime for its shell, even from water containing but an inappreciable quantity. If a living mussel be placed in water, it will soon be seen to slightly open its shell, and from one end two currents of water will be noticed, one passing into the shell, while the other current passes from the shell, as indicated in the diagram by the arrows. So strong are these currents, that if a dozen mussels are placed in



a uniform manner around the edge of a circular dish, a current is soon produced which will cause a miniature boat to sail round and round. The mussel not only appropriates the oxygen contained in the water which bathes the gills within, as in fishes, but having no hard parts to its mouth, or any ability to seize food, depends upon the minute particles of organic matter floating in the water which are constantly swept into the mouth by the same organs which cause the currents, namely — cilia. These cilia are microscopic lashes $\frac{1}{5000}$ o

an inch in length, which clothe the gills like down, and which keep up a perpetual movement.

Professor Jeffries Wyman has discovered some interesting properties in the ciliary motion of the cells of the fresh-water mussel. By carefully removing the gills with a pair of scissors, and placing them in a uniform direction on a wet board, their edges slightly lapping over each other, he has caused a slip of paper to which was affixed an upright wire with a wad of cotton at the end, to travel slowly from one end of the gill series to the other. Or, by placing the gill in the water, pinned to a float, the float has been propelled slowly along. As the mussel is almost always in action, it is obvious that many hundred barrels of water pass into the shell during its life-time. A shell four inches long is at least fifteen years old, as shown by Prof. Agassiz.

In portions of this country, as in the West, where the rivers flow through limestone regions, the same species of mollusk which in New England have a very thin shell, in the limy waters of the West have a very thick and ponderous shell. It has been noticed that some species of marine mollusks living in pure sea-water, where the calcareous salts are abundant, have thicker shells than when occurring near the mouth of our rivers, where the water is brackish and consequently containing less lime.

EDWARD S. MORSE.

EDITORIAL NOTES.

QUICK WORK. — An English journal gives the following illustration of what may be accomplished with the aid of steam and modern machinery, even on a single day's notice. A Manchester merchant required 1,500 pieces of prints for shipment to America next day. In spite of diligent search, he was unable to find the desired pattern. At 5 o'clock in the evening he went to see a large cotton printer at Harpeney, three miles distant from Manchester, who undertook to print the 1,500 pieces in the colors, to finish them and deliver them, boxed up and ready for shipment, at noon of the following day. He was as good as his word. At 3 o'clock in the afternoon the goods reached Liverpool, and were taken out by the steamer two hours later. We should hardly believe this possible, if the account were not endorsed by the *Manufacturers' Review*, whose authority on a question of the kind is not to be questioned.

CHEMICAL NOMENCLATURE. — The *Academy* gives an outline of a new nomenclature proposed by Professor Filopanti, of the University of Bologna, as a substitute for the one now in use. "He forms words on his system that shall express not only the chemical formulæ, but, where possible, some of the properties of the compounds. Hydrogen is *a*, oxygen *e*, nitrogen *i*, and carbon *o*; and these letters, the first four vowels of the alphabet, indicate at the same time the quantivalence of the elements in question. The other elementary bodies have names consisting of four letters, the first being invariably *u*, the last the vowel denoting the quantivalence, and the remaining intermediate two being consonants taken from the ordinary name of the element. Thus we have for chlorine *ucra*, calcium *ucle*, copper *upre*, silicium *usle*. To mark the number of atoms contained in a compound, consonants are employed of the following respective values: —

[illegible]	*c*,	*d*,	*f*,	*g*,	*l*,	*m*,	*n*,	*p*,	*r*;
[illegible]	2,	3,	4,	5,	6,	7,	8,	9,	0;

and numbers over nine are shown by a combination of the above letters, *de* being 3 atoms of oxygen, *man* 78 atoms of hydrogen, and so on. State of aggregation, degree of basicity, and other characteristics, are indicated by the position of the accent. In this new language water becomes *beca*, carbonic acid *cebo*, lime *bebuclee*, urea *bobecifa*, melissylic alcohol *velo...or*, and chloride of sodium *busdabucra*." [We give these as printed in the *Academy*, but suspect that carbonic acid should be *cebo* and lime *bebucle*.] The system is ingenious, and, like others that have been proposed, has its good points, but it will hardly commend itself to chemists as the *beau ideal* of a nomenclature; and so radical a change in the "short hand" of chemical language is not to be easily brought about, unless we can get an absolutely perfect substitute for what we now have.

THE POETRY OF ADULTERATION. — A British rhymer has given to the world, under the title of "Poisoning and Pilfering," his views with regard to the prevalence of adulteration in his native isle. The following are extracts from the book, as quoted by a reviewer: —

"Scarce an article bought — or it seems so to me —
Is really the substance you take it to be:
There is hair sold as wool, there is cotton for flax,
There is sugar for honey, and tallow for wax."

"And in cocoa — which doctors commend —
There are poisonous things without number,
For there sago and arrowroot blend
With chalk, and red ochre, and umber;
And potato, and sugar, and flour,
With oxide of iron and oil —
And the husk they put in, too, has power
The invalid's breakfast to spoil."

If these are fair samples of the verses, there is more truth than poetry in them.

Speaking of adulteration in England, the Commissioners of her Majesty's Inland Revenue, in a report just published, state that during the past year eight samples of medicines for internal use, examined under Excise supervision, were found to have been prepared from methylated spirit. They comprised sweet spirit of nitre, paregoric, and the tinctures of catechu, rhubarb, and cardamoms.

We have referred before to various ways in which the farmer on the other side of the water is cheated, some of them being quite equal to the "best efforts" of agricultural sharpers of Yankee birth. One of the latest tricks of the kind is mixing the seed of the wild charlock, or corn mustard, with turnip seed, which it closely resembles. But before being mixed it is heated to a temperature which destroys its germinating power; so that, when the mixed seed is sown, only the turnip comes up, and the fraud is not likely to be detected.

ENGLISH BOOKS. — Among the thousands of cultivated men and women who read the JOURNAL, there are many who will be pleased to know how they can readily procure books in the London market. Mr. Bernard Quaritch, 15 Piccadilly, London, whose advertisement appears in the advertising columns of this number, is *the American* London bookseller, and a gentleman thoroughly reliable and every way qualified to attend to all orders which may be sent to him from this side of the water. All *rare* books in every department of literature and science he has on hand, or will procure, if they can be found in England. We have entrusted to him our book orders for several years, and take pleasure in commending him to our readers.

AGRICULTURAL ADDRESSES. — We have consented to deliver the annual address at the Worcester North Cattle Show and Fair, at Fitchburg, Sept. 27th, and also at the Amesbury and Salisbury Agricultural Fair, Sept. 21st. As the October JOURNAL will reach many of our subscribers, certainly before the Worcester Fair, we make the announcement in this number.

CORRESPONDENCE. — A large number of letters continue to be received, the contents of which are of such a character that we cannot give them attention. We are led to believe that our patrons and friends suppose we have considerable leisure on our hands, and can attend to making researches and answering questions for their benefit as well as not. This is a decided mistake. Every moment of our time is occupied, and not a day passes that we are able to attend to all the duties pressing upon us. Our friends must remember this in their correspondence.

ATOMS.

THE chief, if not the only solvent of indigo blue, or indigotine, hitherto known and used, has been concentrated sulphuric acid; but it has been lately found that several other substances will answer the same purpose, as aniline oil, Venetian turpentine, boiling paraffine, stearine, and petroleum. — To hypochondriac and nervous people who are over anxious as to what they shall eat, the advice of Sir Richard Jebb may be recommended: "My directions will be few and simple: you must not eat the poker, shovel, or tongs, for they are hard of digestion; nor the bellows, because they are windy; but anything else you please." — In these days, when there is so much discussion concerning the origin of the minutest and simplest forms of life, it is evident that the legal adage, "De minimis non curat lex," is not likely to be accepted as a maxim in zoölogy. — Fly paper, which is sticky without being poisonous, may be made by melting some rosin in an iron vessel, adding sweet oil or lard enough to make it as thick as molasses when cold, and spreading the mixture with a brush on coarse brown paper. — An artesian well has been sunk to the depth of 2,800 feet, at Cohoes, N. Y. — According to a late writer, sun-stroke is due to the action of light upon the brain, exerted through the eye, and not, as generally believed, to an elevation of temperature; and it is asserted that, if the eye be properly shaded from the glare of the sun, any unusual precaution in the way of protecting the head and back of the neck may be dispensed with. — An "air-blast loom" has been invented in England, in which the shuttle is driven by means of the sudden release of a very small quantity of compressed air, acting directly upon the shuttle, without any of the complicated machinery required in former contrivances of the kind. — The cotton factory at Augusta, Ga., has paid dividends of 20 per cent. from the start, and a new one, to run 1,000 looms, is contemplated, if the requisite capital can be secured. — The bedding of the common people in Holland is generally made of *kapok*, a silky fibre from a tree gourd found only in the Indies, which, besides its cheapness, has the merit of not being attacked by moths or vermin. — Mrs. Mary Michaels, of Petersburg, Pa., aged one hundred and ten years, has come to a premature end by suicide. — In England, they are making chamber-sets, book cases, and other furniture of Southern or pitch pine, stained to imitate mahogany, or varnished with its natural color; and the material is to be commended as cheap, solid, easily worked, and durable. — The editor of the *Manufacturers' Review* has recently analyzed a "simple and harmless antidote for the opium habit," put up in Indiana and sold at sixteen dollars a bottle, and finds it to be a syrup containing a large amount of *sulphate of morphia*. — On this side of the equator all bean vines twine the same way, but in southern latitudes they go round the pole in the opposite direction; whereupon the *Rural Carolinian* raises the question, "How does the bean manage directly under the equator?" — The so-called jet ornaments fashionable nowadays are nearly all made in Bohemia of a fine black glass, which is quite as handsome as the real jet, and much less fragile. — There is a sugar refinery in Brooklyn, which cost two and a half millions, employs two thousand men, and turns out nearly half a million pounds of sugar daily; and there are several other establishments in the same city that are nearly as large. — The *Pall Mall Gazette* states that in India cases of leprosy have been cured with carbolic acid, and a recent Madras paper says that it has been used with success even in very advanced stages of the disease. — The subject of instructing women in domestic economy is attracting attention in Eng-

land, and an institution is soon to be established in London, under the direction of a lady, for the purpose of teaching the art of housekeeping. — A man in Illinois has gathered eleven thousand pounds of grapes from a single acre of his vineyard. — The orthography of the Flemish language having lately been modified by government authority, a printer demands from the King an indemnity of $18,000, on the ground that the sale of his stock of dictionaries is spoiled. — Some one spilled a small quantity of magenta on the sidewalk near our office about three weeks ago, which still shows very plainly, though we have had, meanwhile, several heavy rains; and at one time the sidewalk for a hundred feet on either side of the place was distinctly red, showing the wonderful coloring power of the agent. — Ultramarine, for which fifty years ago artists paid its weight in gold, is now made artificially in immense quantities, and is used for such common purposes as painting carts and wagons, and coloring wrapping-paper; it is very permanent, and altogether unaffected by the weather. — The Nile carries fifty-five billion tons of water into the Mediterranean in the course of a year. — An American reaping-machine has won a prize in Hungary, where it was tested in competition with nearly forty other machines. — The *Medical Archives*, of St. Louis, is one of the best of our medical exchanges, and we would remind our Western friends that we furnish it *with the* JOURNAL at three dollars a year, which is the regular price of the *Archives* alone. — Several children in Liverpool were poisoned by eating Calabar beans, which they picked up from refuse matter on a vacant lot, where it had probably been thrown from some ship or dock. — The first gas meter was invented by Mr. Samuel Clegg, in 1815, and was used at the Gas Works in Westminster, Great Britain.

LITERARY NOTES.

MESSRS. LINDSAY AND BLAKISTON, of Philadelphia, have recently published *A Manual of Midwifery*, by Alfred Meadows, M. D., Member of the Royal College of Physicians, etc.; the first American from the second London edition, with illustrations. It is one of the most convenient, practical, and concise books yet published on the subject. They also reprint Dillenberger's *Handy Book of the Treatment of Women and Children's Diseases*, according to the Vienna Medical School; translated from the German by P. Nichol, M. D., who has added valuable notes on the main differences between the Austrian and the British practice. Another of their new issues is Dr. G. B. Duchenne's *Localized Electrization*, and its Applications to Pathology and Therapeutics; translated from the third French edition, with notes and additions, by Dr. Herbert Tibbits; a work to which we shall have occasion to refer hereafter.

The Harpers have just published *Shakespeare's Comedy of The Tempest*, edited, with notes, by W. J. Rolfe; the second volume of their illustrated school and family edition of the poet. Among their other recent publications are Lyell's *Elements of Geology*, issued as one of the popular "Student's Series," and unquestionably a better manual of the science for educational use than any other of similar compass; Bush's *Reindeer, Dogs, and Snowshoes*, a journal of Siberian travel and exploration in connection with the Russo-American telegraph expedition, — a very interesting book about an almost unknown region; Abbott's *Frederick the Great*, which has attracted much attention during its serial issue, and is now put into handsome form for the library; and *Jefferson's Domestic Life*, compiled from family letters and reminiscences, by his great granddaughter, Sarah N. Randolph, — a most entertaining memoir, and an important contribution to American historical biography. They have ready, also, their *Handbook for Travellers in Europe and the East*, revised for its *tenth* annual edition. The matter is brought down to the summer of 1871, and the maps, plans of cities, etc., which we commended as a new and valuable feature of the last issue, have been largely increased in number. The book still is, as it always has been, the best of its class.

Messrs. Hurd and Houghton have lately published *Stories from Old English Poetry*, by Abby Sage Richardson, who has culled from Chaucer and Spenser and Shakespeare the stories that were sure to charm the children, and has been peculiarly happy in her way of telling them. We hope that she will make it the first of a series, drawing further material from the ample stores of our early poets and dramatists.

All these books may be found at Noyes, Holmes, & Co.'s, 117 Washington Street.

We have received the *Second Annual Report of the Massachusetts Bureau of Statistics of Labor*, — voluminous and valuable, — and various pamphlets, which our space does not permit us to notice in detail.

Medicine.

HUMAN LABOR UNDER HIGH TEMPERATURES.

OUR readers are aware that the Commissioners appointed to inquire into the probable duration of the coal supply in Great Britain, have just issued their report. They have come to the conclusion that the existing quantity of available coal would suffice for 1,273 years, at the present rate of consumption; but if this rate increases as it has done for the last fifteen years, the supply would be exhausted in 110 years. Making allowance for a probable diminution of this rate of increase, the time would be extended to 360 years. In these estimates it is assumed that coal existing at depths of more than four thousand feet is not available or "workable," since it would probably be cheaper to import coal than to raise it from greater depths, even if human labor could be carried on under the high temperature which must prevail there. It is an interesting question, what is the maximum temperature compatible with the healthful exercise of human labor. The Commissioners appointed a committee to make investigations on this subject, and the results are embodied in their report. The question was found to be very difficult to decide. Evidence was given of extraordinary temperatures endured in the boiler-rooms of steamers and in glass-houses. In some of these cases labor has been carried on without serious detriment to health where the thermometer has indicated 180° Fahrenheit. In these instances, however, the thermometer was chiefly acted on by radiant heat, and therefore did not indicate the actual temperature of the air. In an experiment made under the direction of the Committee, it was found that a thermometer exposed to the radiation from the boilers of a steamer indicated a temperature of 105°; while another thermometer in the same position, but carefully screened from the radiant heat, stood at only 78°. It is important also to observe that the men who work in these hot places have ready access to the external air, and avail themselves of numerous intervals in their labor to cool themselves. One of the medical witnesses, who had spent a great part of his life in tropical climates, stated that he had experienced a temperature of 125° Fahrenheit in the shade, and that this great heat was rendered endurable by the dryness of the atmosphere; on the other hand, he had felt a damp atmosphere almost intolerable at the comparatively low temperature of 86°. Mining work is done in a Cornish mine where the air is heated by a hot spring to a very high temperature, and is also by the same cause saturated with moisture. Dr. Sanderson was deputed to visit this mine and make an investigation. He found the highest temperature at the extremity of an excavation, where a stream of water entered at a temperature of 114½°. At a distance of a yard from the extremity the thermometer indicated a temperature of 103°; but at a distance of only ten feet there was access to air, where the thermometer stood at 81°. According to other evidence, the temperature of the air occasionally reached 123°. The miners remained in their workings six hours out of the twenty-four. Four men were employed at a time, of whom two were always at rest in the cool air, and the other two were not always at work. The total duration of each man's work was less than three hours in the twenty-four. No man remained more than fifteeen minutes in the heat at one time. The condition of each miner on retreating into cool air is described as one of complete exhaustion; but on allowing cool water to pour over his body, the distressing effect quickly passed off. Dr. Sanderson came to the conclusion that the occupation in question is not necessarily inconsistent with the enjoyment of vigorous health; but he found there were many men who after trying the work were compelled to desist on account of the distress and exhaustion which were produced. It is his opinion that labor is not practicable in moist air at a temperature equal to that of the blood, namely 98°, except for very short intervals; and this conclusion is in harmony with the other medical evidence. The question of the maximum temperature under which work could be carried on in a coal mine hinges in a great measure on the hygrometric condition of the air. The depth at which the temperature of the air would, under present conditions, become equal to the heat of the blood would be about 3,420 feet. Beyond this point it is very doubtful whether work could be carried on; but, assuming that within moderate limits expedients may be devised for reducing the temperature, the Committee considered that the depth might be extended to four thousand feet. It appears, then, that the greatest depth at which, in the present state of our knowledge and mechanical skill, it would *pay* to work a coal mine, is at the same time the greatest depth at which it would be possible to labor, on account of the temperature.

A FOUNDLING HOSPITAL.

DR. GEORGE BAYLES, in the *Medical Gazette*, of New York, gives the following description of the celebrated Parisian Foundling Hospital:

Throughout all Europe the necessity for foundling hospitals is recognized, and such institutions are liberally provided by the governments of France, England, Austria, Italy, Russia, and other countries, in the districts where they are most needed. Like insane asylums, however, they are found available in the prevention of crime only in districts within a certain distance, not exceeding a radius of from 25 to 30 miles: but within this circle their influence is clearly noticeable. The best-known of these is probably the Foundling Hospital of Paris, established by St. Vincent de Paul in 1620. The building now in use was formerly occupied as a convent, and in many respects is admirably adapted to its present use. The number of children under the charge of the officers of this institution three years ago was about 17,000, only a small portion of whom were allowed to remain long in the building after their reception. All foundlings and orphans, by the rules of this institution, are taken without distinction, and kept for ten days, when, if healthy and in good condition, they are sent into the country to be nursed. If sick from diseases contracted before or after admission, they are carefully tended, and allowed to remain until a change of location is decided to be safe and desirable. A plan is adopted in the reception of children, which prevents any distinction being made with reference to age, sex, or physical condition. A small retired court-yard opens on the street, through which the persons bringing children pass to a place in the wall where "*le tour*," a revolving box turning on a pivot, communicates with the interior of the building. In its

ıe infants are placed, and a sliding door on the out-de is closed to prevent the identification of the par-es bringing them. When this is done, the bell on ıe outside is rung, and the nurse on duty within pro-eeds to "*le tour*," takes out the child, and replaces ıe box in its original position. Ten or twelve are ceived in this manner every evening, and their arentage remains forever unknown. Some are ought there publicly, their names registered, and ıch marks put on them as will enable their par-ıts, who are compelled to part with them unwill-gly, to recognize and claim them should they de-re to do so; while others are transferred from the arious public institutions, principally from the Maternité," where they are born of indigent others, or those who die in giving them birth.

The interior arrangements of this admirable in-itution are as perfect as they could well be made. he building is divided into four wards, commodi-ıs, clean, and well ventilated. The top floor is in-nded for the sick, it being more silent and secluded an the others, and both the medical and surgical itients are placed in separate apartments. The wer floors are devoted to children in good health, ıd have their separate dormitories, refectories, ıd wash and play rooms. A sister of charity has harge of each ward, assisted by a corps of nurses umbering one to six children, who are replaced at ght by a force of equal size and efficiency, so that e same number is constantly on duty. The fur-iture is plain and strong, but cheerful and attrac-ve in appearance. The cribs are all simple, and nstructed of iron, supplied with soft mattresses ıd most faultless bed-linen, and are enveloped in ırtains of snowy-white dimity. Each one is num-ered, and has a ticket opposite, with the date of e occupant's birth and its name, if one has been ven it by the person from whom it is received. he peculiar American institution which Dickens ıs forcibly characterized as "the eternal, accursed, ffocating, red hot demon of a stove," is unknown the public institutions of Paris. At each end of e dormitories and large halls is a great open fire-ace, where cheerful wood fires, protected by wire ıders, are kept burning during the cold season. efore them the children are washed and dressed, d a padded shelf or a long couch is placed within suitable distance, on which they are allowed to lie d warm themselves before being put to bed again. is difficult to imagine a pleasanter sight than this, d it would cheer the heart of many a poor mother uld she see the more than maternal solicitude with hich these *enfants de la patrie* are tended and itched over by their kind-hearted nurses. Every ır hours they are taken up and fed, their regular et consisting of milk, thin barley, rice-water, and rb teas. The rates of mortality among the chil-en here received are great, but not unnecessarily considering the fact that many are taken when t a few hours old, and, in addition to an untimely posure to the night air, are deprived of that nu-ment which physiological science has decided to essential to life, and impossible of accurate imita-on.

Of the 17,000 children constantly under the arge of the institution, but few are allowed to re-ain long in the hospital. The rest are either arded in suitable country houses, adopted into orthy families, or, if old enough, apprenticed to a ade in the city. On coming of age, they are dis-arged with a small gratuity from the surplus nds of the institution, and sent out into the world seek their fortunes. Most of the boys either en-t or are conscripted into the army, where many them have attained honorable rank and distinc-on; while the girls, deprived of suitable protection, e too often corrupted by the evil associations with hich, in the immoral city of Paris, they are soon rrounded. Here we notice the first great defect in the French system of rearing foundlings, but the evil result of this abandonment of the young women at an early age is not necessarily a part of the plan as it should and will be adopted in America.

MEDICAL MEMORANDA.

Statistics of Suicide. — A late number of the *British Medical Journal* gives some interesting statistics and comments upon suicide, collated from the records of the inquests of the coroner of central Middlesex, from which it would appear that, of all causes of death, suicide is the most constant. The proportion of suicides to the population is one in 12,000 in England and Wales, while in the district in question it is about one in 13,000. The proportion in which the sexes commit self-destruction is nearly the same everywhere, being about five males for every two females. The ages at which suicide is committed are, for the seven years which the coroner reports, nearly the same. One in twelve are young people under twenty years of age; a larger proportion among people above sixty; and the remainder, nine tenths of the whole, are equally divided among people from twenty to forty years of age. A further analysis of the cases shows that, as a rule, women prefer taking poison and drowning themselves. Of twenty-three cases of female suicide, six were from poisoning and ten from drowning. Women seldom cut their throats or hang themselves, whilst of sixty-six cases of male suicide exactly one half chose these methods of self-destruction. Men are also more given to jumping out of windows and from the tops of high places.

Cantharides in Hydrophobia. — At the last meeting of the British Pharmaceutical Conference, Mr. H. Groves read a paper "On the use of blistering flies in hydrophobia," from which it appears that about thirteen or fourteen years ago a certain Nikititsch Levachoff, of Peklitz, in Russia, created a sensation by his cures of hydrophobia. His arcanum was supposed to be the *Cetonia aurata*, or rose beetle. The monks of Phaneromenos, near Eleusis, Greece, use the insect *Mylabris bimaculata* with equal parts of the leaves of the *Cynancum excelsum*, in doses of fifteen grains of the mixed powder. At the same time they cauterize the wound with boiling oil. In Tuscany there are one or two persons who are reputed to be able to treat successfully the bites of mad animals by means of a nostrum whose basis is supposed to be cantharides, or other insects with blistering properties. The *Cantharis vesicatoria* is found in several parts of Tuscany, where the peasants collect it by spreading cloths under the trees morning and evening, and shaking the insects out of the branches. The months of May and June are those in which the gathering takes place, and the fly prefers the olive tree to the poplar and ash, which it also frequents. They are killed by being plunged into weak vinegar, or by being held over the steam of the same. Afterwards they are dried as rapidly as possible in the sun, and are frequently turned over by a thickly gloved hand or by other means.

To Prevent Pitting in Small-Pox. — Dr. I. H. Bird (*Med. and Surg. Reporter*) uses an ointment made of charcoal and lard to prevent pitting in small-pox. This is applied freely over the surface of the face, neck, and hands, as soon as the disease is distinguished, and continued until all symptoms of suppurative fever have ceased. The application allays the itching, and seems to shorten the duration of the disease, and leaves the patient without a blemish, the eruption protected by the ointment not even showing signs of pustulation; the charcoal preventing the action of light, and lard that of air.

Uses of Carbolic Acid. — Dr. Lehlback uses carbolic acid in solution of 5 to 20 grains to the ounce of glycerine and water, as a dressing to wounds. The benefit was marked in arresting suppuration and exciting rapid granulation. In *carbuncles* he uses *carbolized poultices*, and after a forced or spontaneous opening of the carbuncle a solution of carbolic acid in glycerine, from half a drachm to one and a half drachms of the former to the ounce of the latter. In conjunctivitis he thinks it is valuable. In burns and scalds he esteems it of great value; using one drachm to six ounces of glycerine. In minor burns and scalds, one application of the ordinary crude fluid article will almost invariably arrest the pain in a few moments, and prevent subsequent vesication.

Transplantation of Bone. — M. Philipeaux has made some experiments upon guinea-pigs, tending to prove that bone taken from an animal may be transplanted upon another animal of the same species. M. Ollier had made similar experiments before, but they were made upon the same animal and grafted in the same opening wherefrom they had been taken. M. Vulpian says that an important condition of success depends upon the age of the animals.

The Cathedral and the Hospital. — When the French took Paris, the cathedral of Notre Dame seems to have had a very narrow escape, and the rumors which reached us of its having been set on fire were not without foundation. It was saved by the courage and devotion of the house-surgeons of the neighboring hospital, the Hôtel Dieu. About three o'clock on the morning of the 24th of May, M. Hanot, the house-surgeon on duty in the waiting-room, was aroused by a great noise. Casks were being rolled through an opening in a neighboring barricade to the place between the hospital and cathedral, and a lieutenant of the Nationals, with an armed force, was demanding at the gate to be furnished with gimlets, locksmith's tools, and a candle. They were about to set fire to Notre Dame. The director of the Hôtel Dieu was sent for; it was pointed out by him that there were nine hundred sick and wounded in the hospital, and that the destruction of the one building would necessarily involve that of the other. After a long and rough colloquy with the officer a respite was obtained, and reference was made to the Committee of Public Safety, and a promise given that the cathedral should not be set on fire till time had been given to remove the sick. At about eleven in the morning, however, the cathedral was seen to be on fire, and smoke was issuing from one of the windows. The six house-surgeons were refused the use of the fire-engine, but collecting together a crowd of women and children they made their way into the building; the smoke was so thick and suffocating that they were on the point of being driven back; but, with the help of a fireman, who gave his aid in spite of the prohibition of the Communists, they reached the source of the mischief and extinguished the flames. A burning brazier was found at the choir, and another by the high altar. The chairs, benches, etc., had been piled up around the pulpit as high as the great organ, and also round the statues of Christ and the Virgin; paper had been laid at the base of the piles. The flames were extinguished, windows were broken to let the smoke out, every part of the cathedral was visited, and a guard organized for the purpose of preserving the edifice from further incendiary attempts. It was not interfered with during the day, and at eleven at night this part of the city was in the hands of the troops, and the Hôtel Dieu and Notre Dame were safe. M. Hanot, one of the house-surgeons, who tells the story very graphically in the *Gazette Médicale de Paris*, deserves that his name should be remembered in French history.

The Pool of Siloam. — This venerable spring has not only lost its miraculous power of healing, but it appears to have become the source of disease instead. Referring to a case of scarlet fever, Dr. A. Fisher, a surgeon in the British navy, says: —

"I attribute the origin of this case to the use of the water at Jerusalem, and consider ourselves fortunate in having escaped with only one case of enteric fever among the seventy-two persons visiting it. Without the walls of Jerusalem the water appears to be very good, but inside it is received into vast tanks and reservoirs beneath the Harem area, and elsewhere. These, from what I saw in the excavations recently executed by the Palestine Exploration Society, are entirely without protection from receiving a large proportion of the sewage of the city, in some cases without even the slightest filtration through earth or other obstacle. At the fountain of Siloam and Pool of Siloam, the water distinctly tasted like soap-suds, brought down by the water from the baths, etc., close to the Temple inclosure."

A Critic Criticised. — The *Pall Mall Gazette* was very severe, the other day, upon druggists who make mistakes in putting up prescriptions, and suggested that it would be well to hang one of the offenders as an example. The article was suggested by a case which the writer reports as follows: —

"The latest instance of this kind is the death of a gentleman named Wall, living at Salcombe Regis, near Sidmouth, who sent the other day to a neighboring chemist for a mixture containing a small quantity of morphia. The chemist put a *scruple* instead of a *drachm* of muriate of morphia into the mixture, the result of this little mistake being the death of Mr. Wall."

Some one ventured to suggest that the critic had blundered, whereupon he comes out, a few days later, with the following: —

"In an occasional note on a recent instance of poisoning, the words 'scruple' and 'drachm' were transposed, so as to make it appear that the chemist had given the smaller instead of the larger dose; whereas, obviously, the reverse was the case."

The fact was, as we find from a report of the case elsewhere, that the druggist had put in a scruple (or twenty grains) of muriate of morphia instead of half a drachm of the *solution* of the same (equal to half a grain of the drug), the prescription being written in a very indistinct hand by Mr. Wall, who was in the habit of taking opium, and of prescribing for himself.

SYSTEM IN BRAIN WORK.

A correspondent of *London Society* says: "I know a remarkably able and fertile reviewer who tells me that, though over his midnight oil he can lucubrate articles with a certain sharpness and force, yet for quietly looking at a subject all round, and doing justice to all its belongings, he wanted the quiet morning hours. Lancelot Andrews says he is no true scholar who goes out of his house before twelve o'clock. Similarly an editor once told me that though his town contributors sent him the brightest papers, he always detected a peculiar mellowness and finish about the men who wrote in the country. I knew an important crown official whose hours were from ten to three. He had to sign his name to papers; and as a great deal depended upon his signature, he was very cautious and chary how he gave it. After three o'clock struck, no beseeching powers of suitors or solicitors could induce him to do a stroke of work. He would not contaminate the quality of his work by doing too much of it. He would not impair his rest by continuing his work. And so he fulfilled the duties of his office for exactly fifty years before he retired on full pay from the service of the country. And when impatient people blame lawyers for being slow, and offices for closing punctually, and shops for shutting early, and, generally speaking, the wider adaptation of our day to periods of holidays and rest, they should recollect that these things are the lessons of experience, and the philosophy of society and life."

SELECTED FORMULÆ.

Carbolic Acid Ointment. — The London *Pharmacist* gives the following recipe: —

Simple ointment, benzoated, 4 pounds troy.
Carbolic acid, crystallized, 3 ounces, 96 grains.

Liquefy the acid by immersing the vessel containing it in hot water, and when the ointment is about congealing add the acid, stirring well with a strong wooden spatula. Each drachm contains three grains. This ointment has been of excellent service in treating large superficial wounds, and ulcerating surfaces caused by burns, and in cutaneous eruptions of a parasitic nature.

Liquor Sedativus. — This is a combination often prescribed by English physicians in diseases complicated with febrile symptoms: —

Tinct. Opii Camphor.
Spts. Æth. Nit. dulc.
" Mindereri.
Syr. Simpl.
Aq. Camphoræ, āā part. æq.
M. et ft. solutio. Dose: a teaspoonful.

To increase the therapeutic effect of this mixture, 2 fl.ʒ of Tinct. Gelsemini, or 1 fl.ʒ of Tinct. Verat. vir. are often added to four ounces, to meet particular indications.

Belladonna Solution. — The *Georgia Medical Companion* recommends this formula: —

℞ Ext. Belladonna	ʒi.
Glycerine	℥i.

Mix well. Glycerine is a better solvent for belladonna than water, for the purpose of applying around the brow, to produce dilation of the pupil. It prevents the extract from forming a hard crust, and insures with more certainty its absorption.

Cucumber Ointment. — The *Pharmacist* gives the following formula for cucumber ointment: —

Take of oil of sweet almonds, seven fluid ounces.
Spermaceti, eighteen drachms.
White wax, five drachms.
Glycerine, one fluid ounce.
Green cucumbers, four pounds.

Cut the cucumbers in small pieces, mash them in a wedgewood mortar, let them macerate in their own liquor for twelve hours, express and strain; melt the almond oil, spermaceti, and wax together, by means of a water bath; add to it the strained liquor, stirring constantly so as to incorporate the whole together. Set aside in a cool place (an ice chest preferred) till it becomes hard, then beat with a wooden spoon, so as to separate the watery portion of the cucumbers from the ointment, pour off the liquor thus obtained, and mix the glycerine with the ointment without the aid of heat, by working it with the hands until it becomes thoroughly incorporated. Put up in four-ounce jars, cover with a layer of rose-water, and set aside in a cool place. The ointment prepared in this way will keep sweet and nice for twelve months. It is much esteemed by physicians and the public generally in the South and Southwest.

Pomatum for Chapped Lips. — The following is from the *Druggists' Circular*: —

℞ Lard	16 parts.
Cacao oil	24 "
Spermaceti	8 "
Yellow wax	3 "
Alcanna root	1 "

The substances are fused for a quarter of an hour at a gentle heat, then strained through a cloth and mixed with —

Oil of lemon,	
Oil of bergamot, āā	1-6 part.
Oil of bitter almonds	1-15 "

when the mass is poured into suitable vessels to cool.

Glycerine Cream. — This recipe is excellent:

Take of Spermaceti, four drachms.
White wax, one drachm.
Oil of almonds, two troy-ounces,
Glycerine, one troy-ounce.

Melt the spermaceti, wax, and oil together, and when cooling stir in the glycerine and perfume.

Preserving Meat. — Many methods have b introduced to meet the ever-growing want of E land — cheap animal food. Liebig's process been carried on very profitably at home as w as abroad; but the preparation of extract of m has been declared wasteful, from the small amou of stimulating material preserved, and the casti away of all albuminoid matters to the manure hea A new plan has been introduced by an engine whose experience in sugar refineries and other e tensive works in hot latitudes has ensured a prac cal and economical solution of one of the most i portant problems of the day. Mr. T. F. Henl does away with steeping the meat in water, and wi boiling and otherwise treating it in the most cost way. He simply squeezes a definite amount juice out of the fibre, and by mechanical desiccati preserves the latter intact. The pressed meat th obtained contains ten per cent. of alcoholic extra and salt, and over fifty per cent. of fibrine and oth albuminoid constituents. It is exceedingly rich, an so is the meat juice, which Mr. Henley evaporat in vacuum pans. The juice contains about 15 p cent. of alcoholic extract, and over 50 per cent. o albumen. The old method of abstracting water onl from the animal matter is relied on as the preserv tive, and the low temperature at which the evapor tion is carried on prevents any loss of flavor or oth deterioration. It is perhaps strange that so chea and simple a process has not been suggested befor The first works on an extensive scale are to b opened on the River Platte, at the Estancia Nuev Alemania, where cattle have been reared an fattened for the European markets. It is propose to slaughter three hundred bullocks daily, and sinc it is stated that the hides and feet pay the first cost of the bullock and of its slaughtering, the prospects of the undertaking are promising. — *British Medical Journal.*

Pollen from Beets. — Reading the remarks upon dust, in the August No. of the Journal, leads me to mention that some persons are much troubled with itching and inflammation of the eyes during the blossoming of beets, and that without contact with the plants, but simply from the presence in the air of very fine invisible particles emitted from the flower, and evidenced to the nose by a pungent aroma. I have had very sore eyes this summer from the above cause. J. Robe.

Mount Lebanon, N. Y.

Lawrence, Kansas, *July 14th*, 1871.

Jas. R. Nichols & Co., — Enclosed you will find $5, for which please send me "Cincho-Quinine." Send by mail immediately, as I am nearly out.

I find it preferable to the Sulphate, — all in fact that you claim for it. Do you prepare it in form of sugar-coated pills? S. B. Anderson, M. D.

Answer. We do not, as it is so palatable that it seems quite unnecessary to put the agent in that form.

Middletown, Conn., *Sept. 6th*, 1871.

Jas. R. Nichols & Co., — I have made trial of your preparation of Cod Liver Oil with hypophosphites of lime and soda, in the case of a young man suffering from pulmonary turberculosis. The preparation had a very prompt and decided effect, in arresting the night sweats, relieving cough and dyspnœa, and in fact improvement has taken place in every respect. I shall continue its use.

J. Morgan, M. D.

Professor Wurtz has stated to the French Academy of Sciences that the nitrate of strychnia, used hypodermically, is an antidote to the poisonous effects of chloral.

Boston Journal of Chemistry.

Volume VI. BOSTON, NOVEMBER, 1871. Number 5.

Familiar Science.

[Communicated to Boston Journal of Chemistry.]

AN EXPLOSION ON THE SUN.

On the 7th of September, between half past twelve and two P. M., there occurred an outburst of solar energy remarkable for its suddenness and violence. Just at noon the writer had been examining with the telespectroscope [1] an enormous protuberance or hydrogen cloud on the eastern limb of the sun.

It had remained with very little change since the preceding noon — a long, low, quiet looking cloud, not very dense or brilliant, nor in any way remarkable except for its size. It was made up mostly of filaments nearly horizontal, and floated above the chromosphere [2] with its lower surface at a height of some 15,000 miles, but was connected to it, as is usually the case, by three or four vertical columns brighter and more active than the rest. Lockyer compares such masses to a banyan grove. In length it measures 3′ 45″, and in elevation about 2′ to its upper surface — that is, since at the sun's distance 1″ equals 450 miles nearly, it was about 100,000 miles long by 54,000 high.

At 12.30, when I was called away for a few minutes, there was no indication of what was about to happen, except that one of the connecting stems at the southern extremity of the cloud had grown considerably brighter, and was curiously bent to one side; and near the base of another at the northern end a little brilliant lump had developed itself, shaped much like a summer thunder-head. Figure 1 represents the prominence at this time, *a* being the little "thunder-head." [3]

Figure 1.

What was my surprise, then, on returning in less than half an hour (at 12.55), to find that in the mean time the whole thing had been literally blown to shreds by some inconceivable up-rush from beneath. In place of the quiet cloud I had left, the air, if I may use the expression, was filled with flying *débris* — a mass of detached vertical fusiform filaments, each from 10″ to 30″ long by 2″ or 3″ wide, brighter and closer together where the pillars had formerly stood, and rapidly ascending.

When I first looked some of them had already reached a height of nearly 4′ (100,000 miles), and while I watched them they rose with a motion almost perceptible to the eye, until in ten minutes (1.05) the uppermost were more than 200,000 miles above the solar surface. This was ascertained by careful measurement; the mean of three closely accordant determinations gave 7′ 49″ as the extreme altitude attained, and I am particular in the statement because, so far as I know, chromospheric matter (*red-hydrogen* in this case) has never before been observed at an altitude exceeding 5′. The velocity of ascent also, 166 miles per second, is considerably greater than anything hitherto recorded. A general idea of its appearance when the filaments attained their greatest elevation may be obtained from Figure 2.

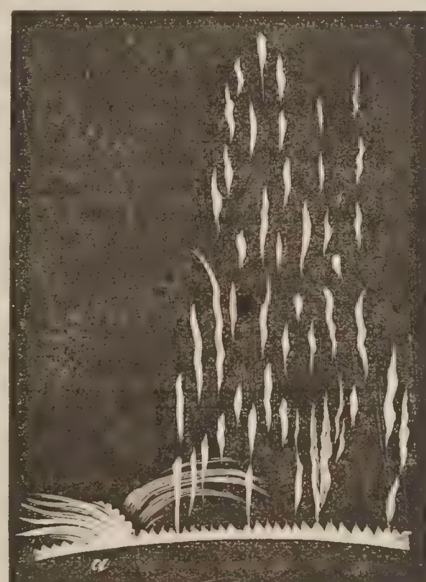


Figure 2.

As the filaments rose they gradually faded away like a dissolving cloud, and at 1.15 only a few filmy wisps, with some brighter streamers low down near the chromosphere, remained to mark the place.

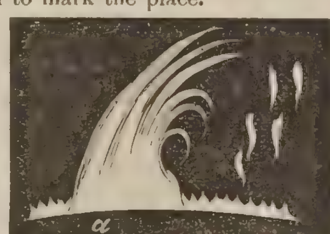


Figure 3.

But in the meanwhile the little "thunder head," before alluded to, had grown and developed wonderfully, into a mass of rolling and ever changing flame, to speak according to appearances. First it was crowded down, as it were, along the solar surface; later it rose almost pyramidally 50,000 miles in height; then its summit was drawn out into long filaments and threads which were most curiously rolled backwards and downwards, like the volutes of an Ionic capital; and finally it faded away, and by 2.30 had vanished like the other. Figures 3 and 4 show it in its full development; the former having been sketched at 1.40, and the latter at 1.55.

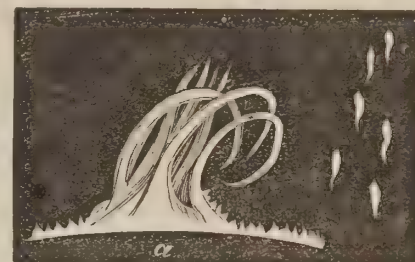


Figure 4.

The whole phenomenon suggested most forcibly the idea of an *explosion* under the great prominence, acting mainly upwards, but also in all directions outwards, and then after an interval followed by a corresponding in-rush: and it seems far from impossible that the mysterious coronal streamers, if they turn out to be truly solar, as now seems likely, may find their origin and explanation in such events.

The same afternoon a portion of the chromosphere on the opposite (western) limb of the sun was for several hours in a state of unusual brilliance and excitement, and showed in the spectrum more than 120 bright lines whose position was determined and catalogued, — all that I had ever seen before, and some 15 or 20 besides.

Whether the fine Aurora Borealis which succeeded in the evening was really the earth's response to this magnificent outburst of the sun is perhaps uncertain, but the coincidence is at least suggestive, and may easily become something more if, as I somewhat confidently expect to learn, the Greenwich magnetic record indicates a disturbance precisely simultaneous with the solar explosion. C. A. Young.

Dartmouth College, *September*, 1871.

[1] This is the name given by Schellen to the combination of astronomical telescope and spectroscope.

[2] The *chromosphere* (called also *sierra* by Proctor and others) is a layer of hydrogen and other gases which surrounds the sun to a depth of about 7,000 miles. Of this the prominences are mere extensions.

[3] The sketches do not pretend to accuracy of detail, except the the three *rolls* in that are nearly exact.

HOW ARTIFICIAL STONES ARE MADE.

A recent visit to the works of the Union Stone Company at Chelsea, Mass., afforded full opportunity to learn regarding the materials used, and the methods employed by the Company in fabricating their artificial stones and other industrial products. The works are quite extensive, and very conveniently situated to facilitate the peculiar manufacture to which they are devoted. They are upon the edge of the marsh, and a creek which connects with Mystic River winds around the yard, and the water is of sufficient depth to permit vessels of considerable tonnage to approach the wharf to discharge cargoes of raw materials, and receive the completed products.

The process adapted by the Company is essentially that of M. Sorel, the eminent French chem-

ist, who in discovering that the oxychloride of magnesium was a hydraulic cement of great strength and hardness, laid the foundation of a new manufacture which promises to be of great importance. The process, stated in the fewest words possible, is as follows: A solution of chloride of magnesium, of the proper strength and in the proper proportions, is added to the oxide of magnesium; this forms the cement; and sand, powdered marble dust, slate, or other material, forms the bulk of the body held together by the cement. A beautiful and durable sandstone for window caps, sills, steps, etc., is formed by incorporating the cement with clean beach sand. The color and hardness of the articles correspond with the sandstone hewn from the quarries in the valley of the Connecticut, and buildings constructed of it will be equally elegant and durable. Beside the stones, the Company manufacture soapstone sinks, stoves, etc., marble mantles, emery wheels, whetstones, hones, and balls for billiard tables. It is quite impossible to fix a limit to the articles of the greatest utility which may be made by this process. The soapstone articles are made by using the waste powder of the soapstone workers, and this is re-formed into very perfect stone by aid of the cement; so also, the marble is made by utilizing the fragments from the marble yards.

Of course, the prominent question which comes up in the mind of every one whose attention is called to the matter is, "Will it pay?" Can stones be made as cheaply or cheaper than they can be quarried in rock-producing sections? Another important question also arises, Will these artificial stones be as durable and safe building materials as the natural products? The last question we will answer at once; *they will.* The chemical nature of the artificial stone is such, that it becomes as hard as granite, and there cannot be a doubt that it will subserve all the desirable purposes for which that material is employed. It resists the action of frost, steam, acids, and other disintegrating influences as well as any of our best building stones.

The cost depends upon the cheapness at which the cement can be supplied, and the Company conclude that after two years of investigation and experiment they have "touched bottom" in this direction. At first, they were compelled to purchase the magnesia element of druggists at high cost, and also the chloride of magnesium was procured with difficulty, and they labored under great disadvantages till they learned that in one of the islands in the Grecian Archipelago (Negropont) a deposit of pure *magnesite* existed, and specimens were procured for experiment. It was found that the deposit was carbonate of magnesia with only *three per cent.* impurity, and a cargo of eight hundred tons, specially shipped and landed at the works, cost only \$19 *the ton!* This was certainly better than paying ten cents a pound for the article to the apothecaries. It was soon learned that "*bitterns,*" a waste product of the seaside salt works, supplied the liquid chloride needed to perfect the cement, and so the problem of cheap cement was solved.

And now we pass to consider briefly the process of manufacturing the stone article. The beautiful white lumps of the Grecian magnesite are knocked to pieces with a sledge hammer, and then they are thrown into a brick kiln and calcined, or heated to redness to expel the carbonic acid. This converts them into oxide of magnesium, which is taken, when cold, and ground to an impalpable powder; this is kept from the air, in large wooden bins. The bittern waters (solution of chloride of magnesium) are brought to the factory in casks and poured into large iron tanks, which are elevated so that they can flow through pipes to the point where they are mixed with the stone-forming materials. The calcined magnesia, ready for use, costs about two cents a pound, the bitterns perhaps four cents a gallon. Now to make a cubic foot of stone,

100 lbs. of beach sand are used, costing		.05
10 " " comminuted marble	"	.02
10 " " calcined magnesia	"	.20
10 " " bittern water	"	.02
		.29
Labor	"	.20
		.49

A cubic foot of stone, which now costs say fifty cents, formerly cost the Company nearly double that sum; and with the present high prices which are paid for labor, by quarrymen, the artificial product can fairly compete with the finished stones from the quarries.

The mixing is a very simple process. The sand and the magnesia are weighed together and mixed with a hoe upon a floor, and as the mixing goes on, the bitterns are gradually added so that a moist granular mass results. This is shovelled into a mould, tamped firmly with a mallet, and the finished product put away to "set." The "setting" or hardening process is accomplished in about a day, but the stones are not used until a month after they are manufactured. No heat whatever is employed, save in calcining the magnesite. Only about ten per cent. of the magnesia moistened with the liquid bittern water is required to hold together firmly the particles of sand so as to make a durable and beautiful stone. The chemical result is due to the combination of the chloride with the oxide of magnesium; and this, covering each particle of sand with a thin film, causes the mass to adhere together with such solidity, that it is capable of resisting a crushing weight of more than 20,000 lbs. to the square inch. The stones can be made of any form or size, and ornamented in any way which may be desired.

The Union Company are giving special attention to the manufacture of emery wheels and whetstones, and these products are of superior excellence. They have great tensile strength, and their cutting qualities are all that can be desired. In the proof trials, the wheels are made to revolve with a velocity of three miles per minute at the circumference, and they will not break under the immense velocity of four miles per minute. In the manufacture of the wheels it becomes necessary to bevel the cutting surface of some of them, and as this cannot be accomplished in the mou'd, it must be done by a cutter of some kind. Now what can be found that will cut an emery stone? a material so excessively refractory that a file of the hardest steel is rapidly torn into fragments when brought in contact with it. The implement used is a little *diamond*, and with this fixed into a holder, and the wheel made to revolve, the stone is cut as readily as a billet of wood in the lathe of the turner. The cutting edge of the diamond brought continually in contact with the hard emery for six months, is not sensibly dulled or in any way injured. In the manufacture of th wheels and other products, it has been foun that simple pressure applied to the materials i the moulds, does not cause the particles to co here together, and tamping or concussion i necessary. Mr. Elliot, the superintendent of th works, has contrived some most ingenious ma chines for facilitating the manufacture, and fo these he deserves much credit. The Compan have made a very large number of experiment and have persevered under many difficulties un til they have attained success. They have se cured patents which cover the most importar manipulating processes adopted by them. W are under obligations to Mr. John F. Wood, th Treasurer of the Company, for information, an for affording the fullest opportunity for inspec ing the work.

THE NEW "PSYCHIC FORCE."

THROUGH the politeness of Mr. Colman Se lers, of Philadelphia, we received advance shee of the *Journal of the Franklin Institute*, contai ing his paper, "Remarks on Experimental Inve tigations of a New Force, by Wm. Crookes, F. I S." In this paper Mr. Sellers endeavors to sho that Prof. Crookes has been most decided duped by Home the "medium," and that the o currences which took place in connection wi him were nothing but *tricks*. The oscillati board experiment, and that with the accordio described by Prof. Crookes, Mr. Sellers regar as of easy imitation, and in cleverness scarce rising to a level with the sleight-of-hand perfor ances of travelling mountebanks. Mr. Sellers probably one of the most accomplished mechan cians in the country, and he has contrived son beautiful and intricate pieces of machinery; a further, he is not only a maker of mechanic puzzles, but he possesses in an eminent degr the capability of using them skilfully. He is short known in private among his friends as a *pre tidigitateur* of the highest excellence. We spe of this, because it indicates his eminent fitness judge of the nature of mechanical contrivanc designed to deceive and puzzle the inexperience

So far as the experiments go which are carefully described by Prof. Crookes, we do n regard them as of much importance. They a certainly trifling and insignificant, compared wi phenomena of a similar nature which might u doubtedly have been observed in hundreds private families in London, at the time of his i terview with Home. The three gentlemen, fro their mental discipline and experience in r search, ought not to have been easily deceive they ought not to have fallen easy victims to t clumsy tricks of a charlatan, or one skilful prestidigitation. Recent advices from Mess Crookes, Huggins, and Cox, state that continu and more diversified experiments had been mad all of which were confirmatory of the genuinene of the phenomena, and tended to fix the belief the existence of the new "psychic force." R. Varley, F. R. S., the eminent electrician, h written a long letter to Prof. Crookes in whic he describes what he "has seen," and urges hi to continue his researches, intimating that h himself believes the disturbances to be the wor of "disembodied spirits." They propose to for a Psychological Society to be composed of twen or thirty competent gentlemen, whose speci work it shall be to meet every fortnight an

carefully investigate the phenomena. We do not think much will come of this, as "committees of investigation," and societies established to perform special work, are usually composed of very incongruous materials, and are apt to quarrel among themselves at an early period in their labors.

As regards the phenomena; after attempts at investigations, extending over a period of nearly a quarter of a century, and after having been brought in contact with every phase of it, we are unable to give information as to *how* it may be "investigated." Every mechanical, chemical, philosophical appliance, so far as we know, fails to elucidate any principle or shed any light upon the nature of the phenomena, and we shall be glad to be led out of the darkness by the English philosophers. We have found it quite easy to imitate many of the mechanical movements, sounds, etc., by the aid of electro-magnetism, chemical reactions, and mechanical contrivances. Twenty years ago we constructed an electro-magnetic device which gave the "rappings" perfectly, and by artfully arranging it in a room, we were able to deceive for a long time a wide circle of intelligent friends, and were looked upon as a "medium." The movements of small tables, chairs, etc., after the manner of the *true* "psychic force," may be readily imitated by any ingenious mechanic, give him *time enough* to construct the devices and a *proper place* in which to arrange them.

Undoubtedly we should be greatly interested in Mr. Sellers's ingenious performances, and quite possibly they are so skilfully arranged that, with all our experience, we might fail to detect his methods, or the source of his tricks; still there must be a wide difference in the *conditions* under which he is able to exhibit them as contrasted with what is seen every day in hundreds of private families in every State in the Union.

None of the performances of Mr. Home, or the "Fox girls," or the Davenports, or any other of the professional mediums, would probably convince us of the reality of the phenomena in question.

We have often attempted to investigate them as observed in the families of our most trusted friends, families where the moral uprightness and high character of every inmate rendered suspicion impossible. It has not been our business however to permit this known condition of things to deter us from the most thorough and persistent search, and we believe if the astounding physical disturbances witnessed had been due to secret springs, wires, electro-magnets, etc., we should have found them. No, the prestidigitation theory fails to explain the phenomena, and so do ventriloquism, sleight-of-hand, and all such tricks and devices. Science, within its present boundaries, has no methods for explaining or investigating it, and here we seem to stand at the present time. We may as well call it the "psychic force" as to employ any other term, and certainly while Prof. Crookes and his illustrious associates will probably fail to shed much light on the dark subject, they ought not to be ridiculed and abused by their equals, much less by those who are vastly their inferiors in every department of learning. In research and knowledge of physical science, Prof. Crookes and Mr. Huggins are certainly the equals of any men living.

NOTES IN FAMILIAR SCIENCE.

Some Facts about Fermentation. — The little organisms which cause fermentation are soft and wet; moisture constitutes a great part of their substance, and in a dry medium they cannot live. Applications, therefore, of a mere drying process are among the most important agencies for preventing fermentation. Germs of putrefaction or decomposition may be present in fruit, but if we merely take away the greater part of the moisture, we render the substance incapable of decomposing. Among the agents which serve for that purpose, there are some which abstract the water, not in a state of vapor, but in the liquid state. If we put a piece of fresh meat in contact with salt, or rub it over with salt, the salt gradually absorbs the water. The action is truly a drying action upon the meat, and it is effectual. In like manner, it is known to many persons that sugar is used just as salt. Ordinary jam — fruit and sugar which have been boiled together for some time — keeps better if the pots into which it is poured are tied up while hot. If one pot of jam be allowed to cool before it is tied down, little germs will fall upon it from the air, and they will retain their vitality, because they fall upon a cool substance; they will be shut in by the paper, and will soon fall to work decomposing the fruit. If another pot, perfectly similar, be filled with a boiling-hot mixture, and immediately covered over — though, of course, some of the outside air must be shut in — any germs which are floating in it will be scalded, and in all probability destroyed; so that no decomposition can take place.

Fossil Elephants in Alaska. — It has been generally supposed by scientific men that the fossil elephant of Siberia had no representative in the same latitude on this continent. Recent examinations on the Yukon River in Alaska, however, have established the fact that the remains are even more plentiful on the west than on the east side of the North Pacific. Enormous quantities of bones are found, and a supply of ivory sufficient to last the world for centuries. The valleys of all the streams and all the low grounds are filled with bones and tusks, so that every vessel now arriving from those remote possessions has part of its cargo made up in part of these new-found remains. The elephant, whose range was formerly almost universal, is now confined to a small portion of Africa and Asia, and it would seem as if the species was in process of slow extinction. Neither Europe nor America, which once swarmed with them, has now either a climate or vegetation fitted to their existence. Their remains however, are likely to give Alaska a value not previously suspected.

The Cow Tree. — Of this singular tree, the *Galactodendron utile*, Humboldt says: "Among the many curious phenomena which presented themselves to me in the course of my travels, I confess there were few by which my imagination was so powerfully affected as by the cow tree. On the parched side of a rock on the mountains of Venezuela grows a tree with dry and leathery foliage, its large woody roots scarcely penetrating into the ground. For several months in the year its leaves are not moistened by a shower: its branches look as if they were dead and withered; but when the trunk is bored, a bland and nourishing milk flows from it. It is at sunrise that the vegetable fountain flows most freely. At that time the blacks and natives are seen coming from all parts, provided with large bowls to receive the milk, which grows yellow and thickens at its surface. Some empty their vessels on the spot, while others carry them to their children. One imagines he sees the family of a shepherd who is distributing the milk of his flock."

The *Milk Journal*, commenting upon this description, remarks: "Our English climate would scarcely be congenial to this lactiferous tree, or this would present a fine opportunity for the Acclimatization Society; for what a solution it would be to the perplexities of the 'milk pail,' with its contents of typhoid-producing water and milk, contaminated with the germs of pleuro-pneumonia and foot-and-mouth disease, if every householder could have his own cow in his garden without awaking the ire of his neighbors, or the just indignation of sanitary inspectors. We are afraid, however, that if exposed to the scrutiny of our Laboratory, the vegetable milk would hardly be admitted to the 'genuine list,' but would be found to keep the word of promise to the eye to break it to the sense."

War and Vegetation. — Among the evil effects of the war it has been observed that in the vicinity of the scenes of great battles vegetation has been generally if not entirely destroyed — at any rate, materially impaired. German chemists explain the phenomenon as arising from the diffusion of sulphur in the air and over the surface of the soil. This sulphur, in the shape in which it is contained in the smoke of gunpowder, is supposed to combine with the oxygen in the atmosphere to sulphurous acid, a deadly poison in its effects on organisms of any kind.

Phosphorescence. — M. Panceri, in a paper presented to a scientific association, at Turin, claims to have established that the phosphorescent substance in fishes, in whatever part of the body it may be situated, is always fat, and that the phenomenon is due to its slow oxidation in contact with air. The skin of fishes is permeable to gases, and the oxidation of the subcutaneous fat proceeds without difficulty. Phosphorescence shows itself, as a rule, some time after death, and continues until putrefaction commences; as soon as a true decomposition sets in, accompanied by the disengagement of ammonia, phosphorescence ceases. Phosphorescence is prevented by the presence of fresh water, alcohol, or carbonic acid; oxygen, on the other hand, strengthens the phenomenon.

The Tints of Autumnal Foliage. — Mr. Sorby, in a recent number of the *Quarterly Journal of Science*, comes to the conclusion that the production of the fine tints of autumn is an evidence of diminished vital powers of the plants. This generalization also agrees with the fact that the unhealthy branches of a tree turn yellow, while the rest remain green, the subsequent development of more sombre tints being proof of more complete death.

An Artificial Whirlwind. — The fact that whirlwinds are caused by upward currents of heated air, was recently demonstrated in the town of Queensburg, N. Y. A farmer having occasion to burn a yellow pine fallow of some twenty acres, fearing that the fire might spread into the adjacent timber, ignited the fallow in several places on the edge, after taking the precaution of cleaning off the brush from a strip surrounding it. The flames rushing toward the centre from every direction, the air and smoke soon assumed a rotary motion, which increased in intensity. This whirlwind — for such it was — after becoming fairly formed, moved with wonderful velocity on its axis, tearing up small trees by the roots and lifting them into the air, stripping the branches from some that adhered too firmly to the ground, and fairly wringing the bark from others. It was accompanied by a noise resembling thunder, and lasted from five to ten minutes, but did not pass the bounds of the fallow, although it swayed back and forth across the field of fire several times.

HOUSEHOLD RECIPES.

Laundry Polish. — Take two ounces of fine white gum arabic powder, put it into a pitcher, and pour on a pint of water; and then having covered it, let it stand all night. In the morning pour it carefully from the dregs into a clean bottle, cork it, and

keep it for use. A tablespoonful of this gum water, added to a pint of starch made in the usual manner, will give to lawns, either white or printed, a look of newness, after they are washed. It is excellent as a polish for shirt bosoms and other starched linen.

To Clean Looking-Glasses. — Take a newspaper, fold it small, dip it in a basin of clean cold water. When thoroughly wet, squeeze it out as you do a sponge; then rub it pretty hard all over the surface of the glass, taking care that it is not so wet as to run down in streams; in fact, the paper must only be completely moistened, or dampened, all through. Let it rest a few minutes, then go over the glass with a piece of fresh newspaper, till it looks clear and bright. The insides of windows may be cleaned in the same way; also spectacle-glasses, lamp-glasses, etc. White paper that has not been printed on is better; but in the absence of that a very old newspaper, on which the ink has become thoroughly dried, should be used. Writing paper will not answer.

To Preserve Fresh Flowers. — Heat fine white quartz-sand in an iron pot, and stir in some stearic acid and spermaceti, using half an ounce of each to every five pounds of sand. Taken from the fire, the whole is well mixed, and used as follows: A small box, with a drawer lid, with the bottom knocked out, is inverted, and a coarse piece of wire gauze placed inside, over the lid, which now forms the bottom. This sieve is then covered with a layer of the prepared sand. The flowers, properly trimmed, are then placed on this sand, and completely embedded in more of it, to keep them in position. The box, covered with paper, is then placed in a room or oven, in which a temperature of one hundred to one hundred and ten degrees Fahrenheit is kept up, in which they will soon be dried. When this point is reached, the lid of the box is drawn, which causes the sand to fall out, leaving the dried flowers on the gauze.

Peach-Leaf Yeast. — One of our Southern exchanges gives the following recipe: Take three handfuls of peach-leaves, and three medium sized potatoes; boil them in two quarts of water until the potatoes are done; then take out the leaves and throw them away; peel the potatoes, and rub them up with a pint of flour, adding cool water sufficient to make a paste. Then pour on the hot peach-leaf tea, and scald for about five minutes. If you add to this a little old yeast, it will be ready for use in three hours; if you add none, it will require to stand a day and a night before use. Leaves dried in the shade are as good as fresh ones. As this is stronger than hop-yeast, less should be used in bread-making.

Welsh Rarebit. — Put into a frying-pan a quarter of a pound of cheese cut up into thin slices. Pour on it half a pint of sweet milk. Stir in an egg that was already beaten up, add a fourth of a teaspoonful of mustard, a little less red pepper, already ground, and a teaspoonful of nice butter. Stir this mixture all the time. Then add, lastly, a few crackers well broken up, and after thoroughly incorporating them into the mixture, turn it all into a heated dish and cover it.

English Salad Sauce. — Pound in a mortar the hard-boiled yolk of an egg; mix with it a salt-spoonful of salt, a teaspoonful of mustard flour, a mashed mealy potato, two dessert-spoonfuls each of cream and olive oil, and a tablespoonful of good vinegar.

Carpeted Floors. — When a carpet is taken up to be cleaned, the floor beneath it is generally very much covered with dust. This dust is very fine and dry, and poisonous to the lungs. Before removing it, sprinkle the floor with very dilute carbolic acid, to kill any poisonous germs that may be present, and to thoroughly disinfect the floor and render it sweet.

The Arts.

NICKEL, AND NICKEL PLATING.

Nickel, although known for more than a hundred years, has been brought prominently before the public only within a very few years. Its alloys with copper and brass have been long used, but no one seems to have thought of applying the metal to any useful purpose until about the year 1866, when patents were issued to Messrs. Adams and Remington for methods of depositing nickel from solution. Whether either of these gentlemen had any claim to priority of invention is now a question before the courts, and it is so loaded down with technicalities that it seems likely to stay there for some time. In the meanwhile several firms in Boston are actively engaged in the nickel plating business. They find a ready demand for all the work they can do.

Nickel, when pure, is of a silvery whiteness; it admits of a high degree of polish, and is not so readily scratched or tarnished as silver. It has a degree of hardness almost equal to steel. For the purposes of protecting nice mathematical and astronomical instruments from oxidation, nothing has yet been discovered that will equal it. Under conditions when silver will soon become tarnished, nickel preserves its polish for years. It is therefore extensively used for the graduated parts of instruments. It has, however, been found that the graduation must be done before the instruments are plated, as the nickel forms a hard surface, so that it is almost impossible to cut it. Delicate instruments coated with it look nice and clean, and have the advantage over the brass, that they are not attacked by mercury which may accidently fall upon them.

Nickel forms a perfect protection for steel articles; these are first coated with a thin film of copper by electrolysis, and then receive a heavy coating of nickel. In fact there is hardly a tool or implement upon which nickel may not be used, if a bright metal surface is desired.

In order to deposit nickel, a solution of the sulphate of nickel and ammonia is used in connection with anodes of cast nickel. Dr. Adams has separate patents on the solution and on the anode. Any one who wishes to see the metal can readily throw down a small portion in the following manner, which is not patented.

If pure nickel cannot be obtained, dissolve nickel coins (which contain about twenty-five per cent. nickel) in sulphuric acid with the addition of a little nitric acid, then evaporate to dryness, or nearly so, to expel all the nitric acid and any excess of sulphuric acid.

Dissolve the salt in water, adding if necessary a few drops of sulphuric acid, taking care to avoid any great excess of water, as it is best to keep the solution as concentrated as possible. Place in the liquid two plates of platinum which are connected with two cells of a Grove or Bunsen battery, or three cells of a Daniels' battery coupled for intensity. By this means we can completely remove the copper from the solution in the course of a few hours. When the copper is completely removed, which can readily be determined by testing the solution with a little hydrosulphuric acid, the plate upon which the copper is deposited is removed, the solution is made strongly alkaline with ammonia, and the article upon which it is desired to deposit the nickel is suspended in place of the copper-co ered plate. It will generally be found necessa to add another cell to the battery in order obtain a sufficiently powerful current to depo the nickel. The process as given above is excellent one for the separation and quantitati estimation of copper and nickel; the plate platinum being weighed before and after the de osition of the copper, it is then replaced in t solution and the nickel is deposited directly up the copper. The mass is again weighed, the la increase of weight being of course due to t nickel.

This process for the estimation of copper an nickel is due to Dr. Gibbs, who first publish it in the *American Journal of Science*, v. xxxix., January, 1865.

MEMORANDA IN THE ARTS.

Waterproof Starch. — A patent has be taken out in France for the preparation of a fini, or starch, for vegetable tissues, yarns, clothes, et, which is not soluble in water, and which, therefo, when once applied, will remain throughout seve successive washings. In this case, the articles i question are properly starched, and then passed a temperature of about sixty degrees Fahrenh through a bath of chloride of zinc, by means which such a change is produced in the fibre a the starch that the latter resists the action of water in the most thorough manner. A bath three parts of sulphuric acid and one of water m, it is said, be used instead of that of chloride zinc. The liquid is to be placed in a trough, which a revolving barrel is immersed, almost its axis, and above which is a roller which is mov in an opposite direction by the turning of the low one. Between the two the material to be impr nated is passed, being moistened from below the bath, and receiving during its passage necessary pressure. If the material be heavy, barrel lies entirely in the bath, and a pair of roll fixed above it is used to press out the superflu liquid. The articles are carried directly from trough into running water, from which they are be removed, pressed out, and dried.

German Soup Tablets. — The following Reinsch's receipt for making the soup tablets wh were extensively used by the German armies the late war; Take eleven parts by weight of g suet, melt it in an iron pan, and make it very h, so as to become brown; add, while keeping the stirred, eighteen parts of rye meal, and conti heating and stirring so as to make the mass brow; then add four parts of dried salt and two parts coarsely pulverized caraway seed. The mixt is then poured into tin pans somewhat like th used for making chocolate into cakes. The ca have the appearance of chocolate, and are chi intended for the use of soldiers while in the fi. A quantity of about one ounce of this preparat is sufficient to yield, when boiled with some wat, a ration of good soup, and in case of need, cakes, being agreeable to the taste, may be ea raw.

A Revolving Safe. — Among the articles hibited in the industrial department of the Lond International Exhibition just concluded, is sor thing new in the shape of a revolving safe. It made in a circular shape, and when locked a placed in a position either against a wall, or b into it, the door is turned into the wall, the ba facing the spectator. To open the safe, a lock opened in a strong iron box on which the safe res. This moves a spring, which enables the operat, by means of a small hand key, to bring the door the safe round to the front, and causes a bell ring a loud alarm. The door being opened

means of a key, another door presents itself, which is opened by being moved round to the back of the safe. The invention has been much admired.

Tungstic Glue. — Tungstic glue bids fair to become a substitute for hard india rubber, now so high in price. It is prepared by mixing a thick solution of glue with tungstate of soda and hydrochloric acid, by means of which a compound of tungstic acid and glue is precipitated, which at a temperature of 86° to 104° Fahrenheit is sufficiently elastic to admit of being drawn out into very thin sheets. On cooling, this mass becomes solid and brittle, and on being heated is again soft and plastic. This compound, it is said, can be used for all purposes to which hard rubber is adapted.

Purification of Fats. — The *Comptes Rendus* gives an account of a process communicated to the French Academy by M. Boillet. Suet, or fat of any kind, is heated for three or four hours with lime water, the proportions being about half a gallon of lime water to 2½ lbs. of fat; it is then allowed to cool. As soon as the fat is sufficiently set, it is transferred to a linen or flannel bag, and the water and oleic acid squeezed from it by gradually increasing pressure, in a hydraulic press, or otherwise. He states that fatty matters thus treated lose all bad smell, and acquire remarkable whiteness and hardness, after standing a few days. If re-melted in water, acidulated with sulphuric acid, acetic acid, or vinegar, a fat is obtained which is "perfectly" purified, and can be applied to all purposes for which the best fats are employed.

PRACTICAL RECIPES.

Black Lustre. — Dr. Kielmeyer gives a recipe which is adapted for either paper, cloth, or porous wood. It stands well, is very supple, and has no tendency to get sticky. To prepare it, boil together 8 pounds of glue, previously dissolved in 16 pounds of water; 1 pound of potato starch, dissolved in 5½ pounds of water; 5¼ pounds of campeachy, extract of 6° Beaumé; 1 pound 2 ounces of green vitriol, and 8¾ pounds of brown glycerine. When thoroughly mixed, remove the pot from the fire, and continue to stir until the liquid is cold. If the paint be desired thicker or thinner, the amount of starch and glue must be varied, as well as the other materials.

To Give Plaster of Paris the Appearance of Marble. — Put into four pounds of clear water one ounce of pure curd soap, grated and dissolved in a well glazed earthen vessel; then add one ounce of white beeswax cut into thin slices; as soon as the whole is incorporated, it is fit for use. Having well dried the figure before the fire, suspend it by a twine, and dip it once into the varnish; upon taking it out, the moisture will appear to have been absorbed; in about two minutes' time stir the mixture and dip it again, and this generally suffices. Cover it carefully from the dust for a week, then with a fine soft muslin rag, or cotton wool, rub the figure gently, and a brilliant gloss will be produced.

Or, take well skimmed milk, and with a camel's-hair pencil apply it to the model until it holds out, or will imbibe no more. Shake off or blow off any that remains on the surface, and lay it in a place perfectly free from dust. When dry it will look like polished marble. This mode answers well, if the figure is not to be exposed to wet weather.

To Remove a Screw from Wood. — Heat a piece of iron red hot, and put it on the top of the screw for a minute or two; then the screwdriver will easily get it out, if used while it is warm.

A New Brass Solder. — A new brass has been devised, having its expansion and contraction by changes of temperature the same as those of iron or steel; or so nearly so, that it may be used to solder those metals to brass. Its composition is: tin, 3 parts; copper, 39½ parts; zinc, 7½ parts.

Agriculture.

FARM PENCILLINGS AT LAKESIDE.

CORN FODDER.

The opinion we have always held upon the question of the value of green corn fodder for milch cows has been, that when raised from broadcast sowing it is nearly worthless, but when sown in hills or in drills, and cultivated, with access of air and sunlight, it is of high value. During the present season we have made some experiments to test the correctness of these views. Stalks were collected from a field where the seed was sown broadcast, and also stalks growing in drills upon the same field, and they were dried in a drying closet to expel the moisture. Both specimens were planted at the same time (the 6th of May), and it was found that the plants from the broadcast sowing contained 92 per cent. of water, those from drills 83 per cent. of water. Thus it was shown that the difference of solid matter in the two was relatively as 8 to 17 per cent. The solid matter was composed of starch, gum, sugar, and woody fibre. There was almost an entire absence of sugar and gum in the stalks from the broadcast sowing, while the stalks that had grown under the influence of light and air held these nutrient principles in considerable quantities. The stalks were collected at the period of growth just before the ear begins to form, a period when most farmers commence to cut the fodder for their cows. Our experiments upon corn fodder have afforded us important information upon other points. We find that the stalks cut before they reach a certain stage of growth are deficient in nutrient matter, and therefore it is a waste to feed them too early. The corn plant, like all other vegetable structures, has but one object or aim in its growth, and that is to produce seed. It is engaged during its whole life in storing up large quantities of starch, which is to be used when the pressing occasion arrives, or the seed vessels mature, to form by some subtle mysterious changes the rich nutrient principles which are found in seeds. As soon as this struggle is over, the corn plant, like all animals, dies a natural death. It is not necessary for frost to strike it; it dies from simple exhaustion. The proper time to cut and feed corn stalks is during the four or five weeks which succeed inflorescence, or in other words they should not be cut until the flower is fairly developed, and the ear commences to form; and any corn that is so planted that the ear cannot form and *mature* is *practically worthless as fodder*. Farmers may learn from these facts that corn designed to be cut for fodder should be planted at two or three periods during the season; some fields quite early, others somewhat later, and still others as late as is safe. In this way, when the hot, dry months of July and August are reached, and the pastures falter, a supply of fodder is secured, at a proper stage of growth to afford the largest amount of nutriment. Our note-book contains many *pencillings*, recording the results of experiments with corn fodder, which we will present hereafter.

POTATOES.

We all have observed the great deterioration in our potato crops, during the past ten or twenty years; and what is the cause of this alarming decrease of tubers? Can science, can chemistry point out the reason, or aid in remedying the difficulty? We think it can, and in order to place the matter in a clear light we will point out the kind and amount of food which the potato demands. We had a field of potatoes upon the farm which yielded 300 bushels to the acre; this may be regarded as an old-fashioned crop. This crop removed from the soil in tubers and tops at least 400 pounds of potash; also it removed 150 pounds of phosphoric acid. Now these amounts are very large, and serve to show that the potato plant is a great consumer of the two substances, and also it shows that in order to restore our potato fields to their former productive condition, we must supply phosphatic compounds and substances holding potash in large quantities. For six or eight generations in New England, our fathers have been exhausting the soil, by removing these agents in their potato and other crops, and we have reached a time when the vegetable is starving in our fields for want of its proper food. Our farmers have found that new land gives the best crops, and this is due to the fact that such fields afford the most potash. But so long as we crop our pastures so unreasonably, we cannot resort to new land, as land is not *new* that has had its potash and phosphatic elements removed by grazing animals. Remember that a potato field which gives but 100 bushels to the acre requires at least 160 pounds of potash, but by allowing the tops to decay upon the field, 60 pounds of this is restored to the soil again, as that amount is contained in them; a medium crop of potatoes requires twice as much phosphoric acid as a medium crop of wheat, so that in two years with wheat the land is deprived of no more of the agent than it loses in one year with potatoes.

NEW SOURCES FOR SUPPLIES OF POTASH.

There has never been a time when soil cultivation as a pursuit was more hopeful and promising than the present. We have just learned the important fact that an abundance of plant food has been stored up for our use in mines and rocks, and that we have only to reach out our hands and take all that we require. Ten years ago who could even have dreamed of such vast deposits of potash as have been opened up to us at the Stassfurth salt works in Germany. Some idea of the supply may be formed from the fact that at the present time more potash is furnished from these mines than from the wood ash sources of the whole world. About 13,000 tons of potash were sent to market from the United States and British America in 1870, and yet at Stassfurth, where a dozen years ago it was not supposed that a single ton could be procured, 30,000 tons of the muriate of potash were manufactured and supplied to consumers upon both continents during the past year. The surface salts at these mines, which hold the potash, are practically inexhaustible, and millions of tons will be supplied in succeeding years. No doubt our own salt mines will be found upon careful examination to afford potash, and hence we may look with confidence to the rapid cheapening of this most useful product.

GRAPES.

The vineyard at Lakeside has produced bountifully the present season. The Concords and

Delawares ripened perfectly, and the fruit was of superior quality. This vineyard has never received any dressing since it was planted, six years ago. It then received a generous supply of fine ground bone and unleached ashes, and these have supplied all the food required. No animal excrement has been used in connection with the vines, and the results have been highly satisfactory. Potash and phosphoric acid are the two agents most largely consumed by grapes (as mineral food), and these must be supplied to insure successful crops.

SORREL AS A POTASH PLANT.

Under the above head there appear some rather remarkable chemical statements in the *Vermont Farmer* for Sept. 30, 1871. The following passage is particularly worthy of notice:

"By means of that very oxalic acid which sorrel takes from the atmosphere, it acts upon the solid feldspar sand which surrounds its roots, and dissolves out enough potash to supply its wants."

If this is so, we have been working upon wrong theories, and incurring useless expense in supplying potash to soils that contained feldspar. It would be better to raise a crop or two of sorrel and plough it under, in order that the oxalic acid of the sorrel may be able to act on feldspar more extensively. But manifestly some wrong views are entertained regarding the matter. In the first place, no plant has power to prepare its own food, but must take such as is present in the soil in a soluble form; and second, if the experiment is tried of dissolving feldspar in oxalic acid, it will be found to be a difficult operation, as the mineral is totally insoluble in this acid.

AN ABSURD IDEA.

Colonel Pleasanton, of Philadelphia, it is stated, claims to accomplish wonders in vegetable and animal growths by the use of violet or blue glass. He remarks very truly that the violet are the chemical rays; but he overlooks the important fact that by using violet colored glass, he diminishes the very rays that he proposes to increase. No means are known to science by which we can increase the intensity of light in any portion of the spectrum. We cannot change red light into violet or violet into red; the only change we can make is to cut off a portion of the rays, but in so doing we diminish the intensity of all the remaining ones, to a greater or less amount. The only effect of the violet glass would be to cut off the yellow, orange, red, and green rays, without adding anything to the violet; in fact the violet would rather be diminished.

NITROGENIZED COMPOSTS.

We find in *The Plantation* an account of some experiments made by M. Bortier, an eminent Belgium agriculturist, on the artificial production of saltpetre in composts, from which we make the following extract:—

A large quantity of stable manure was spread in a farmyard, under rough covering. It was divided into three equal parts. The first part was left, in the usual way, to be trampled by stock. The second was secluded from the stock and spread lightly. The third part was spread lightly with alternate layers of marl, the marl being about three per cent. in weight of the part of manure. This process went on from early spring to September, when these three portions of manure were applied to a piece of land divided into three equal parts, being of the same quality of loamy soil.

For four crops in succession (with only one application of manure) that part containing marl produced over ten per cent. more than each of the other parcels, by careful measurement.

M. Bortier had a portion of marl from his compost analyzed by a competent chemist, when the formation of nitre was fully proved.

From further experiment it is inferred that the capacity for absorbing nitrogen from the atmosphere varies with the kind of lime used. The most porous kinds (calcareous tufa, for instance) absorb nitrogen most rapidly. And, moreover, the addition of a small quantity of lime, already nitrogenized, increases considerably the capacity of the mass for absorbing nitrogen and producing saltpetre.

This is illustrated in the following experiment: One thousand parts of marl, placed in layers among stable manure for two months, produced by analysis 0.69 parts of nitric acid.

One thousand parts of marl, treated in the same way, but previously mixed with 50 parts old plaster and mortar, containing 0.62 parts of nitric acid, were found, after two months, to contain 2.3 parts of nitric acid. Subtracting the .62 added with the plaster, the acid produced by this experiment was 1.68, or nearly three times that produced by the first experiment.

It is the opinion of M. Bortier, that the particles of limestone thus nitrogenized will continue for years to absorb nitrogen from the atmosphere and fertilize the soil with which they have been mixed.

PRESERVATION OF EGGS.

The subject of the preservation of eggs has recently attracted a great deal of attention, and many methods of effecting it have been published, though none are altogether perfect for the simple reason that the true cause of the spoiling of the eggs is either unknown by those who have attempted to furnish us with directions, or has been lost sight of by them. There are two efficient causes for the spoiling of eggs, and unless one or both of these are avoided, we cannot hope for success. The first is exposure to a high temperature, and the other is access of air. It may be safely affirmed that, at temperatures below 32 deg. Fah., nearly all change ceases in organic bodies, while very few organic substances will bear continual exposure to a temperature above 90 deg. The freezing point is rather too low for the preservation of eggs in good condition, as freezing affects the flavor unfavorably; but if we desire to preserve eggs in the best manner we must keep them cool—say at a temperature below 50 deg. if possible, a temperature which is frequently maintained in good cellars. But it will be of no use to place the eggs in a cool cellar if they have been previously exposed for hours to a temperature of over 90 deg.

The collection of the eggs must, therefore, in the first place, engage our attention. Those who raise poultry, and especially those who keep fowls for the sake of their eggs, commit a great error when they fail to remove from their yards those birds that are inclined to set, and which consequently take every opportunity of warming the eggs in the nests. If any one will attempt to preserve eggs that have been subjected to the hatching process for one or two days, he will discover the force of this statement.

Kohler, of Germany, who owns an extensive poultry-raising establishment, and who, every winter, preserves thousands of eggs without ever losing one, has recently published an account of his method of proceeding, and has given the following rules fo[r] securing favorable results:—

1. The nest must be placed in a cool position.
2. The fowls that show a tendency to set mus[t] be removed at once, and placed in separate inclos[]ures until this propensity has left them.
3. If many hens be confined in the same inclosure or use the same nests for laying their eggs, the egg[s] ought to be removed from the nests several times [a] day.
4. The eggs ought to be assorted according t[o] age, and preserved in boxes with the covers alway[s] partially open. These boxes must be kept in a cool airy, and perfectly dry place.
5. At the commencement of winter, the store o[f] eggs is placed in some room that is not heated by [a] fire, but that is, at the same time, thoroughly pro[]tected from frost.
6. The packages are so arranged that the oldes[t] may be used first.

Eggs treated according to these rules do not ac[]quire the peculiar taste which is generally the resul[t] of the receipts in vogue for preserving eggs.

HINTS FOR THE FARM.

Watering Teams Often.—Horses and oxe[n] at work need water often. The ploughman carrie[s] his jug of water, or leaves his team to rest whil[e] he goes to the house for a drink. But the tean[m] works harder than the driver, and probably need[s] drink as often; yet many teams are taken out earl[y] to the field, where there is no water except in th[e] driver's jug, and work five or six hours before the[y] can get a drop. Is it any wonder that they ar[e] injured by drinking too much when they are le[d] to the spring at noon or evening?

To Keep Flies from Horses.—One of th[e] simplest means of keeping flies from annoying horses or cattle, is to take a bunch of smart-weed, bruise it so as to make the juice exude, and ru[b] the animal thoroughly with this bunch of bruised weed—especially upon his neck, legs, and ears Neither flies nor other insects will trouble him for at least twenty-four hours. If preferred, an infu[]sion may be made by steeping the weed, and the liquid applied with a sponge.

Hens versus Dogs.—The *Poultry Standard* has the following sensible remarks on this subject: "There is hardly a family that does not throw away enough table scraps to keep at least half a dozen hens; and many that keep a nuisance in the shape of a dog, that does no good, but costs more than a dozen good hens, complain that they cannot afford to keep hens. One dog in a neighborhood is greater trouble to the neighbors than a flock of hens would be, for if hens are well fed at home they will rarely go away. But who ever saw a dog that was not a pest, running across the newly-made garden, and sticking his nose into everything? Kill off the curs and give the food to the hens, and you will find pleasure as well as profit in so doing. We wish there was a tax of one hundred dollars on every dog kept in the country. Those that are of value as watch dogs could be retained, while the host of snarling, dirty curs would give place to some more useful and less troublesome pet."

To Make Common Hard Soap.—Put into an iron kettle five pounds unslacked lime, five pounds soda, and three gallons of soft water; let it soak over night; in the morning pour off the water, then add three and a half pounds of grease, boil till thick, turn into a pan until cool, and then cut in bars.

To Dry Pumpkins.—Peel and cut as for cooking; then slice them very thin, spread on tin or other driers, and expose to a moderate heat in the stove oven. Thus dried, the pumpkin will retain its natural flavor. To prepare it for cooking, soak it in water a few hours.

SEEDS AND CUTTINGS.

Mr. Dickens on Farming. — The younger Charles Dickens, in a recent number of *All the Year Round*, says: "The part of the holding of a farmer or land-owner which pays best for cultivation is the small estate within the ring fence of his skull. Let him begin with the right tillage of his brains, and it shall be well with his grains, roots, herbage and forage, sheep and cattle; they shall thrive, and he shall thrive. 'Practice with science,' is now the adopted motto of the Royal Agricultural Society."

Farming in Japan. — The Hon. James Brooks writes from Japan: "Proud as I am of the arts, sciences, and marvellous doings of my own country, I blush when I compare American farming with this. Here are the rice fields artificially created, luxuriant in beauty now, terraced from hill-side, up and down, and watered by the hill streams, or not watered, as the husbandman wills. There are barley fields and bean fields, and fields of all sorts of Japan agricultural productions. Forests cap all the hill-tops. Two crops are raised in Japan in one year, even on the rice fields, where the first crop is grain. The grain harvest is over in April or May. The rains come on in June or July, and now the new crops are up, and the whole is one beautiful landscape of green."

Science in Agriculture. — A writer in the *Western Rural* makes the following sensible remarks: "The sooner we throw away the words science of Agriculture, and substitute Science in agriculture, the sooner we shall be on the high-road to scientific farming. It rests upon all science, taking only a portion here and there, just as the animal crops the herbage as he passes along. He can live and even grow fat upon but few varieties, but for his full sustenance craves many. So of the farmer. He can get along better than any other profession with but little knowledge except that of mere art. The moment he reaches after that higher knowledge, it should be in such directions as will enable him to profit by it. 'The principles of science, and not the bare manipulations of art,' is what he should attain, but, as a practical man, science, only so far as it may bear upon, or can be applied to his practical art."

Soot for Rose-bushes. — A correspondent of the *New York Observer* says: "Never give up a choice but decaying rose-bush till you have tried watering it two or three times with soot tea. Take soot from a chimney or stove in which wood is burned, and make tea of it. When cold, water the rose-bush with it. When all is used, pour boiling water a second time on the soot. The shrub will quickly send out thrifty shoots, the leaves become large and thick, and the blossoms will be larger and more richly tinted. To keep the plants clear of insects syringe them with quassia tea. Quassia chips can be obtained of the apothecaries."

Valuable Information for Farmers. — We find the following among the "Answers to Inquiries," in a Western agricultural journal: —

"A Pound to a Quart. — *A. C. I., Brooklyn, Iowa.* — The experience of cheese factories is that a quart of milk will produce a pound of cheese almost invariably. You can, therefore, safely make calculations upon this basis."

We fear that "A. C. I." is doomed to disappointment, if his prospective profits in cheese-making are calculated upon the "basis" here given. If he can accomplish the miracle of converting water into cheese, he may be more successful with milk containing 88 per cent. of that liquid than we have led him to expect; but otherwise, he had better reckon at least six or seven quarts of milk to the pound of cheese. Our former estimate of *ten* quarts refers, not to green, but to *old* cheese.

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, NOVEMBER 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

Mr. A. D. Blanchard *is no longer a Travelling Agent for the Journal. All money paid on Journal account should be sent directly to the office, 150 Congress Street.*

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Parties in any section of the United States desiring our services will please in their correspondence state the nature of the work required, and instructions will be given regarding the securing and forwarding of specimens, and also advices regarding the probable cost.

THE SUN.

Not only explosions of steam boilers, gun cotton, nitro-glycerine, gases, etc., are occurring constantly in all parts of our little planet, but the sun has recently shown us what can be done in the way of an explosion upon a grand scale. The paper which Prof. Young, the distinguished Dartmouth astronomer, communicates to this number of the Journal, will be read with deep interest by every one. It is certainly an important contribution to our knowledge of solar physics, and will add to the author's reputation as being one of the most vigilant and competent observers living. No statement could afford a clearer idea of the stupendous energies and intense activities prevailing on the sun than that of Prof. Young, and the phenomenon must have a near or remote bearing, not only upon our planet, but upon the whole family of bodies which are held in place by the sun's attraction. The change in the spectrum after the "in-rush" of luminous matter which followed the explosion, is a most interesting and important point, inasmuch as it would seem to show that new elements or forms of matter were brought to the surface by the disturbance. Prof. Young observes that during the unusual brilliance and excitement of the solar surface, on the afternoon of the 7th of September, *fifteen or twenty new lines* were observed in the spectrum. Explosions of this kind are probably not infrequent, and it is singular that no one has yet been brought directly under telescopic observation. The thirty minutes' absence of Prof. Young from his instrument happened to be a most important period of time, and no one can regret the circumstance more than himself. Our interest in solar spectroscopy increases every year, and we have reason to expect that the enlargement of the boundaries of knowledge in that direction will be rapid and wonderful. The cuts which accompany the paper are from pen and ink sketches, supplied by the author.

THE PERILS OF NAPHTHA.

It is stated that the unparalleled conflagration at Chicago originated from the breaking of a kerosene lamp, and as it is impossible for true kerosene of legal standard to form ignitable vapors at ordinary temperatures, it is evident that the liquid which caused this immense amount of human misery was inflammable *naphtha*, one of the most dangerous agents with which we have to contend. It may be necessary that millions of property should be destroyed in order to awaken the community to a sense of the perils of this incendiary liquid, which is introduced into dwellings as a source of artificial illumination. We have during the past six years devoted column after column in this journal to exposing the frauds and tricks of travelling mountebanks, and unprincipled dealers in our towns and cities, who are selling naphtha as kerosene, or under some assumed and taking name. It is an *immense evil*, which should receive the immediate attention of officers of the law, and of every humane citizen.

Every autumn, pedlers start out from cities all over the country, and sell naphtha *as a safe oil*, or sell to unsuspecting people recipes for making an *inexplosive oil*, the chief ingredient of which is naphtha. They give to it new names, *solar oil*, or *sunlight oil*, or *crystal liquid*, or *lunar oil*, or some other high sounding title to deceive the uninformed and unsuspicious rural population. These men ought to receive similar treatment to that which befel the incendiaries who were detected in their infernal work at Chicago. It is very strange that sensible people can be so deceived, but the appeal is to the pocket. Naphtha costs but a trifle, and the difference of a few cents in the cost of a gallon of burning fluid weighs largely with many. We hope no reader of the Journal can be deceived by the makers of "*safe oils*." Housekeepers had better introduce gunpowder or robbers into their dwellings, than any one of the "inexplosive" oils or fluids which are sold throughout the country. If you need a safe illuminating oil, go to a respectable dealer, and purchase "kerosene" of legal standard; and in order to be assured that it is safe, insist upon having a competent inspector appointed in your town or village, and have him test all burning liquids according to the plan we have described in the Journal.

HIRAM POWERS.

The friends of this distinguished American sculptor have known that he has been engaged upon a statue for many months which he designed to be his greatest work. In a letter which we have just received from Mr. Powers, he remarks as follows: "The 'Eve,' or as I

prefer to call it, 'Paradise Lost,' is now quite finished, or will be soon, as there is nothing but some slight touches about the base and the tree support to complete it. You will notice in the photograph of the figure which I send, that the head of the serpent was not quite finished when it was taken. He is represented as descending the tree stump, and Eve is accusing him with her right hand: 'The serpent tempted me, and I did eat.' The figure is six feet three inches high, but does not seem so tall, unless contrasted with some person near it. The marble is very beautiful, and I am certain I have done nothing superior to this, and all my visitors think so." It is probable that this magnificent work of art will adorn the new mansion recently completed by Mr. A. T. Stewart, of New York.

Mr. Powers's health has been much impaired from constant labor, and he was obliged to leave Florence in the spring, and visit England, where he has remained until the last month. During the five months before leaving Italy, he modelled no less than *eleven* portrait busts, mostly of Americans. Mr. Powers is now quite advanced in life, and from the photograph of himself which he was so kind as to send us, we perceive that he has changed greatly during the decade of years since we saw him at Florence. He is an artist of whom every American is proud, and we hope he will live many years to enjoy the fruits of his labors.

FLOATING STEAM FIRE-ENGINES.

The great fire in Chicago has been the means of drawing public attention to the risk of similar disasters in other of our large cities, and to the means of averting the danger. It is generally admitted that, with our present modes of building, this risk is a very serious one; and since our cities could not at once be reconstructed on better principles, even if we were ready for the architectural reform, the immediate question must be, how to increase the safeguards against fire, and the appliances for checking its ravages. Among the latter, it seems to us that floating fire-engines deserve mention, though, so far as we are aware, they are almost unknown in this country. Two years ago we had an opportunity of examining one of them in London, where they have proved of great service in checking the spread of conflagrations occurring near the banks of the Thames. They have two engines, of about twenty-five horse power each, so arranged that they can be used either for propelling the boat or for throwing water upon a fire. Steam is always kept up in one of the boilers, and the other is ready for having its fires started at a moment's notice. On an alarm of fire, the boat is under way at once, and by the time it reaches the spot the second engine is steamed up. The two can throw ten tons of water a minute, and often with force enough to knock down the walls of a building after the timber work within has been partially burned out. The management of the stream is in the hands of regular firemen on land; the crew of the floating engine attending exclusively to the work on board. The equipment of hose is very large, and serves to make the engine useful at considerable distance from the river-bank.

The motive power of these craft is neither paddle-wheels nor screw. Paddle boxes would be an obstacle to rapid movements in narrow and crowded docks, and even a screw would often be in danger of getting "fouled" in such peculiar navigation. The form of propulsion adopted is simple and in keeping with the regular business of the engines. It consists merely in forcing two streams of water from the stern of the boat against the water of the river. The engine thus "squirts" at the *water* until it reaches the place where it can "squirt" at the *fire*; when the pipes at the stern are closed, and those to which the hose is attached are opened. It will be seen that this arrangement obviates the necessity of complicated machinery for propelling the vessel, distinct from that required for its uses as a fire-engine; and that the risk of its getting out of order is proportionally less.

Engines like these can often work in situations where the ordinary steam fire-engines cannot get a fair chance to work, especially in conflagrations among shipping, and among wharves and docks. It is, moreover, easy to imagine cases in which, from the fact of their being afloat, they could continue to pour water upon a fire after the land engines had been driven "out of range" by the heat, or had been cut off from a supply of water. In fact, their advantages as a branch of the fire department in any city or large town situated on ocean, lake, or river, are so obvious that we need not enlarge upon the subject.

EDITORIAL NOTES.

Dr. Liebreich of Berlin. — We have information that Dr. Liebreich is desirous of coming to this country, with the view of making it his home. Such a man would be an acquisition to any country, and we hope that measures will be taken to secure his services in some one of our colleges or medical schools. The man who, by a course of inductive reasoning, was able to point out the hypnotic powers of chloral, and establish the agent as one of the most important in materia medica, is entitled to the highest honors, if he had no other claims to distinction. Dr. Liebreich is one of the most remarkable men of the age, and in research and analytical skill has few equals. He is not only a physician, but a chemist and physicist, and the boundaries of knowledge in many departments have been greatly extended through his labors. It will be fortunate for our country if we can add his name to our list of scientific investigators.

The Journal in England. — We have some enthusiastic patrons and friends in England, who often send us complimentary and encouraging letters. A distinguished English gentleman writes as follows, from London: "I think highly of the Boston Journal of Chemistry, and in spite of my numerous and pressing duties, I always find time to read it. It really keeps us informed with regard to what is transpiring in the world of art and science on both sides of the water."

Complimentary. — On the 13th of October, Prof. Young, of Dartmouth, received a cable telegram from Prof. Lockyer, the eminent English astronomer, inviting him to join the English Eclipse Expedition to India, offering to pay all expenses, etc. This is a high compliment, and it is a matter of regret that the important home duties of Prof. Young prevent him from accepting the invitation.

Lectures and Lecturers. — We are greatly obliged to our numerous friends in various parts of the country, who send pressing invitations for us to lecture before lyceums, literary and scientific associations, etc. However much we may desire to gratify our friends, our duties are so numerous and pressing, that we have but little time to devote to lecturing. The deep interest we take in the progress of agriculture, has led us to address agricultural meetings and associations, and this we are willing to do occasionally, when circumstances will permit; but the general lecture-field we cannot enter. We earnestly hope that in arranging courses of lectures in the various cities and towns of the country, the ensuing winter, sensational lecturers will be avoided, and something more useful and healthful will be provided. There are lecturers who combine entertainment with instruction, and they should be widely known. Prof. E. S. Morse, of Salem, Mass., presents topics of Natural History in a delightful manner, and every association should secure, if possible, one or more of his lectures. His subjects are, "How Animals Move," "How Animals Feed," "How Animals See," etc., etc., and with marvellous skill in the use of the black-board, he makes everything plain and easily understood. Prof. Niles, of Cambridge, is an easy and graceful lecturer upon geology and kindred topics, and there are others, less known, who ought to be encouraged.

Enamelled Water-Pipes. — Our attention has been called to some specimens of enamelled iron-pipe for water conduction, which have recently been manufactured in England. So far as we can judge, it appears to meet a most important want, and if the vitreous coating which is upon the inner and outer surfaces is stable, — and we think it is, — it leaves nothing further to be desired in the way of a safe and cleanly water-pipe. The turns and couplings are enamelled, and thus water contact and consequent oxidation is prevented through the entire extent of the supply pipe. The expense will not, we trust, prove a bar to its general employment.

Chemical Experiments. — Most persons have an idea that it requires a great deal of expensive apparatus to show chemical experiments. Such is, however, not the case; a great many pleasing and instructive experiments can be shown without any more apparatus than can generally be found in any dwelling. And with the addition of a few glass tubes of various diameters, a dozen or two test tubes, a pint flask or two, and an assortment of ordinary glass bottles and corks, there is scarcely an experiment that may not be attempted with fair prospects of success. In order to make bell glasses, it is only necessary to cut the bottoms out of bottles; these may be made of various sizes at an expense that should not exceed thirty or forty cents for the one holding two quarts. In order to cut out the bottom, a mark is made with a sharp three-cornered file, about an inch from the bottom; a piece of ignited charcoal is held against this mark until the bottle cracks. With a little skill the crack may be made to follow the charcoal around the bottle. The edge is then rounded off with a file, or it may be ground off on a grindstone. With such a bell glass all experiments which do not require the use of an air pump may be shown. A dinner plate answers very well to stand it in, a little water having been previously poured into the plate. A common wooden pail answers for a pneumatic trough, a board perforated with a few holes being placed across it a short distance below the top.

New Planetoids. — Within a few months there have been three additions to the large family of minor planets between the orbits of Mars and Jupiter; and the credit of their discovery belongs to American astronomers. The first (No. 114) and the third (No. 116) were picked up by Prof. C. H. F. Peters, of Hamilton College, N. Y.; the former on the night of July 23d, and the latter on the night of Sept. 8th. No. 115 was detected by Prof. J. C. Watson, at Ann Arbor, Michigan, on the night of August 6th. No. 114 has received the name of *Cassandra*, but the names of the others have not yet been announced. Our readers are aware that the whole hundred and sixteen of these "children of the sun" have become known to astronome

uring the present century, and all but four of them within the last twenty-six years. Only one (*Vesta*) ever visible to the naked eye, and that only under favorable circumstances of position and atmosphere, while most of them are to be seen only with telescopes of considerable power. The magnitudes of the three last discovered, for instance, are given as 1.3 (though it will be somewhat brighter when it comes nearer to us), 10, and 11. The smallest stars visible to the unaided eye are of the *sixth* magnitude.

SCIENCE IN PRUSSIA. — Sir Wm. Thompson stated in his recent address before the British Association, that in Prussia every university, every polytechnic academy, every industrial school, most of the grammar schools, in a word nearly all the schools superior in rank to the elementary schools of the common people, are supplied with chemical laboratories and a collection of philosophical instruments and apparatus, access to which is most liberally granted by the directors of those schools to any person qualified for *scientific experiments.* In consequence there will scarcely be found a town exceeding 5,000 inhabitants that does not offer facilities for scientific investigations at no other cost than that of the materials wasted in the experiments. And further, professors, preceptors, and teachers of secondary schools are engaged on account of their skillfulness in teaching, but professors of universities are never engaged unless they have already proved by their own investigations that they are to be relied upon for the advancement of science.

THE FREEZING OF WATER. — Boussingault finds that by preventing the dilatation of water, it may be kept unfrozen down to —18°C. He experimented with a steel gun-barrel into which a steel ball was dropped before filling it with water. During the cold days of December 1870, the temperature fell to —12° and —18°C., and yet on shaking the tube the ball was found to move freely, showing that the water was not frozen.

THE DETECTION OF IRON AND ALUMINA IN PRESENCE OF EACH OTHER. — A trace of iron is readily detected in the presence of a large quantity of alumina, but unfortunately the converse is not true. It is extremely difficult to detect a trace of alumina in presence of considerable iron. We have however obtained good results by the following process: —

The precipitate obtained by adding ammonia to a solution containing both these metals is dissolved in dilute hydrochloric acid. To the solution thus obtained, which should be only slightly acid, solution of cyanide of potassium is added in considerable excess; it is then slightly acidified with hydrochloric acid and ammonia added to alkaline reaction. If a precipitate forms, it indicates the presence of alumina. The explanation of this process is that iron forms double cyanides with the cyanide of potassa, while alumina does not. The object of acidifying after the addition of the cyanide is to prevent any solution of the ammonia by the carbonate of potassa with which cyanide of potassium is always mixed.

THE ASCENT OF ATLAS. — A recent number of the *London Times* states that "the ridge of the great Atlas, never hitherto ascended by a European, was successfully scaled on the 16th ult. by Dr. Hooker, Mr. George Maw, and Mr. J. Ball." Finding their way, under the care of a friendly sheikh, to a village at the end of a picturesque ravine, 7,000 feet above the level of the sea, they completed their ascent from that point. "The crowning ridge, forming the watershed between the plain of Morocco on the north and the Sous valley on the south, was reached at a height of nearly 12,000 feet above the sea. The isolated points on the ridge were supposed to exceed this altitude by 400 or 500 feet." It must be observed that the "watershed" here mentioned does not divide the streams which flow to the Atlantic from those which flow eastward, and are absorbed in the Central Sahara; the valley of Sous has its direction westerly, towards the ocean, which it reaches at Agadir. So the geographical summit of Atlas has not been attained. But no doubt the point reached — the snowy ridge conspicuous from the plains of Morocco — was the conventional Atlas of the ancients — the heaven-supporting hill, the dwelling of the Western giant from whom the adjoining ocean, and the nymphs who inhabit it, and the sunset region beyond its waves dreamed of by Plato, derive their names.

HONORS TO SIR HUMPHRY DAVY. — A statue to this eminent chemist is about to be erected in Penzance, the town of his birth. A working committee was formed some time since, and a sum of £500 has been raised in subscriptions. A very eligible site has been obtained from the Town Council, immediately in front of the Market-house, and facing the main entrance of the town. The statue is to be of heroic size (about seven feet high), and is designed after Sir Thomas Lawrence's portrait, painted for the Royal Society, and now at Burlington-House, but other portraits have been also studied. Sir Humphry is represented in the well-known costume of the portrait, a light overcoat flung back, the coat within buttoned over, and waistcoat with upright collar appearing above the latter, shorts, long stockings, shoes and buckles; the head is slightly thrown back, as if inspired with the courage and enthusiasm for science which excited Coleridge's strong admiration for his friend; and the right hand rests on a safety-lamp, the product and symbol of the beneficent genius of the chemist.

It may not be generally known that Davy was a poet, though his productions in that line were not numerous. We believe it was Coleridge who said of him that, "had he not been the first chemist, he would have been the first poet of his age."

ATOMS.

SOME recent experiments at the Philadelphia High School developed the fact that when a strong solution of phosphorus in bisulphide of carbon is poured upon finely powered chlorate of potassa, resting on paper, and the mixture is exposed to air, upon the evaporation of the bisulphide of carbon, the phosphorus being left in a very finely divided state, intimately mixed with the chlorate of potassa, the mixture presently explodes spontaneously, with a loud detonation. — It is said that a few drops of coal oil, applied to parts stung by bees, wasps, or hornets, will give instant relief. — Astronomers in all parts of the world are now beginning to make arrangements for the careful observation of the next transit of Venus, which occurs in 1874. — A paper on Ancient Dentistry, presented to one of the scientific associations not long ago, showed that gold was used by the Romans for filling teeth, and for holding artificial teeth, five hundred years before the Christian era. — A span of horses forty-two years old, and still in excellent condition, are daily seen in the streets of Watertown, N. Y. — The richest borax deposits in the United States are to be found in Nevada, where the area under the control of a single company covers twenty thousand acres. — To clean a sink pipe that is clogged, take a straight poker or stick, wrap one end with a wet cloth (keeping hold of the cloth for safety), and work it up and down a few times in the pipe, like a piston. — The people of Louisiana and Mississippi, have found a new source of wealth in obtaining oil from the innumerable pelicans frequenting that portion of the Gulf coast; and quite a fleet of small vessels is now engaged in capturing them. — A new telegraph pole is made of galvanized iron tubes, shutting into one another in telescopic fashion, for convenience and economy in transportation to distant points. — Mr. A. R. Wallace, who lived for years in the East Indies, says that the popular notions of the gorgeousness of tropical vegetation are incorrect; flowers being less effective in lending color to the landscape than in temperate climates, since they are fewer in proportion to the mass of mere foliage. — Our neighbor of the *Transcript*, referring to the tall, showy plants of the *Ricinus communis*, or castor-oil bean, in the Boston Public Garden, says: "Little children of to-day, brought up under the mild regimen of pellets and powders, may gambol securely in the shadow of its umbrella-like leaves; but there are still some who would shudder in passing if they knew it to be castor-oil." — Butterflies have been found flying at sea, six hundred miles from land. — One of our exchanges remarks that "Mrs. Jones was very careful to get the 'non-explosive' kind, but the lamp blew up all the same, and she died in the old-fashioned way." — For coating fabrics and tissues with metal, such as copper, silver, and gold, the material is first to be impregnated with a solution of sulphate of copper, in ammonia, and then dried; after which the whole is immersed in a warm solution of grape sugar, which develops oxide of copper, upon which silver or gold can be electroplated in the usual way — The active principles of many plants are found to be more concentrated under the slower growth of cold regions, where the vegetation is less luxuriant than in warm climates; thus tobacco grown at the North is stronger than that raised at the South, and the same is said to be true of celery. — A concise list of "infallible remedies" is given as follows: — "For corns, easy shoes; for bile, exercise; for rheumatism, new flannel and patience; for gout, toast and water; and for the toothache, a dentist." — Among the rules given in the sixteenth century for an apothecary's life and conduct, the following deserves preservation: "That he put not in *quid pro quo* (that is, use one ingredient in place of another when dispensing a physician's prescription), *without advisement.*" — "Keep the doors of the hospital closed, and the windows open," was the wise and pithy admonition of Florence Nightingale. — The Cotton-growers and Manufacturers' Association of California, has two thousand acres in cotton.

LITERARY NOTES.

THE Appletons have just reprinted the *tenth* edition of *Combe's Management of Infancy*, revised and edited by Sir James Clark, Physician-in-Ordinary to the Queen. The work is too well known to require an extended notice, and in this improved form will be more popular than ever.

In December, 1831, the *Beagle*, under the command of Captain Fitzroy, sailed from England for a survey of South America, and the circumnavigation of the globe, and Charles Darwin, then only twenty-two years old, volunteered to go as the naturalist of the expedition. After his return, in October, 1836, he published his *Naturalist's Voyage Round the World*, a work which at once gave him literary no less than scientific fame. A revised edition was published in 1845, and another in 1860. A fourth has now been called for in England, and the Appletons have republished it in uniform style with their issue of the author's recent works.

Parturition without Pain is the title of an essay by Dr. Holbrook, editor of the *Journal of Health*, published by Messrs. Wood & Holbrook, of New York, and containing a good deal of sensible hygienic advice.

First Help in Accidents and in Sickness, intended as "a guide in the absence or before the arrival of medical assistance," is a little book published by Alexander Moore, of Boston, and one which, from a hasty examination, we regard as *safe* for family use. Its suggestions appear to be sensible, and such as will be approved by competent physicians.

Cancer, its Classification and Remedies, by J. W. Bright, M. D., is to be noted as a valuable contribution to the literature of this disease. It is published by S. W. Butler, of Philadelphia.

Messrs. Hurd and Houghton have issued a new edition of Judge Haliburton's *Sam Slick, the Clockmaker*, with illustrations by Darley; also a translation of DeMaistre's *Journey Round My Room* (*Voyage autour de ma Chambre*), a gem of French literature in an English setting not unworthy of it, and exquisitely printed withal; and a new novel by Therese Yelverton (Countess Avonmore), entitled, *Zanita*, a Tale of the Yosemite. Mrs. White's *Little-Folk Songs* is a marked success in a field where failure is the rule, and success the exception. Verses for children are common as sugar-plums, but there is no poetry so rare as that which is suited to the wants and tastes of a child. These lyrics are quite perfect in their way, and are sure to become classics of the nursery.

The Milk Journal is "a monthly review of the dairy, dairy produce, and poultry yard," published in London, which has already become an authority in its special department. We can furnish it (post free from London) *with the* JOURNAL, at the low price of *three dollars a year* for the two. We can furnish *The Doctor*, "a monthly review of British and foreign medical practice and literature," on the same terms; and *The Journal of Applied Science*, "a monthly record of progress in the industrial arts," edited by P. L. Simmonds (also published in London), *with the* JOURNAL, for *two dollars and a half* a year.

An American subscriber of the London *Chemist and Druggist* writes as follows to the publishers of that journal: —

"In July, 1870, I subscribed for the *Chemist and Druggist*, through a news-agent in our city, and paid the moderate price of *six* dollars currency per annum, and I should have continued my subscriptions at the same rate, rather than not have the paper."

Our readers will remember that we furnish the *Chemist and Druggist* for *two dollars a year*, or *with the* JOURNAL for *two dollars and a half*. These rates, and those of all the foreign periodicals on our clubbing list, are the result of special arrangements with the publishers, and are much lower than have been offered before in this country.

We would take this occasion to remark that our clubbing list remains the same as published in our number for June, 1870. Copies of it will be sent to any address on application.

The publishers of *Scribner's Magazine* will enlarge it with the new volume, and the price will be $4.00 a year. We will send it *with the* JOURNAL on receipt of that price. It is now one of the most popular of the magazines, and promises to become even more of a favorite in its enlarged form.

The American Naturalist issues a double number for October, with full reports of the natural history section of the last meeting of the American Association. This excellent monthly deserves a much wider circulation than it has yet won. Our subscribers should recollect that we furnish it *with the* JOURNAL for $4.00 a year, the regular price of the *Naturalist* alone.

We have received sets of the *Reports* of the State Boards of Agriculture of Michigan and of Connecticut, and also of the United States Department of Agriculture, for all of which we return our thanks. We should be happy to receive similar sets of documents from other States that issue them.

Medicine.

MEDICAL PHILOSOPHY.

It is a matter of regret that in the regular profession of medicine there is no system of medical philosophy. We have a vast accumulation of facts, the result of the most careful and scientific observation and experiment, and a certain amount of deduction as the result of investigation, but no comprehensive philosophy, to govern the physician in his treatment of disease.

It is believed that medical art has kept pace with other improvements, for which this century is so remarkable, and what is to be the progress in the future no one can predict: but no one can doubt that it will make even greater advances than in the past.

The want of a comprehensive medical philosophy to which I have alluded, may not be recognized by a physician already established, but to the young man just commencing practice the want of such a guide must be keenly felt.

The homœopath has a simple philosophy in the words *Similia similibus curantur*, and while it captivates many intelligent people, a large majority of physicians do not believe it to be true, and are incredulous as to the capability of matter to be subdivided to the extent claimed by their practice.

If the medical profession are ever to have a medical philosophy which is true, it must be the legitimate deduction from facts, and with a view to take the first step in the desired direction, you will permit me to announce a single principle by which I have been governed during a somewhat extensive practice.

It is well known by physicians that the human body is composed of quite a number of substances, such as albumen, globuline, fibrine, caseine, and kerotine, among the proteine compounds; gelatine, chondrine, fatty matter, — organic acids and inorganic acids, etc.; till we come to the metallic bases: potash, soda, ammonia, magnesia, iron, and manganese. Now in medical practice I never give, under any circumstances, any mineral either in the form of a salt or compound that does not enter into the human organization, as it would become a foreign substance incapable of assimilation, and therefore poisonous to that extent — or at least a foreign body. On administering an organic substance, or any of the minerals which constitute a part of the human system, there is a provision to discard or eliminate what is not wanted — if in excess of the requirements. But if you give lead or mercury, copper or silver, zinc or tin, there is in nature no arrangement to eliminate it from the system.

Physicians deplore lead or zinc poisoning; why then should they give the salts of either, to produce a temporary action, regardless of subsequent effects? Every conceivable drug has been recommended for every known disease, but if the physician would adopt the simple rule I have indicated, he would have the satisfaction of feeling that he had at least done no harm to his patients that would return at some future time to torment him.

J. H. STEARNS, M. D.,
Surgeon, National Asylum for Disabled Soldiers.
AUGUSTA, MAINE.

NOTES AND COMMENTS.

EXPLOSIVE PRESCRIPTIONS. — Several months since we stated in the JOURNAL that a mixture of chlorate of potassa and tannin was a dangerous combination, and should not be prescribed by physicians or compounded by apothecaries. A case of severe injury resulting from the explosion of this mixture has recently come under our notice. An apothecary in a neighboring city undertook to rub up in a mortar two drams of chlorate of potassa with one of tannic acid, as prescribed by a physician; the mixture exploded violently, burning the hands and face of the manipulator so severely that he was confined to the house for a week. A mixture left with an invalid friend, by a homœopathic physician, to be dissolved and used as a gargle in a throat affection, was found upon examination to be composed of the dangerous materials, and we find it is often prescribed by some practitioners. Its dangerous nature should be generally understood.

CURIOUS FRAUD. — We were shown recently a quantity of what was sold for "German Saffron" by a wholesale druggist, which upon examination proved to be shreds of Campeachy logwood and fustic, ingeniously blended or matted together, and moistened with a little heavy syrup. The deception was so perfect that an experienced druggist purchased the article and sold it for genuine saffron. In the history of fraudulent imitations, we have met with no instance so remarkable as this. Saffron has been for a long while scarce and high, and this circumstance has stimulated some enterprising and ingenious cheat to devise a cheap substitute. The amount upon the market we learn has been quite large, and druggists will do well to examine closely the article as offered for sale.

WILL CHEMISTS EVER MAKE THE VALUABLE ALKALOIDS, QUINIA AND MORPHIA? — There is but little doubt in our mind that they will. The synthetical production of conia has already been accomplished, by Schiff, a German chemist, and this result, so unexpected and remarkable, paves the way for the artificial production of the other alkaloids. The conia of Schiff, is produced by first forming dibutyraldine, and then subjecting it to dry distillation, from which one of the products obtained is conia, having the chemical composition and the poisonous properties of the natural alkaloid. This is one of the greatest triumphs of modern organic chemistry, more remarkable than the production of valerianic acid, which so excited the great chemist Liebig, twenty years ago. The field for research and experiment in organic chemistry is a wide one, and whoever discovers methods by which the alkaloids peculiar to the poppy plant and Peruvian bark can be artificially produced, will acquire a name and fame which will be lasting.

BEHIND THE BARS. — Several months ago we called attention to a series of quite remarkable papers with this title, which were appearing in the *Courier* newspaper of this city. The papers have been collected and published in book form, a copy of which we have received. The book is one which every physician should read, as it treats upon a subject which most intimately concerns the medical profession, those who are daily consulted regarding the care of the insane, and the conduct of our asylums designed for their treatment. The author of the book is one who has the confidence of all acquaintances and friends, and no one can call in question the motives which prompted its preparation. It is a matter of regret that the name of the author is not given, as it would add greatly to its influence upon readers. We have in the former notice spoken of the nature of the work, but at a future time shall endeavor to present some extracts, which will more clearly represent its designs and character.

HARD WATER AND HEALTH. — Some time ago we referred to Dr. Letheby's views on this subject. They led to no small controversy in Edinburgh and elsewhere, and both sides have since been busy in collecting facts to support their opinions. Dr. Charles Wilson, of Edinburgh, has recently published the results of his investigations. He gives a list of sixty-five towns, with their death rates, and the hardness of the water supplied to them. We give a summary abstract of the tables, in which the towns are classified according to the degrees of hardness of water supply:

Deg's of Hardness of Water.	Average Degree of Hardness.	Average Death-rate per 1,000 of Population.
Over 10	16.0	21.9
10 to 6	8.0	24.9
6 to 2	3.8	26.3
2 and under	1.3	28.5

These lists include towns placed under every variety of conditions. There is but one thing comparable among them, and that is the quality of the water supply; and nothing can be clearer than that the death-rate increases just as the hardness of the water decreases.

The finest breeds of cattle have originated in the hard-water tracts of Lincoln, Leicester, York, Durham, and Northumberland. The finest horses, too, come from hard-water districts; while, among the gneiss of Shetland and the Grampians, and the slates of Wales and Cumberland, we have the diminutive Welsh and Highland sheep, the Herdwicks, the kylo, and the pony as the characteristic indigenous races. These facts are certainly significant, — at least, until we hear from the other side.

HYDRATE OF CHLORAL IN INSANITY.

DR. J. B. ANDREWS has some interesting observations on the physiological action and therapeutical use of chloral, in the *American Journal of Insanity* for July. Dr. Andrews has used the article extensively in the New York State Lunatic Asylum, and concludes regarding its physiological action: "1. That the effect of chloral is to reduce the number of pulsations. (In experiments from 84 to 54.) 2. That the primary action is to increase the force of the heart's action and arterial tension. 3. That in large doses, within safe limits, the pulsations are not reduced in number proportionately to the size of the dose, but the effect is more prolonged. 4. That the secondary effect is to diminish the force of the heart's action and the arterial tension."

Chloral has been used to the extent of *nine pounds* in the New York Asylum, having been prescribed in three hundred and seventy cases. The average length of time of administration has been to the men thirty-nine days, to the women forty-three days. In a case of melancholia, marked by the

nost distressing delusions and wakefulness, it was given in twenty-grain doses, for two hundred and ifty-seven nights, as a hypnotic, without losing its effect, and with the happy result of securing refreshing sleep. The patient recovered. In this case, as in others, the value of the remedy was ested by occasionally intermitting the dose. Sixty grains were administered during an attack of mania or one hundred and ninety-five nights in succession.

The value of the remedy in insanity is as a hypnotic, and for this purpose it is of eminent efficacy. Patients who would otherwise be out of bed and oisy at night, to their own injury and the disturbance of a ward, are usually quieted and kept in ed, and at last put to sleep, by a dose of chloral imely administered. The sleep usually lasts from our to eight hours. It is natural, and the patient can be easily aroused. The appetite is not affected y the remedy, no constipation ensues, no ill effects re produced upon the brain, and no appetite for ie medicine is created by its use, as often happens ith opium; but in some instances it produces ausea and vomiting, and unless largely diluted it is pt to cause a burning sensation in the stomach and uces. In some cases its action is so prompt as to ive alarm to attendants. It is advantageously ombined with hyoscyamus and the bromides, to rolong its soporific effects. Dangerous symptoms ave followed a dose of fifty grains of chloral, but as uch as six hundred grains has failed to destroy fe. A case is cited in which a comatose condition as induced by twenty grains. A few fatal accients are ascribed to the remedy, and wisdom sugests caution in its administration.

NTERNAL HÆMORRHOIDS TREATED WITHOUT OPERATION.

DURING the past year Dr. Beekman has treated t the New York Dispensary eleven cases of internal hæmorrhoids, all occurring in females, and all eated without operation. In every case, the only iternal medication consisted in the employment of ie following formula: —

℞ Pulv. Sennæ.
Potass. Bitartrat.
Pulv. Sulphuris, *aa*. . oz. 2.
Pulv. Zinziberis . . oz. ½. M.

This preparation is designated in the Dispensary harmacopœia, as *Pulvis Sennæ Compositus*. The ose, as employed by Dr. Beekman, was a teaspoonl of the powder in molasses, every morning. The cal treatment consisted in the use of the following ntment: —

℞ Ext. Belladonnæ,
Plumbi Acetatis, *aa*. . dr. 2.
Acid Tannic . . . oz. ⅛.
Ung. Adipis, q. s. ut fiat unguentum.

A small mass of the ointment to be introduced ithin the anus thrice daily, after a thorough ablution of the parts with cold water. The duration the treatment was quite various, bearing a direct itio to the severity of the case, ranging from a eek to about five weeks. As far as could be asrtained, recovery took place in every instance, ad no case of relapse has thus far come to Dr. eekman's notice. A few of these patients sufred from hæmorrhage, but not to an excessive nount. Instead of the ointment above mentioned, r. Beekman uses, in private practice, suppositories ade up of the same ingredients, with the exception that cocoa-butter is substituted for the simple ntment — each suppository containing two grains ich of extract of belladonna and acetate of lead, ith four grains of tannin.— *N. Y. Medical Gazette.*

AN ENGLISH HOSPITAL.

FROM the accounts which we find in recent Engsh papers, it is evident that the Royal Orthoedic Hospital, of London, is an exception to the general character of such institutions in that country. An inquest was held a few weeks ago on the body of a little boy who died in this hospital from an attack of diphtheria. Dr. Bourne, the resident house surgeon to the institution, in giving his evidence, expressed his opinion that the attack of diphtheria from which the deceased had died was accelerated, if not produced, by the defective sanitary condition of the hospital. Upon beginning his duties four weeks since, he found the general and sanitary arrangements as bad as they could possibly be, in regard to the diet, the cooking, the cleanliness, and the knowledge and attention of the matron and nurses. There was no order or regularity. The patients were left unwashed for days together, and the atmosphere of the wards was damp and moist, owing to the washing and scrubbing taking place at all hours of the day, instead of early in the morning. The walls of the wards were always reeking with moisture, owing to this cause and all sorts of slops being thrown down the baths in the wards by the nurses. There had been eight deaths from diphtheria since December last. He believed all these deaths to have arisen entirely from the wretched sanitary condition of the hospital, and the defective and neglectful system of nursing. He had frequently got up in the night to attend to the children while crying, the nurse not paying any attention to them. Dr. Bourne's evidence was confirmed in the main by other medical witnesses, and, although it appears some slight improvement has lately taken place in the sanitary condition of the hospital, its present condition was described by one of them as being all "disorder and confusion." The jury took a merciful view of the case, not perhaps as regards the patients, but as regards those responsible for the evils. Their verdict was not "manslaughter;" they found that the deceased died from diphtheria, and recommended the committee to adopt and act upon the suggestions of their medical officers, especially with regard to the appointment of a highly trained nurse.

RELICS OF JOHN HUNTER.

MR. FRANK BUCKLAND has been an indefatigable searcher for relics of the greatest anatomist, physiologist, and surgeon, that England ever produced. Twelve years ago he found John Hunter's bones in the vaults of St. Martin's-in-the-Fields, and got them buried in Westminster Abbey; and he has lately been making a searching examination of the house and grounds that once belonged to him at Earl's Court, Kensington, but are now in the occupation of Dr. Gardiner Hill. According to all local tradition, the house and grounds are very little, if at all, altered since the days that John Hunter lived there. The house was built by himself, and it is such as might have been expected, — without the slightest attempt at effect or useless ornamentation. His favorite room was evidently the large one on the ground-floor, looking out on the park; Mrs. Hunter's rooms being doubtless upstairs. All round the house is a covered cloister dug about six feet into the earth. This cloister probably served the double purpose of keeping the house dry, and of being a good place for keeping live-stock. Mr. Buckland has no doubt that here many of Hunter's smaller animals used for experiments, such as dormice, hedgehogs, bats, vipers, snakes, and snails, for his researches on torpidity, were located; as well as hutches of rabbits, whose unfortunate fate it was to have their ears frozen to prove points connected with blood-circulation. The entrance into these cloisters leads through a very dark, subterraneous passage, at one end of which is a mysterious-looking door, leading into a small room, now used as a receptacle for rubbish. In a corner of this room, there is a largish-sized copper boiler standing out of the wall. "If this old boiler," exclaims Mr. Buckland, "could only tell us what it had boiled!" *One* giant, we know, was boiled in it; for in 1787 John Hunter wrote to Sir Joseph Banks: "I have lately got a tall man. I hope to be able to show him to you next summer." This was, no doubt, O'Brien, the Irish giant, whose skeleton is now in the Hunterian Museum at the College of Surgeons. Close to the boiler are the old (now tumble-down) pig-sties, where, probably, John Hunter kept the little pigs which he fed with madder, so as to cause their bones to become red. The places where his cocks and hens, pigeons — that have become matters of history now — probably lived, and all his other animals, are described. — *The Lancet.*

MEDICAL MEMORANDA.

BROMIDE OF POTASSIUM IN TAPE-WORM. — An interesting case of tape-worm is reported in the *Buffalo Medical Journal* as being cured, after all the ordinary remedies had been employed ineffectually, by taking bromide of potassium, in twenty-grain doses every four hours. After continuing the bromide for three days, and taking half an ounce of the spirits of turpentine, and soon afterwards two ounces of castor-oil, a perfect cure was effected. Two hundred feet were passed from the first medicine, and in a few weeks afterward, after repeating this treatment, fifty feet more were passed, at which time the head was voided. Since that time the patient has rapidly improved in health, and has not been troubled with parasites.

CARBOLIC ACID IN PHTHISIS. — Dr. A. F. Richmond writes to the *Medical Times and Gazette:* "As the cure of tubercles frequently takes place naturally, it occurred to me that nature might be aided by means of this curative agent, administered internally. Accordingly, in the month of March last, in a case of phthisis where the physical and functional derangements were of the most advanced kind, I prescribed two grains in syrup three times per diem — the result being diminished expectoration, and the pulse reduced from 135 to 116, with corresponding abatement of hectic fever. The medicine has been continued without any counteracting or injurious symptoms. From my experience of this case, I would feel justified in using the medicine in cases from the first to the latest stages of the disease; and I think it is proper to bring it under the notice of the profession, in order to elicit observations on it, and to have the merits of carbolic acid, as an internal medicine in cases of consumption, brought to the test."

We have frequently prescribed carbolic acid, alone and in combination with iodine and other remedies, both by the lungs and alimentary canal, with marked benefit, in phthisical cases.

TURPENTINE IN HEADACHE. — Dr. Warburton Begbie (*Edinburgh Medical Journal*) advocates the use of turpentine in the severe headache to which nervous and hysterical women are subject. "There is moreover," he says, "another class of sufferers from headache, and this is composed of both sexes, who may be relieved by turpentine. I refer to the frontal headache, which is most apt to occur after prolonged mental effort, but may likewise be induced by unduly-sustained physical exertion, — what may be styled the headache of a fatigued brain. A cup of very strong tea often relieves this form of headache; but this remedy, with not a few, is perilous, for, bringing relief to pain, it may produce general restlessness and — worst of all — banish sleep. Turpentine, in doses of twenty or thirty minims, given at intervals of an hour or two, will not only remove the headache, but produce in a wonderful manner, that soothing influence to which reference has already been made."

IRON ALUM AS A HÆMOSTATIC. — A strong solution of this salt in glycerine is admirably

adapted for the arrest of continued profuse bleeding where there is no large vessel to be seen and ligated. For hæmorrhage from the gums it may be applied in powder upon a piece of lint; and epistaxis may be checked by stuffing the nostrils with lint soaked in the saturated solution. If the vessels are much above the size of capillaries, it is not a suitable application; but cases of such capillary bleeding are often dangerous. Internal hæmorrhage may be treated with iron alum, especially gastrorrhagia and enterorrhagia, as well as bleeding from the rectum, when it is to be used as an injection. In these last cases it may be advantageously combined with some preparation of opium.

SPONGE PAPER. — This is an article recently patented in France. It is made of evenly and finely divided sponge added to ordinary paper pulp, and worked, as in the common paper-making apparatus, into sheets of different thicknesses. It is said to have all the peculiarities of sponge, absorbing water readily, and remaining moist a long time. It has been used as dressing for wounds with considerable advantage, and is capable of several important technical applications.

BRAIN WASTING. — J. Crichton Browne, M. D., Lecturer on Mental Diseases to the Leeds School of Medicine, says in the *British Medical Journal*: —

"1st. Women recover from this disease more frequently and rapidly than men. 2d. The earlier the age at which brain-wasting occurs, the better is the prospect of recovery. 3. The more decided the paralytic symptoms, the worse is the prospect of recovery. We owe a debt of gratitude to Dr. Radcliffe for pointing out the value of cod-liver oil and the hypophosphites in debilitating nervous diseases. They supply the essential elements of nerve nutrition in an easily assimilable form, and are unmistakably beneficial in cases of brain-wasting. A tablespoonful of cod-liver oil, and 15 grs. of the hypophosphite of soda, given twice or three times daily, at the outset of such a case, often arrest at once the downward tendency, and induce restoration of mental and muscular power. Sometimes, when these remedies seem ineffectual, doses of from 5 to 15 drops of tincture of opium and sulphuric ether, twice a day, expedite their action, besides conferring independent benefits. The opium gives, as it were, a fillip to cerebral nutrition, and thus diffuses a favorable influence through the whole economy."

PLEIS'S FIT POWDERS. — Dr. A. W. Miller has examined this nostrum — extensively advertised in the East for the cure of epilepsy — and communicated his results to the *Journal of Pharmacy*. He concludes that the remedy is composed of bromide of potassium, disguised by the addition of a little powdered gentian. Each powder contains about 15 grains of coarsely powdered bromide of potassium, and 5 grains of gentian.

COLORED CANDIES. — Some months since a great variety of the candies sold in New York were analyzed by Dr. Endemann, Assistant Chemist to the Health Department of that city, and reported in the *American Chemist*. Reds were either carmine or aniline-red (both harmless). Blues were either ultramarine or Prussian blue (also harmless). Yellows were either saffron, chromate of lime, chromate of baryta, chromate of lead, gamboge, or vegetable colors. Of ten samples five were colored with chromate of lead, and one with gamboge, both poisonous. Greens were harmless, so far as examined. *Starch sugar* is a common constituent of some kinds of candy, and starch is often substituted for gum arabic. In two cases *gypsum* was found, 3 and 6 per cent.; no other inorganic adulterations were detected.

RICINAL COLLODION (COLLODIUM CUM OL. RICINI). — This preparation, a mixture of collodion and castor-oil, is strongly recommended in cholera. The *Archives Générales de Médicine*, says that thirty to forty grammes painted over the abdomen will arrest cholera in the algid stage. It stops the vomiting of cholerine and cholera, and provokes a sudoral crisis, in which the poison is eliminated.

VALUABLE FORMULÆ.

PHOSPHORUS PILLS. — Dr. Ratcliffe, in the *Pharmaceutical Journal*, suggests this formula: Take of phosphorus 6 grains, suet 600 grains; melt the suet in a stopped bottle capable of holding twice the quantity indicated; put in the phosphorus, and when liquid agitate the mixture until it becomes solid; roll into 3-grain pills, and cover with gelatine. Each pill will contain one thirty-third of a grain of phosphorus.

SODA MINT. — This is much prescribed in Philadelphia as an antacid and carminative, and is prepared, according to the *Journal of Pharmacy*, as follows: —

℞	Sodæ bicarb.	℥ ss.
	Spt. ammon. aromat.	℥ i.
	Aquæ menthæ pip.	Oj.

M. Dose, from a dessert-spoonful to a tablespoonful for adults; from half to one teaspoonful for infants.

CARBOLIC CERATE. — Mr. Charles A. Bœhme suggests the following as an excellent formula: —

℞	Adipis	℥ x.
	Ceræ albæ	℥ v.
	Terebinth. Can.	℥ i.
	Acid carbol.	ʒ i.

Melt the lard and wax together, add the balsam fir, and when it begins to cool, stir in the carbolic acid. The addition of the balsam fir corrects the disagreeable odor of the acid, and renders the preparation slightly adhesive.

PRESERVATION OF TINCT. KINO FROM GELATINIZING. — To protect this tincture from change, Mr. J. M. Wood uses this formula: —

℞	Kino in fine powder	℥ i ss.
	Alcohol, .835	f. ℥ viii.
	Water	f. ℥ iv.
	Glycerine	f. ℥ iv.

Mix the alcohol, water, and glycerine and having mixed the kino with an equal bulk of clean sand, introduce into a percolator and pour on the menstruum.

AMANDINE. — The London *Pharmaceutical Journal* gives the following recipes: —

1. Bitter almonds (blanched), 4 oz.

Beat them in a mortar with a small quantity of water to a smooth paste, and add: —

Orris root, in fine powder	
Soap, in fine powder, each	1 oz.
Glycerole of starch	2 oz.
Clarified honey	1 oz.
Oil of bitter almonds	5 drops.
Oil of lavender	½ fl. drm.
Oil of bergamot	1 fl. drm.

Tincture of cochineal, q. s. to color. Mix.

2. Blanch 12 oz. of bitter almonds, and beat them in a mortar with a small quantity of rose or other water to a smooth paste; then add 7 oz. of rice flour, 3 oz. of bean flour, 1 oz. of orris powder, and when perfectly mixed, ½ oz. carbonate of potash, dissolved in rose-water; again beat together, and add 3 oz. of spirituous essence of jessamine, 2 drops of oil of rhodium, and one of neroli.

3. Take of fine pale honey (or strong syrup) 4 oz., white soft soap made from lard and potash, 2 oz., mix them thoroughly in a Wedgewood mortar, adding, if necessary, two or three teaspoonfuls of solution of potash, so as to produce a thoroughly homogeneous paste. To this add and rub in by degrees, and very gradually, 3½ lbs. oil of almonds, previously mixed and scented with

Essential oil of almonds,
Essence of bergamot, of each, 3 fl. drms.
Oil of cloves,
Balsam of Peru, of each, 1½ drm.

And continue the trituration until the whole as sumes the appearance of a rich transparent jelly Finally, put the paste into pots or wide-mouthe bottle.

[NOTE. — The balsam ought to be triturated with a little of a mond oil, warm, before adding to it the rest, and, after all th scents are added, the oil should be allowed to settle for two or thr days, and the clean portion only used.]

In using, a lump of amandine, the size of a larg pea, is rubbed with a few drops of warm water, an the rich, white lather applied to the hands, fac neck, etc. In a short time the skin may be wipe with a soft napkin.

ESSENCE OF MOSS ROSE. — This is from th same authority: —

Otto Rose	ʒ iss.
Ess. Ambergris	ʒ iiss.
Ess. Musk	℥ j.
Alcohol	℥ xv.
Aq. Rosæ Conc.	℥ x.

ANISEED CORDIAL. — The following is a goo recipe: —

℞	Ol. Anisi	ʒ ss.
	Sacch. Alb.	℥ ij.
	Syr. Simpl.	℥ iij.
	Sp. Vin. rect.	ʒ viij.
	Aq. destill.	℥ xxx.

The oil to be well rubbed with the sugar; ad the water gradually; mix the remaining ingred ents, and filter.

FUMIGATING PASTILLES. — The *Druggist's Ci cular* gives these two recipes: —

1 — Take Benzoin	2 ounces.
Balsam of Tolu	
Yellow Sandal-wood, of each	4 drachms.
Nitre	2 drachms.
Labdanum	1 drachm.
Charcoal	6 ounces.

Mix with a solution of gum tragacanth, and d vide the mass into pastilles, cone-shaped, and dr them in the air. The foregoing is the formula o the Paris Codex.

2 — Take Benzoin	4 ounces.
Cascarilla	½ ounce.
Nitre and	
Gum Arabic, of each	3 drachms.
Myrrh	1 drachm.
Oil of Nutmeg and	
Cloves, of each	25 drops.
Charcoal	7 ounces.

All in fine powder. Beat them to a smoot mass with cold water q. s., and form into sma cones and dry in the air.

WASH FOR THE GUMS. — The French prepar tion known as *Eau de Botot* is made as follows: —

℞	Anise-seed	80 parts.
	Cloves	
	Cinnamon, āā	20 "
	Oil of peppermint	10 "
	Cochineal	5 "
	Vanilla	1 "
	Rectified spirits	800 "
	Rose-water	200 "

Digest for about a week and filter; then add of
Essence of amber . . . . . . 1 part.

A few drops in a glass of water, to rinse the mout with.

CUNDURANGO. — It can hardly fail to cause th heart of the American pharmacist to bound for joy to know that Dr. Bliss, from blissful Washington has announced the blissful intelligence that a carg of Cundurango has arrived in New York, whicl will be furnished to the profession at the highes possible prices. "See, the conquering hero comes!" The very name Cundurango has a high and mighty conquering sound — sweetly blended of High Span ish, Guinea Nigger, Fiji, and Whang Doodle. Dr B. has taken steps to Helmboldize the drug at once We will soon see it marching on across the Conti nent, side by side with the other heroic names which, by the magic of paint and cheap blacking blazoned on every bridge, fence, and crag, from the Atlantic to the Pacific, have been stencilled upon the great American heart. — *Chicago Pharmacist.*

Boston Journal of Chemistry.

Volume VI. BOSTON, DECEMBER, 1871. Number 6.

Familiar Science.

UNRECOGNIZED POISONS.

So essential to comfort and happiness is good ealth, it would seem that if other considerations iiled to lead us to take good care of our bodies, iere selfishness would control our conduct. 'here are many ills incident to the flesh which annot well be kept at bay, but a large majority f those which torment and destroy the human imily are undeniably preventable, or can be 'arded off or mitigated by intelligent care and ie proper observance of hygienic laws. The auses of disease are manifold, and they exist nseen in the air we breathe, in the water we rink, in the food we consume, and in the clothig we wear. Thousands of human beings have ist their lives from *poisons;* not such as are btained of chemists and apothecaries, but those hich result from causes incident to our mode f life; poisons which cannot be readily seen, andled, or weighed. The progress of the uman family towards civilization and refineient has resulted in a complete change in the onditions under which it exists. The men and vomen of this age, residing in civilized commuities, no more conform to the habits of their ncestors than to those of the animals they rear; id whilst they are surrounded with the manild comforts, luxuries, and conveniences which iodern science and art have devised, new aveies have been opened for the approach of disise, and new sources for the development of odily poisons have been created. If science id not kept pace with the multiplication of iese hurtful influences, and proved adequate to oint them out, the race long since would have ecome extinct. It is not necessary that we low our retrospective glances to take a very r-reaching sweep into the past, to learn that e air breathed by our ancestors was such as iture provides, unmixed, unadulterated. Inoors as well as out of doors, the air that came esh from the hills had almost unimpeded cirlation. No "hot air" furnaces and "red hot" oves loaded the in-door air with poisonous ises and suffocating dust, and raised it to a mperature corresponding to "blood heat." 'hey had plenty of smoke no doubt in their vellings, for their imperfect chimneys, even ider a draught urged by blazing logs of hicky, would not always lead upwards the blue ass of unconsumed fuel. But fresh wood ioke they did not mind, even when it was inse enough to tan the skin. The air which ey breathed was crisp, and full of oxygen, d the respiratory valves were sufficiently vigous to intercept the offending matter and pel it.

The quaint old English writer, Holinshed, hose chronicles we read with so much interest, garded smoke not only as healthful, but as a medicine." He says, in speaking of the innovations of the times, the introduction of chimneys, etc.: —

"Now we have many chimneys, yet our tenderlings do complain of rheums and catarrh and poses. Once we had nought but a reredos (a fire-place), and our heads did never ache, for the smoke of those days was a good hardening for the house and a far better medicine to keep the good man and his family from the quack or pose, with which then very few were acquainted. There are old men yet dwelling in the village where I remain who have noted how the multitude of chimneys do increase, whereas in their young days there were not above two or three if so many in some uplandish towns of the realm, and peradventure in the manor places of some great lords, but each one made his fire against a reredos in the hall where he dined and dressed his meat. But when our houses were built of willow, then we had oaken men; but now our houses are built of oak, our men are not only become willow, but a great many altogether men of *straw*, which is a sore alteration."

The partially carbonized particles of fuel which escape from burning wood in the form of "smoke" are irritating to the mucous surface of the air passages when inhaled, and Holinshed's views are of course absurd, but there is a wide difference between this "smoke" and the products of combustion which escape into rooms from the burning of anthracite coal. These cannot be seen, and the agents most poisonous are unfortunately not readily detected by the sense of smell. The two gaseous products derived from coal which are offensive and deleterious result from the presence of sulphur in the coal. These bodies — sulphydric acid and sulphurous acid — are exceedingly unpleasant and dangerous to inhale, and hardly any one is so indifferent or stupid as not to be alarmed, or at least annoyed, by their presence in dwellings. But the amount of sulphur in coal is small, and in a few moments after fresh fuel is added to a fire, it is changed or volatilized by heat, and the disagreeable odor passes away. Another class of bodies, at least equally poisonous, but without special odor, continue to be evolved from the burning coal so long as any remains unconsumed, and they pass into rooms as freely as the offensive sulphurous gases. Carbonic acid and carbonic oxide are irrespirable bodies, and the latter is an active poison. Now, from a series of carefully conducted experiments made in the rooms of numerous dwellings in city and country, during the past ten years, we are convinced that there are but few houses in which any form of cast-iron furnace is used, where these gases are entirely absent. It is a well established fact in science that cast-iron is freely permeable to these gases, and if furnace plates contain no cracks or joints, they will pass through into the air chamber, and from thence with the air current into the rooms above. But all furnaces constructed of cast-iron must of necessity have more or less joints, and since no luting or cement has ever been devised which will not be decomposed and crumble under the influence of heat, it is through these open joints that most of the gases find access to dwellings. It is deceptive and wrong for any dealer or manufacturer to claim that in arranging furnaces with joints they employ a cement impervious to gases, and which will not speedily be decomposed. No such cement is known. To the presence of the irrespirable and poisonous coal gases in dwellings much of the poor health and positive illnesses in families are manifestly to be attributed. The human constitution is wisely constituted capable of bearing up under great abuses, but it is impossible to resist them when flagrant and long continued. The strong suffer less than the weak, and women and children who are in-doors much during the day, falter oftener than male members of families, who are absent attending to business in the shop or open air. The subject of warmth in dwellings is one of great importance, as it is most intimately connected with health and happiness, but there is a strange indifference regarding it among cultivated and intelligent men even. But little inquiry is made into the conditions under which household warmth is obtained, and family illnesses are often attributed to anything and everything but the right cause.

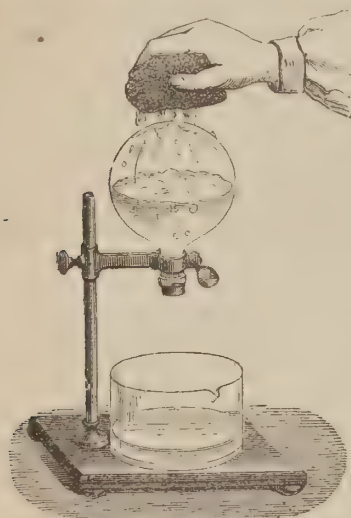
THE BOILING OF WATER.

When a vessel of water is heated to a temperature of 212° F., steam begins to be formed in little explosive bursts at the bottom, and rising in bubbles through the liquid throws it into commotion. If the steam is allowed to escape freely, the temperature of the water rises no higher, all the heat which it receives being absorbed, or rendered *latent*, in the change from a liquid to a gaseous state. This *boiling* is in itself a simple process enough, but it is modified materially by a variety of conditions, giving rise to phenomena some of which do not appear to be understood by people in general, and sometimes not even by those who have charge of steam boilers.

As the steam has to rise from the surface of the water against the pressure of the air, boiling is modified by the degree of that pressure. Diminish the pressure, and the water boils at a lower temperature than 212°; increase it, and the liquid must be heated above that point before it will boil. In fact, the water in our tea-kettles does not boil at exactly the same temperature to-day as it did yesterday, if the barometer has risen or fallen in the mean time. If the mercury has gone up, the boiling water is a little hotter; if it has gone down, the imprisoned steam escapes at a slightly lower temperature, and the liquid is not quite so hot. It would require a delicate thermometer to detect these minute differences of temperature; but if we diminish the atmospheric pressure considerably, the variation becomes readily perceptible. Under the receiver of an air-pump water may be made to boil at a

hundred or more degrees below its ordinary boiling point, or even at the common temperature of a summer day. If we get rid of a part of the pressure by ascending a mountain, the result is similar. On the summit of Mount Washington the boiling point would be a trifle above 200° F., and at the height of 18,000 feet it would be as low as 180°. In some elevated places many substances cannot be thoroughly cooked by boiling.

The paradoxical experiment of making water boil by the application of cold depends upon this lowering of the boiling point by diminution of



pressure. Fill a flask (or any bottle that will bear the changes of temperature without breaking) two thirds full of water, let it boil for some time, then remove it from the source of heat, cork it tightly, and invert it, as shown in the figure. Pour cold water on the flask, and the interrupted boiling will begin again; if we cease the application of the cold water, the boiling stops, and the experiment may be several times repeated. At first the upper part of the flask is full of steam, which exerts quite a pressure on the water. The cold water condenses the steam, and the pressure being thus removed the water boils again, though at a lower temperature than before.

On the other hand, by increasing the pressure artificially we are enabled to raise the boiling point far above 212°. In a vessel containing air condensed into half its ordinary volume water will not boil until it is heated to 234°; under a pressure of four atmospheres, it boils at 294°; under ten atmospheres, at 359°; and under fifty atmospheres, only at 510°.

The boiling point of water may be raised also by increasing the cohesion of its particles. This may be done by dissolving common salt or saltpetre in it, or by removing the air and other gases which it may contain. The elastic force of these gases being increased by the heat, minute bubbles are formed in the interior of the liquid, especially in contact with rough surfaces, and into these the steam dilates and rises. By long boiling the air becomes nearly all expelled, and in such cases the water has been observed to rise even to the temperature of 360° F., in an open glass vessel, which was then shattered by a sudden explosive burst of vapor with a loud report. The force of cohesion had retained the particles of the liquid in contact with each other in a kind of tottering equilibrium, and when this equilibrium was overcome at some one point the repulsive power of the heat stored up within the mass suddenly exerted itself, and the result was an explosion and the instantaneous dispersion of the liquid. If the water had not been kept perfectly still, the unstable equilibrium could not have been maintained so long; and this experiment, like many others that might be mentioned, shows the danger of allowing the water in steam-boilers to remain motionless for any length of time while the fires are kept up. There can be no doubt that explosions have often been caused in this very way.

The boiling point of water is affected even by the material of the vessel in which it is heated. In a perfectly clean glass vessel it may be 2° or 3° higher than in a metallic one. In a copper vessel coated inside with shellac, water will not boil until it attains a temperature of 219°. These phenomena are probably due to differences in the adhesion of the water to the vessel. If the inner surface of a glass vessel is very smooth, distilled water boiled in it will "bump;" that is, it becomes heated a little above the boiling point, and the steam that is formed escapes with a sudden jerk, as if it were a slight explosion; the temperature then falls to 212°, again rising and falling with each burst of vapor. The "bumping" instantly ceases if we put a piece of metal or metallic chips or filings into the vessel. The rough edges of the metal, by breaking up the continuity of the surface, apparently serve to conduct the heat among the particles of the water, and thus to hasten the disruption of their cohesive power.

Intimately connected with this subject of boiling and boiler explosions is that of the *spheroidal state* of liquids, as it is called. Upon this it was our intention to add a few remarks, but the length to which this article has extended compels us to postpone them to another time.

THE DIFFUSION OF GASES.

In another article in this number of the Journal we have referred to the fact that a porous partition is permeable to gases, even though it be of considerable thickness, and of a material as compact as cast-iron. This and similar phenomena depend upon what is known as the *diffusion of gases*, or the tendency of gases to intermix when in contact with each other or when separated only by a porous substance.

If we fill a bottle with a light gas, as hydrogen, and another with a heavy one, as carbonic acid or chlorine, and connect the two by a long tube passing through the corks, we find that the two gases will soon become thoroughly mingled; and this will take place even if the bottle of lighter gas is placed *above* the other. The hydrogen will descend, and the carbonic acid, which is more than twenty times heavier, will ascend, in apparent defiance of the laws of gravity, until the two are equally mixed in both bottles. If the lower bottle be filled with chlorine, which has a distinct yellow color (and which is *thirty-five* times heavier than hydrogen) we can see it as it gradually rises and blends with the colorless gas above. The experiment shows that a gas is virtually a vacuum to another gas. One spreads itself through the other, as through empty space, the only difference being that the expansion is not so rapid in the former case.

The simplest and at the same time the most striking experiment to show the diffusion gases through a porous partition is by means an unglazed porcelain cup, such as is used many forms of the galvanic battery. Close tl mouth of this cup with a cork, through whic passes a glass tube two or three feet long; an let the open end of the tube dip into a vessel water. Now fill a bell-glass with hydrogen ar hold it over the cup so that the cup is immers in the hydrogen (or let a rubber tube from a h drogen apparatus pass into the bell while th held over the cup), and there will be an insta rush of bubbles from the lower end of the tul up through the water. This shows that the h drogen passes at once through the porous cu and mixes with the air inside. If now we r move the bell-glass, the water instantly rises the tube; showing that the hydrogen has pass out the same way as it entered. If the water colored with a drop or two of red ink, its rap rise in the tube can be better seen. In bo cases it can be proved that the air is passi through the porous partition at the same tir with the hydrogen, but in the opposite directi and more slowly. The greater the difference the density of the two gases, the greater the d ference in the rapidity with which they diffu into each other.

That cast-iron is thus permeable to gas though to a less degree than the porcelain c in these experiments, has been established b yond a doubt. When it is red-hot, the gases, might be expected, pass through it more read than when it is cold. Some have denied that is permeable at all in the latter case, but rece experiments made in England go to show t contrary. The ground about cast-iron gas-pipe the joints of which were made hermetically tig so that no direct leakage could take plac has been found to become saturated with g There could be no doubt, under the circumstanc that the gas passed through the iron to mix w the air in the earth outside. In the case gas-pipes laid near wells, the water has be found to be contaminated by the escape of t gas. And what is even more remarkable, it h been found that when gas-pipes and water-pip were laid near each other, the gas escaped fr the former and mixed with the water in the l ter. An instance of this kind recently occurr at Croydon, near London, and the same thi has been observed elsewhere.

The diffusion can of course be prevented coating the pipes on one or both sides with c tar or some of the paints that have been su gested for the purpose. It would seem to true economy to coat water-pipes on both sid and gas-pipes on the outside, to protect th from rust, if for no other reason; but in t country this is rarely, if ever, done.

BOUND FOR THE NORTH POLE.

Arctic exploration appears to have receiv a new impetus of late. To quote the words *The Academy*, "Not only are there more than dozen expeditions, greater and smaller, besiegi the icy fastnesses of the arctic region at alm every point in the circle of its unknown ar but the whole of these, with two exceptions, a independent of any public aid, and have be undertaken at individual risk, in the hope direct mercantile as well as scientific gain."

The Germans are conducting two important ;peditions. One sailed on the 25th of June, ıder the veteran traveller Von Heuglin, and is ·epared for a fifteen months' crüise in the Si- ·rian seas; taking a route through the Strait of ova Zembla and across the Kara Sea, whence ı attempt will be made to double the North ape of Asia, and to reach the island of New iberia. The other, undertaken by Payer and Veyprecht, left Tromsö, in Norway, on the 19th ' July, in a vessel appropriately named the *björn*, or "Ice-bear," and returned to that port ı the 3d of October. The telegraphic report ınouncing her return is brief, but it suffices to ow that the expedition penetrated as far as 79 ·g. of latitude in the region between 42 and 60 ·g. of eastern longitude, and discovered an open a, apparently leading eastward to Polynia and fording a practicable access to the North Pole. r. Petermann therefore concludes that the en- rprising pioneers advanced through the glacial ıne encompassing the Pole by the Gulf Stream, e direction of which, as discovered in 1869 by e steamer *Albert*, pointed exactly towards the ot up to which Payer and Weyprecht have lvanced, — longitude 43 E. and latitude 79 N. t a latitude of 75 or 76 N. the Gulf Stream owed a warmth of 4 deg. Réaumur, a tem- ·rature unapproached at any other spot in those gions, and on that account Dr. Petermann nsiders it the only route by which the Pole n be reached. On this point there has long ·en a dispute between Dr. P. and Captain oldewey, another of the chief German au- orities on arctic geography, and the partisans ' the former are highly gratified at the con- rmation of his views which the results of this ;pedition appear to furnish.

A Swedish expedition, in two government ·ssels, under Professor Nordenskjold, sailed ' May for the exploration of the seas between reenland and Spitzbergen. Several Norwe- ·an vessels, commanded by experienced arctic ·vigators, and equipped by the government ·th scientific instruments, are examining the ·ters between Spitzbergen and Nova Zembla. From Scotland, Mr. Lamont has gone in his ·am yacht to the upper part of the coast of ıst Greenland, visited by the German expe- ·ion of last year; and Mr. Leigh Smith, an ıglishman, has fitted out a vessel for the Spitz- rgen seas.

M. Octave Pavy, a Frenchman, has also pre- red an expedition at his own expense, to carry t the plan proposed by Lambert some years o. He intends to go from San Francisco to pan, where he will charter a ship for Kamt- atka. At Petropaulovsk he will buy two ndred reindeer and fifty dogs for an overland ırney by Anadyrsk to Cape Jakan. There lf of the reindeer will furnish fresh meat for ɜ advance from that point, and the remainder ll be left in charge of the native Chukchees. solid ice is found to extend northward from ɜ Cape to the unvisited Wrangell Land, the g-sledges will be used for going on; if there open water, a "modified monitor raft," con- ·ucted for the purpose, will be fitted up and ınched for the polar voyage.

Captain Hall's expedition from this country, d the plans of its leader, have been fully de- ·ibed in the journals of the day. From Uper- ·vik, as our readers probably know, the *Polaris*, having taken on board a good supply of dogs, will cross Melville Bay and attempt to reach the circumpolar region by way of Jones' Sound.

It may be added that the Russian Government is planning an expedition for next summer, to explore the Siberian sea-coast. The special object will be to find the mouths of the rivers Obi and Yenisei, while an inland expedition is to seek their sources.

BRIEF NOTES ON SCIENTIFIC TOPICS.

Sounds from the Aurora. — It has long been an article of popular belief that the aurora is a roarer; that is, that it produces a sound more or less distinct. Scientific men, however, have generally been inclined to regard this auroral noise as a mere illusion. Loomis, in his excellent "Meteorology," says: "There is no satisfactory evidence that the aurora ever emits any audible sound. . . . The sounds which have been ascribed to the aurora must have been due to other causes, such as the motion of the wind, or the cracking of the snow and ice in consequence of their low temperature." But in a paper read at a recent meeting of the Academy of Science, of Paris, M. Becquerel expressed the opinion that the aurora really does make a noise, and in support of this view quoted the observations of Paul Rollier, aeronaut, who started from Paris in December last, and descended 14 hours after in Norway, on Mount Ide, at an elevation of 4,000 feet: "I saw through a thin fog the moving of the brilliant rays of an aurora borealis, spreading all around its strange light. Soon after an incomprehensible and loud roaring was heard, which, when it ceased completely, was followed by a strong smell of sulphur, almost suffocating."

The Spectroscope and the Nebular Hypothesis. — Prof. Kirkwood says that the spectroscope has demonstrated the present existence of immense nebulous masses such as that from which Laplace supposed the solar system to have been derived. It has shown, moreover, a progressive change in their physical structure, in accordance with the views of the same astronomer. In short, the evidence afforded by spectrum analysis in favor of the nebular hypothesis is cumulative, and of itself sufficient to give this celebrated theory a high degree of probability.

Floating of Solid Iron on Molten Iron. — The following explanation of this paradoxical phenomenon is given in the *Scientific American* as a plausible one, to say the least: "According to the dynamical theory of heat, the molecules or particles of heated metals are in a state of great agitation, and the higher the temperature, the intenser the molecular motion. The difference in the specific gravity of melted and solid cast-iron being slight (as 31 to 32 nearly), this constant and fierce movement of the particles of the former prevents a block of the latter from sinking. An analogous action is found in swift running streams or eddies, upon which bodies of considerably greater gravity than water are supported for a long time, and also in the partial suspension of an egg in boiling water."

The Magnetic Needle and Solar Eclipses. — It is well known that the magnetic condition of the earth is disturbed during a display of the aurora, as is clearly shown by the irregular movements of the magnetic needle. A solar eclipse produces similar disturbances. It was observed on the 22d of last December that the magnetic needle followed its usual course till the commencement of the eclipse that occurred on that day. With the beginning of the eclipse it retraced its steps until it reached its minimum declination at 58 minutes past one, which was the instant of totality. From that moment the ascending motion toward the west began anew, until the needle had regained the exact position it had occupied when the eclipse began.

Another New Planet. — In our last number we referred to the recent discovery of three planetoids, all by American observers. On the 14th of September another was discovered by Dr. Luther, of Bilk, who has been the most successful of "detectives" in this field of astronomical research. Of the 117 of these little planets now known he has discovered *twenty*. Prof. Peters, of Hamilton College, has found *thirteen*, and Prof. Watson, of Ann Arbor, *ten*. It is but fair, however, to state that Dr. Luther has been hunting for planets ever since 1850, when he discovered *Parthenope*, the 11th in the list; while Prof. Peters did not enter the field until 1861, nor Prof. Watson until 1863. Of the last score of these planets, all but three have been discovered by these three astronomers, who appear to be now the chief workers in this department.

Recent Observations of the Planet Venus. — Although this "star of love" is our nearest neighbor among the planetary bodies, we know less about her than about several of the family that are more distant. Her very brilliancy has interfered with the study of her face, blinding the observer "with excess of light," and little has been learned on the subject since the days of the indefatigable Schröter. At the beginning of the present year a committee of the "Observing Astronomical Society," in England, arranged for a series of systematic observations of the planet, and no less than thirty-seven gentlemen promised to aid in the work. They began their operations in March, and valuable results have already been attained. Markings upon the surface of the planet have been seen and delineated by several of the observers, and there is a general similarity in the drawings made at the same date by different persons. When the various sketches and observations have been carefully compared, we may expect that our knowledge of the "geography" of Venus will be materially enlarged.

HOUSEHOLD RECIPES.

To Clean Silver. — Wash in hot soap suds (use the silver soap if convenient); then clean with a paste of whiting and whiskey. Polish with buckskin. If silver was always washed in hot suds, rinsed well, and wiped dry, it would seldom need anything else.

To Clean Brass. — The *Technologist* says: "Rub the surface of the metal with rotten-stone and sweet oil, then rub off with a piece of cotton flannel, and polish with soft leather. A solution of oxalic acid rubbed over tarnished brass soon removes the tarnish, rendering the metal bright. The acid must be washed off with water, and the brass rubbed with whiting and soft leather. A mixture of muriatic acid and alum dissolved in water, imparts a golden color to brass articles that are steeped in it for a few seconds."

To Preserve Clothes Pins. — They should be boiled a few moments and quickly dried, once or twice a month, when they become more flexible and durable. Clothes lines will last longer and keep in better order for wash-day service, if occasionally treated in the same way.

To Restore Furniture. — The best preparation for cleaning picture frames and restoring furniture, marred or scratched, is a mixture of three parts of linseed oil and one part spirits of turpentine. It not only covers the disfigured surface, but restores wood to its original color, and leaves a lustre upon the surface. Put on with a woolen cloth, and when dry, rub with woolen.

To Whiten Straw Hats. — Scrape stick sulphur with a knife, mix the powder to a mush with water, plaster it thickly over the straw, and place in hot water several hours; brush off when dry. This is an easy and effectual plan.

The Arts.

[For the Boston Journal of Chemistry.]

MICROPHOTOGRAPHY.

BY CHARLES STODDER.

NEXT to using the microscope, the most important thing to the microscopist is to communicate to others the discoveries he has made. The true student, the discoverer of a new fact in nature, does not wish to keep it to himself, and he cannot bring the world into his study, to see what he has seen with his instrument. Language is, from the different shades of meaning which may be attached to words, utterly inadequate for conveying to others the exact idea that the user wishes to convey. The only resource of the original observer with the microscope is in pictures, which may be multiplied in indefinite numbers. But how to make the pictures? The microscopist may be an artist of sufficient skill to make a drawing satisfactorily; but oftener he is not. The late Professor J. W. Bailey, of West Point, made most superior drawings. The drawings in Professor Agassiz's "Contributions" are masterpieces of this kind of work.

If the observer cannot draw to his own satisfaction, he must employ some other hand and eye. In such case it is rare that the draughtsman understands the subject, and unless the microscopist stands over him, and watches every stroke of the pencil, something will be wrong or omitted. Then when the drawing has been done it must be copied by the engraver or lithographer; and the same trouble again arises, that the artist does not understand the subject, and if not constantly watched, the picture will be most likely wrong. The observer who can both make his own drawings, and do his own engraving, is most fortunate. Such is the case with Professor Lionel S. Beale, of London. Some of his pictures, in his "How to Work with the Microscope," and the "Microscope Applied to Clinical Medicine," were both drawn and engraved on wood by himself. They are among the best pictorial representations of microscopic work. But so rare are such accomplishments that the writer knows of no other case.

The discovery of the art of sun-printing led to the desire of applying it to the microscope, many years ago, and many trials and attempts were made in that direction both in this country and in Europe. There are now in the museum of the Boston Society of Natural History, several examples of daguerreotype pictures taken about twenty years ago, which gave promise of good, useful results. Parties in England, and probably also on the Continent, made attempts in this direction, but it is not known that any specimens of the earlier efforts in Europe have been brought here. In England, Dr. R. L. Maddox has been highly successful within the last ten years. A page of very beautiful specimens of his work is inserted in the last edition of Beale's "How to Work," etc., and *accompanied with a lens* to show the details. The writer has one specimen from Dr. Maddox that is an exquisite and faithful picture of the object, such as no drawing could produce, requiring a considerable magnifying power to show the finer lines. In this country, Dr. John Dean, of this city, wrote a work on the Medulla Oblongata, published by the Smithsonian Institution about 1866. This was illustrated by original microphotographs which were successfully reproduced by L. H. Bradford, by the photolithographic process of cutting, an art that seems to have fallen into an undeserved obscurity, though it is well replaced by the "carbon" process. Dr. Charles F. Crehore, now of Newton, in 1865–66 made many excellent microphotographs of anatomical preparations and natural objects; well showing what the art was capable of doing, but unfortunately for science he found more profitable employment, and did not long practice the art.

It is at the United States Army Medical Museum at Washington that this application of photography has been most usefully applied and carried to the greatest perfection, by the skilful manipulation of Brevet Maj. E. Curtis, M. D., and Lieut. Col. J. J. Woodward, M. D. A vast collection of examples of diseases, wounds, and injuries have been gathered there, and from time to time reports are published for the information of the medical profession, illustrated when needful by photographs of the microscopic preparations that give any information respecting the diseased structures or tissues.

Now the great advantage, the superiority of this mode of obtaining pictures must be unquestioned by the microscopist. If the instrument used is a good one — and that is the *sine qua non*, in microscopy — if the operation is skilful, the picture will show just what the object is without the mistakes of the artist, or of the imagination. There can be no attempt at adding what ought to be seen, or at making the picture agree with a theory. Whatever errors arise will be errors of interpretation; and in this respect all microscopic observations, especially with very high powers, are more or less uncertain.

Dr. Woodward has probably carried the art to greater perfection than any other person, — at least, no examples that we have seen from Europe surpass, if they equal, those of his production. Dr. Woodward is provided with instruments of the very highest grade that can be procured, and consequently his products represent the results to be obtained by such instruments, not by the ordinary microscopes in common use.

Incidentally to the proper work of the Museum, to test perhaps his objectives, to show the results obtained by his instruments on objects that are familiar to all microscopists, he has made many photographs of such objects. A good many of these are now in possession of the writer, taken at various times during the last three years, up to the last summer. Among these, may be specified as the most remarkable, the set of Nobert's test lines, ruled on glass, from 11,000 to 112,000 to the English inch, the finest of which had never been seen by any microscope until within four years; indeed we have no certain information that they have yet been seen in Europe; also Podura scale magnified 756 diameters with Wales $\frac{1}{8}$; the same, and same power, with Powell and Lealand's $\frac{1}{25}$; the same, 2,100 diam., Powell and Lealand's $\frac{1}{50}$; the same done this year with Powell and Lealand's $\frac{1}{16}$ immersion, 1,200 diam., two pictures, showing the totally different appearance presented by the same object by merely a change of illumination, and the caution that must be exercised in interpreting microscopic appearances. There is a set of eight anatomical preparations, the photographs taken early the present year by Dr. Woodward, and published July 13th, to show the improvements and progress recently made; all of them are beautifully clear, distinct, and sharp.

One of the most difficult tests of the microscope known is the resolution of striæ of the diatom *Amphipleura pellucida*. Messrs. Harrison and Solitt, of Hull, England, claimed to have resolved the striæ of this plant about twenty years ago, and stated their fineness to be 130,000 to the inch. As no lines finer than 85,000 had been actually counted at that time, and were not for fifteen years later, all other microscopists agreed that there must have been some mistake. Messrs. Sulivant and Wormley, in this country, failed to see any striæ on the diatom with the best known English and American instruments.

Some writers have said that they had seen the striæ and they were only 40,000 to the inch; others stated that they had seen them, but gave no intelligible account of precisely what they saw. The writer failed to see anything satisfactory with a superior $\frac{1}{10}$ immersion objective, though he did see an appearance of lines. Dr. Woodward, by using blue sunlight, has settled all questions. He has fou that lines or striæ on different specimens vary fr 90,000 to 96,000 to the inch, and has photograph them with several objectives. Among these are o with Powell and Lealand's so called $\frac{1}{16}$ (nearl $\frac{1}{19}$) 960 diam., taken early the present year; anot with the same, 1,000 diam., taken in July; one by Powell and Lealand's (called) $\frac{1}{8}$; one with a Tolle $\frac{1}{15}$ (angle 135° only); two with two of Tolles's (one of them the same instrument the writer used and one with a Tolles's $\frac{1}{6}$. All these were "imm sion" objectives. All the pictures were taken as ne the same power, 1,000 diameters, as practicable, of them show the transverse striation well, but w varying degrees of distinctness. Then there are t positives on glass, taken with the same $\frac{1}{6}$, one of 9 diam., and the other only 256 diam. The striæ a invisible to the naked eye, but by using a l magnifier they can be seen sharp and clear. By known process other than photography, can su *evidence* of what the modern microscope can do produced. We have here permanently fixed, to seen by all, the very thing, so to speak, that t microscopist saw in his instrument, for what is se in the microscope is not the object on the stage b a picture formed and seen close to the eye. He are no mistakes of draughtsman or engraver, false lines or blots, no imagination, no theory to helped along, but a copy, perfect in every deta except color.

Dr. Woodward has from time to time published f accounts of his apparatus and process, so that a one can adopt and use the same. In his last pap of July 13th, he explains the simplest, most efficie and cheapest, and he states that any one can no make such microphotographs cheaper than they c obtain drawings and engravings.

MEMORANDA IN THE ARTS.

A NEW DIVING MACHINE. — The Naples corr spondent of a Prussian journal describes a new div ing machine for laying torpedoes, etc., under ship invented by a Venetian, named Toselli. It is calle *talpa marina* (the sea-mole), is made entirely of ir and bronze, and is in the shape of a cylinder, fo metres long and about eleven decimetres in diam ter. The machine is in four compartments, o above another. In the first is compressed air f the use of the diver; in the second, the diver hir self; in the third, an apparatus for lowering raising the machine in the water; and in the fourt a quantity of lead to keep the machine in a vertic position. A number of drills and other tools a also fitted into the surface of the machine, to enab the diver to perform various destructive operatio under water. Not long ago Signor Toselli d scended in his machine in the Bay of Naples, i the presence of several high naval officers. H sank to the bottom of the bay, a depth of sevent metres, and remained there for an hour. Durin this time he amused himself by writing a letter d scribing his sensations to Professor Palmieri, th director of the observatory on Mount Vesuvius. I this letter, which is dated "From the bottom of th Bay of Naples," Signor Toselli says that the elemen surrounding his machine does not look like wate but like a mass of transparent glass, compact, im movable, and transmitting sufficient light to enabl him to write and read. Countless fish were passin by in all directions. The stillness was almost pain ful; in other respects Signor Toselli felt quite wel and had a peculiar pleasure in the act of breathing The *talpa marina* will hold two persons comfortabl and a sufficient quantity of compressed air can b carried in it to enable them to remain under wate for fifty hours at a stretch.

SAFE STORAGE OF GUN-COTTON. — The Stow market catastrophe in England has drawn genera

attention to this matter. Fears have been expressed that the manufacture of gun-cotton might be dangerous, but it appears that when made by the Abel process so-called, there are no grounds for apprehension. By this process gun-cotton is kept in a wet condition, and remains, therefore, absolutely inexplosive and uninflammable throughout all the stages of manufacture. It is not until the gun-cotton comes to be dried and stored that any danger or possibility of explosion arises. On this point the teaching of the Stowmarket explosion is quite clear. No gun-cotton except that which was dry, or on the drying stoves, ignited; and the works now contain a quantity of the *damp* gun-cotton, which was in process of manufacture when the explosion occurred. This fact has led to the suggestion that the substance might be stored in the wet state, and dried only when required for use. In this respect gun-cotton has a decided advantage over gunpowder, and it is one which ought to be practically applied.

A New Partition Wall. — A new kind of wall is coming into use in England, the advantages claimed for which are the very important ones of non-absorbency of moisture, non-conduction of heat, economy of space, a washable surface, and, withal, cheapness. Over a framework of strong cross-wires, of about one eighth of an inch in thickness, there is woven a compact layer of fibrous matter, which is saturated with a solution that renders it fire-proof. It is then subjected to a very powerful pressure. A coating of light Scott's cement is then put upon it for inside facing, and of Portland cement for outside facing. By this means surfaces are made impermeable to moisture, smooth, and easily washed with water, thus saving the expense of repeated lime washings. It is formed into slabs in iron frames, which are put together and closely and securely fastened with bolts. The slabs are from one and a half inch to four inches thick. They serve as superior panelling for dividing walls and partitions. Where space is of importance, it has the advantage, perhaps, over concrete walling, in enabling a wall to be made of not more than one and a half inch or two inches in thickness, and yet its quality is said to greatly deaden sound.

Photographic Printing in Colors. — We learn from the *Philadelphia Photographer* that this is effected by mixing the colors with a solution of bichromate of potash, spreading the color thus mixed over the surface to be printed, and exposing it to light under the negative. The spots where the color is not fixed by the decomposition of the bichromate, may be washed off; of course as many negatives must be used as colors are intended to be used, and the parts which are not to receive any of a given color are to be carefully covered in the negative for that color. This process may be used on textile fabrics, glass, etc. The articles to receive the picture should be covered with a varnish of gum damar in benzine, to which a little alcohol has been added, to prevent cracking.

Economy in Steam Power. — A Boston correspondent of the *American Artisan* states that he is running a twenty-horse engine constantly with the heat obtained from the exhaust steam of another twenty-horse engine, thereby doubling the amount of power previously produced by the consumption of a pound of coal. The apparatus used consists of a tubular boiler, twenty-six inches in diameter and ten feet long, with sixty $1\frac{3}{4}$ inch iron tubes in it. This boiler is placed in an upright position and filled half full with bisulphide of carbon, and is heated by passing the exhaust steam through the tubes, from top to bottom. The steam is completely condensed in passing through; and the temperature of the water of condensation discharged at the bottom of the boiler does not exceed 120° Fahr. at any time. The latent heat of the steam is absorbed by the bisulphide of carbon, which is converted into vapor very rapidly under a pressure of fifty pounds to the inch. This vapor is used to drive the second engine, which does as much work as the first is doing. The bisulphide vapor after being used is condensed by passing through a coil of iron pipe immersed in water, and is pumped back into the bottom of the boiler as fast as condensed, and used continuously, the waste not exceeding half a gallon per day. Only forty gallons are required to work the engine successfully.

New Mode of Obtaining the Extract of Hops. — A Mr. Newton, in England, has patented a new method of extracting the useful substance of hops. The process is based upon his discovery that the light products of petroleum, naphtha, etc., are rapid and complete solvents of the essential oils and of the bitter principle of hops, while at the same time they have no solvent action on the other constituents of the plant, which are either useless or hurtful. The hops are simply steeped in the naphtha, under a moderate heat. The apparatus employed is similar to that used for bisulphide of carbon when employed for similar purposes. The lighter hydro-carbons, which boil at 100° Fahr., are preferable for this purpose.

A Hard Cement. — A foreign journal says that a French mason, in repairing the stone steps leading into a garden, used Portland cement mixed with finely divided filings and borings of cast and wrought iron, instead of sand; and that the mass has become so hard that it cannot be broken either with hammer or pickaxe.

PRACTICAL RECIPES.

Shoe Blacking without Acid. — From 3 to 4 lbs. of lamp-black and $\frac{1}{2}$ lb. of bone-black are well mixed with 5 lbs. of glycerine and treacle. Meanwhile, $2\frac{1}{2}$ oz. of gutta percha are cautiously fused in a copper or iron saucepan, and 10 oz. of olive oil added, with continual stirring, and afterwards 1 oz. of stearine. The warm mass is added to the former mixture, and then a solution of 5 oz. of gum senegal in $1\frac{1}{2}$ lbs. of water, and one drachm each of oil of rosemary and lavender may be added. For use, the blacking is diluted with three to four parts of water. This blacking keeps the leather soft, and tends to preserve it.

Bottle Wax. — The ingredients are shellac, two pounds; rosin, four pounds; Venice turpentine, two and a half pounds; red lead, one and a half pounds. Melt the shellac and rosin cautiously in a bright copper pan, over a clear charcoal fire. When melted add the turpentine, and lastly, mix in the red lead. Pour into moulds, or form sticks on a warm marble plate. The gloss may be produced by polishing the sticks with a rag until they are cold.

Fine Blue Ink. — Dissolve ten parts of yellow prussiate of potassa in 160 parts of pure distilled water; gradually and while stirring add to that solution a mixture of five parts of a solution of perchloride of iron (sp. gr. 1.480) and 160 parts of water. The ensuing precipitate is collected on a filter, and washed with distilled water until the water begins to assume a blue color, after which the precipitate, which will then have become completely soluble in distilled water, is to be dissolved in 400 parts of that liquid.

To Prevent Polished Materials from Rusting. — The following has been tested and approved by good authorities: Put half an ounce of solid paraffine into a wide-mouthed glass bottle, and let it melt in boiling water; then add one and a half ounces of petroleum; shake the mixture, after having corked the bottle, until it becomes a cold ointment. In using, cover the metal with it, and wipe off afterwards the greater portion, so that the polish will be little affected. A thin coat is sufficient to prevent polished metals from tarnishing.

Agriculture.

FARM PENCILLINGS AT LAKESIDE.

MILCH COWS.

The extreme sensitiveness of the mammary functions in cows to the influences of cold, fatigue, excitement, unpleasant odors, etc., is indeed surprising. We have been greatly interested in observing the effects of cold upon the milk secretion as seen in the herd of cows upon the farm.

During the past summer, in the hot days in July and August, the animals resorted to the Lake to drink, and after slaking their thirst, they would wade into the water and remain sometimes an hour or two with the legs half immersed. This habit it was found invariably diminished the flow of milk at night, and in order to learn the extent of the diminution careful observations were made. It was ascertained that standing in the water an hour diminished the flow to the amount of 8 or 10 quarts in a herd of thirteen cows. The loss was so great that whenever they resorted to the water they were driven away to the pasture again at once. We have learned that from simply turning the herd into the yard upon a cold day in winter, and allowing them to remain fifteen minutes, the flow of milk was diminished to a serious extent, and consequently the animals are not now allowed to leave the warm stable during the entire winter, except for a brief period upon warm, sunshiny days. Water is brought directly from a well into the barn, and the drinking vessels are arranged so that the animals have to move but a step or two to supply their wants. The nature of the water supply, and conveniences of access, are most important points in the management of milch cows. A draught of ice-cold water, taken by a cow in winter, cuts short the milk yield for the day from one to two pints. Well water drawn into vessels, and allowed to stand a few hours covered, in the warm barn, has its temperature raised several degrees, and this practice should be adopted by all thrifty farmers. It would undoubtedly pay well to slightly warm the water, but this is attended with considerable inconvenience where large herds are kept, unless steam apparatus is used. The influence of a cold current of air, and cold drinking water, upon cows in milk, is not of a transient nature; it extends for a longer period than a day or a week. Many fine animals are ruined by careless exposures every year, and self-interest and feelings of humanity should prompt all cow owners to keep diligent watch over their welfare and comfort.

Cows in milk are often greatly injured by rapid driving from pastures by heedless boys and unthinking men. They should never be urged faster than a walk. Gentleness and kindness of conduct towards cows have a wonderful influence upon the milk pail, and also upon the progeny of the animals. A bad tempered, irascible man ought never to be allowed in a cow stable. A man who will kick a cow in a passion, ought himself to be kicked into the barnyard, and forever prohibited from again coming in contact with the noble animal. The right person placed in charge of a herd of twenty cows, which have been badly managed, will in one month raise the lacteal products so that the increased cash returns will pay his wages. This

is a statement which has been verified more than once.

FEED FOR COWS IN SUMMER.

The past three excessively dry seasons have given much anxiety to farmers regarding the state of their pastures, and attention has been turned to the raising of green crops to keep up the flow of milk. Clover and corn have been the favorite crops, and much discussion has been had regarding them. The experiments made at the farm with fodder corn show that alone it is insufficient to keep cows in perfect condition. There is a stage in its growth embraced within a period of about four weeks when it is capable of *sustaining* a satisfactory flow of milk, but it does not *increase* it when cows are changed from fair pasturage and confined to the fodder. The grasses of the hills and the meadows are manifestly the most proper and natural food for milch cows, and the maize plant is not a perfect substitute. Cows taken from pastures that even are pinched by drought, will fall off in the milk supply, if they are fed solely upon corn fodder cut before the ear begins to form, or at any stage of its growth if it is sown broadcast. It is a great point, however, to have within reach green fodder that will in a fair measure *sustain* the milk secretion when the grasses fail, and corn is so cheaply and easily cultivated that it is upon the whole the most available of any of the green crops. Cows should not however be confined to it alone, but fresh hay or sweet millet or clover should be alternated with the feed. The sweet corn is the variety to be cultivated, and the soil upon which it is grown should not be a stiff, moist loam, but rather a light, warm silicious soil, as this is favorable to the formation of saccharine juices and the richer nutrient principles.

BUTTER.

Our esteemed contemporary, the *Boston Cultivator*, is quite positive that the statement made in the JOURNAL that 16 qts. of good milk is required to make a pound of butter, is incorrect. It is difficult making statements of much value regarding the butter yield of milk, since individual cows, and herds of cows, vary greatly in the quality of the secretion. In addition to our own observations, we have the experiments of Prof. Chandler of New York upon pure milk supplied to the hospitals of that city, which confirm the statements we made. He carefully examined a large number of specimens of country milk, and found that it would take from 12.1 to 15.4 wine quarts to make a pound of butter. Of this milk, we have no doubt, in butter-making upon any farm, it would take 16 qts., as all the butter is seldom obtained from the milk. Wine measure is the legal measure, and as a legal quart of milk does not weigh $2\frac{1}{2}$ lbs. or 2 lbs. 6 oz., it is evident the editor of the *Cultivator* estimates by an empirical standard, which accounts in part for the difference in statements. Very great stories are told by farmers and others regarding the quantity and quality of milk from certain cows, but we have learned to allow a wide margin for those statements; they do not usually bear a close investigation.

APPLE-TREES.

It was without reluctance or hesitation that we decided this autumn to dig up by the roots an orchard of thirty fine, thrifty, fourteen-year-old apple-trees. They were Baldwins, a variety of fruit abounding in all sections of the country. The only crop at the farm, the raising of which has been attended with loss, is the apple crop. Last year it was abundant, and from a careful record of cost in picking, assorting and conveying to market, cost of packages, etc., it was found that the cash returns did not meet expenses. Whenever a "bearing year" comes round apples are in excess of the demand, and must be sold at low prices; consequently the bearing years have come to be regarded with a kind of dread by apple raisers. These fruitful seasons, it is true, have not been very numerous during the past ten years, but those that have occurred have demonstrated the fact that apples do not pay for raising. Immense numbers of trees have been planted within the past twenty years, and among varieties the Baldwins largely preponderate. It is certain that good land is worth more for producing grass, or the cereal grains, than for apples; and hence, instead of planting more trees, some of our best and most sagacious cultivators are removing those already in bearing. Dr. Fisher, of Fitchburg, who had fine apple orchards, has now none, having removed the trees three years ago, and devoted the land to grapes and small fruits. The canker-worm is a pest so annoying and destructive to apple-trees, that if no other discouragement to cultivating apples existed, this would be quite sufficient. The labor of protecting trees is very great, and after all our care we are frequently disappointed in results. For a period of twelve or fifteen years this pest has prevailed in many sections of New England, and the ravages of the worm are dreadful to behold. What can be more disheartening than to see a fine orchard torn and consumed by the loathsome creatures? If the worm, however, spares one half the apple orchards in Massachusetts, and the crops are a fair average the next twenty years, enough fruit will be raised to meet all our wants.

PHOSPHORUS IN PLANTS.

THE wonderful substance (formerly so rare and costly), phosphorus, is so essential an ingredient in the food of plants, that not one of any kind can flourish without it. This highly combustible body, so offensive to taste and smell, and withal so poisonous, enters the plant in combination with oxygen, with which it forms phosphoric acid. The entire supply of phosphorus employed in the arts comes from plants, and they hunt it from the soil atom by atom, and incorporate it into their structures. Animals feeding upon plants abstract the element, and it takes its place in the bones in combination with lime, forming basic phosphate of lime. We gather the bones of the dead animals, and after calcination, subject them to chemical treatment, and thus isolate the phosphorus in a pure state in large quantities. How curious is this cycle of changes and transformations! We can in no way obtain a clearer conception of them than by reflecting upon the fact that the phosphorus found upon the end of every friction match we use in our dwellings has been gathered from the soil by vegetables, and passing through their organization, it has taken its place in the bones of oxen, cows, or horses, and from thence passed into the laboratory of the chemist, where it is fitted to subserve the most useful purposes. If this substance had a tongue, what an interesting history of adventures it could unfold!

The amount of phosphorus or phosphoric acid in the soil is usually insufficient to meet the wants of the plant, and hence the farmer must furnish supplies if he wishes to increase his crops. Formerly there were but two sources of supply, that from manure or animal excrement, and that from the bones of animals; but now we have a third source in the mineral coprolites, or phosphatic deposits, found upon the coast of South Carolina. From these substances what are popularly known as superphosphates are made and sold largely in the market.

The superphosphate of lime, true and simple as known to science, is a rather heavy whitish gray powder, without odor, having an acid taste. It is made from bones, by first calcining them and then dissolving the powder in oil of vitriol. In this method of manipulation we remove from bone phosphate of lime, two equivalents of lime, and replace them with water, and thus we have a superphosphate of lime. By a similar manipulation we can prepare superphosphate from the mineral rock masses before spoken of. The phosphatic deposits from Charleston, contain from 30 to 60 per cent. of phosphate of lime, and when powdered and properly treated with acid, they serve nearly as good purpose as bones, as a source of phosphoric acid. But if the powder is not acted upon by acid, it is almost wholly inert as a fertilizing agent. In this we see the importance of the faithful and skilful treatment of the substances by phosphate makers. Finely powdered bones serve a good purpose in the soil when used in the raw condition, as their structure is different from the coprolites. The gelatine they contain promotes decomposition, and aids in rendering the bony structure assimilable.

TO PREVENT MICE FROM GIRDLING TREES.

MR. E. C. HASERICK gives the following as his method of preventing mice from injuring trees in winter:—

A few years ago I saw it mentioned (I believe in the JOURNAL OF CHEMISTRY) that the way to prevent mice destroying young fruit trees in winter is to trample the first snow fallen around the trees. I found it worked well, but inconveniently, for you have to renew the process every winter, until the trees become large and the bark too hard for the mice to injure them. The philosophy of this method is, that the snow which rests on top of the grass and stubble, and arches thereon so that the mice have access to the trees, is trampled down close to the ground, so that the passage for the intruder is stopped.

To accomplish this result, and more conveniently and profitably, I take about one bushel of shore sand, or other clear sand, to a tree, and spread it about six inches high around each tree. With horse and cart, I fix a hundred trees in three hours. This method has several advantages over the snow-trampling process. First, the snow hugs close to the sand, and needs no trampling, as there is no grass around the tree, and the mice find no passage; and this is done in fair weather, without going out stormy days. Second, the sand is no fertilizer, and will do for several years, as no grass will grow upon it. Third, it will give the tree more vigor. While the grass before robbed the roots of their nourishment and moisture, the dews being evaporated by

the winds blowing through the standing grass, they are now, instead, absorbed by the sand, and easily carried by gravity to the hidden roots. Fourth, it will save all trees formerly destroyed by mice, which is in some years from 25 to 30 per cent. And we learn from the statement of a New York fruit tree dealer, that, according to his own business, he judges that New Hampshire imports no less than $100,000 worth of young trees yearly. This amount can easily be saved by this simple process; and as the season to do it is at hand, I cheerfully give it here for the benefit of my neighbors.

THE IMPORTANCE OF THE FARMER'S WORK.

THE following extract from Edward Everett's address before the New York State Agricultural Society, in 1857, is well worth reproducing:—

"Strike out of existence, at once, ten days' supply of eight or ten articles, such as Indian corn, wheat, rye, potatoes, rice, millet, the date, the banana, and the bread-fruit, with half-a-dozen others which serve as the forage of the domestic animals, and the human race would be extinct. The houses we inhabit, the monuments we erect, the trees we plant, stand in some cases for ages; but our own frames — the stout limbs, the skilful hands that build the houses, and set up the monuments, and plant the trees — have to be built up, re-created, every day; and this must be done from the fruits of the earth, gathered by agriculture. Everything else is luxury, convenience, comfort — food is indispensable. Then consider the bewildering extent of this daily demand and supply, which you will allow me to place before you in a somewhat coarse mechanical illustration. The human race is usually estimated at about one thousand millions of individuals. If the sustenance of a portion of these multitudinous millions is derived from other sources than agriculture, this circumstance is balanced by the fact that there is a great deal of agricultural produce raised in excess of the total demand for food. Let, then, the thoughtful husbandman who desires to form a just idea of the importance of his pursuit, reflect, when he gathers his little flock about him to partake the morning's meal, that one thousand millions of fellow-men have awakened from sleep that morning, craving their daily bread, with the same appetite which reigns at his family board; and that if, by a superior power, they could be gathered together at the same hour, for the same meal, they would fill both sides of five tables reaching all round the globe where it is broadest, seated side by side, and allowing 18 inches to each individual, and that these tables are to be renewed twice or thrice every day. Then let him consider that, in addition to the food of the human race, that of all the humble partakers of man's toil — the lower animals — is to be provided in like manner. These all wait upon agriculture, as the agent of that Providence which giveth them their meat in due season; and they probably consume in the aggregate an equal amount of produce; and, finally, let him add, in imagination, to this untold amount of daily food for man and beast, the various articles which are furnished, directly or indirectly, from the soil, for building material, furniture, clothing, and fuel. The grand total will illustrate the primary importance of agriculture, considered as the steward — the commissary — charged with supplying this almost inconceivable daily demand of the human race and the subject animals for their daily bread; a want so imperative and uncompromising, that death, in its most agonizing form, is the penalty of a failure in the supply."

THE first farmer was the first man, and all historic nobility rests on possession and use of land.

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, DECEMBER 1, 1871.

PUBLISHERS' NOTICE.

All correspondence relating to the business of the Journal, remittances, etc., must be addressed, "Boston Journal of Chemistry, 150 Congress Street, Boston, Mass."

All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

Mr. A. D. BLANCHARD *is no longer a Travelling Agent for the Journal. All money paid on Journal account should be sent directly to the office, 150 Congress Street.*

TO ADVERTISERS.

CHEMICAL ANALYSIS.

MERRIMACK RIVER WATER.

THE Merrimack River, which has its rise in the northern part of New Hampshire, and which flows through the eastern section of Massachusetts on its way to the ocean, is remarkable in several aspects, but more particularly for the immense amount of mechanical work performed by its waters in their descent to the coast. These waters are compelled to labor from the moment they start from the cool springs among the mountains of New Hampshire until they are joined to the salt water of the sea at Newburyport. The river and its tributaries probably turn more wheels than any other in the world, and the amount and variety of industrial products manufactured upon its banks are greater than are produced in any section of country of equal extent. The saw-mills, grist-mills, paper-mills, etc., on the small tributaries, are counted by hundreds, while on the river itself are the great manufacturing towns of Manchester, Hookset, Lowell, and Lawrence.

The waters flowing through or past such sources of contamination would naturally be supposed to become loaded with filth, and to be rendered wholly unsuited to any domestic uses. We have recently been employed to make chemical analysis of the river water at Haverhill, a city about eight miles below Lawrence, and consequently below all the large manufacturing establishments upon the stream, and the results are quite unexpected. Instead of finding a large amount of organic matter, it is actually less than is found in many streams flowing through the same region of country, upon which there are no manufacturing establishments. The results of two careful determinations gave precisely equal amounts of organic and inorganic constituents in the water. In the imperial gallon there was contained of

Organic matter	1.75 grains.
Inorganic "	1.75 "

The specimen of water was perfectly clear, and without special odor or taste. What becomes of the vast quantities of dye liquors, wool washings, soap and starch solutions, animal excrement, etc., which are poured into the river above? This is a question somewhat perplexing. At the present time, owing to the drought, the water in the river is low, but still the volume is not small. It is probable that the impurities thrown into the stream are precipitated upon the bottom, or lodged upon the rocks and shores, before proceeding far on their course, and they remain where they are deposited until the spring freshets occur, when the river-bed receives a thorough cleansing, and the sea swallows up the filth. A comparison of the Merrimack River waters with those of the English and Continental streams, upon which manufactories exist, gives the following results:—

	Total solids in 1,000,000 parts.	Organic.
Merrimack	60.	30.
Thames at London Bridge	408.4	100.
" " Chelsea	304.	34.
Clyde above Glasgow	116.1	26.1
Rhine at Strasburg	169.4	3.3
Penk near Wolverhampton	325.	68.6
Hawswater, Cumberland	57.	9.

It will be noticed that the amount of organic matter found in the Merrimack is exceeded only by three of the streams in the list, while the amount of solid matter is less than any, with one exception.

HARDENING COPPER.

MR. WENDELL PHILLIPS has so often delivered his lecture upon the "Lost Arts" in New England, that almost every one, young and old, is familiar with its statements. Many of these do not bear a very close examination and investigation, but still the lecture is an interesting one, and much more useful than the trashy performances of the fashionable lecturers of the day. Among the many arts and processes of the ancients which he considers as lost to the modern world is that of hardening copper so that it will form cutting instruments, and serve all the purposes to which steel is applied. Undoubtedly there is great exaggeration in the statements made regarding the hardening of copper by the Egyptians and Romans, but it is probable they did succeed in making some very useful implements from the metal. The art of hardening copper is not however a "lost art," for it is known that where phosphorus is combined with it, its physical character is so far changed that it becomes very hard. Berzelius succeeded in making a penknife blade of copper and phosphorus, so hard that it carried a fine cutting edge, and he used it for the purposes of an ordinary steel knife. But it is a curious and perhaps

instructive fact that this alloy is not stable, but easily oxidizes, and in a short time crumbles and falls into a powder.

It is quite probable the copper of the ancients was hardened in this way, although they were totally unacquainted with the element phosphorus. They might have learned that bones contained an element that gave to copper peculiar properties, and still have had no knowledge of the nature of the substance. They might have made a mixture of bone dust, charcoal, and copper, and this mixture exposed to the influence of heat would form the alloy desired. As zinc was a metal unknown to them, they may have employed a process analagous to this in making an alloy in some respects corresponding with our brass. Extended experiments have been made in modern times to form alloys of this nature, but we do not specially need them. Steel is much cheaper and better, and so long as we have an abundance of this compound of carbon and iron, we can appropriate our copper to other and more valuable uses. The ancients in their metallurgical operations as well as in all other labors, worked in the dark, and whilst they were fortunate enough to stumble upon some important processes, they were far from attaining to the perfection to which we have arrived. We work in the light of exact science, and our methods are the results of study and knowledge which have the advantage of mathematical exactness. If the ancients used phosphorus to harden copper, the rapid oxidation of the compound would account for the disappearance of every tool or implement of the kind.

PLANT FOOD.

Dr. Hoskins, the able editor of the *Vermont Farmer*, believes that sorrel has the power of decomposing feldspathic rocks through the agency of oxalic acid, which it holds as a constituent. The Doctor's industry in hunting up authorities to support his views is to be commended; but it is a hard point to prove that oxalic acid, in or out of connection with plants, will act upon "solid feldspar sand" and decompose it. If a plant elaborates oxalic acid, it is simply oxalic acid, and it must behave in the presence of other bodies as it does when produced from other sources. It does not matter from whence it comes, and inasmuch as "solid feldspar sand" is totally insoluble in oxalic acid, it cannot "dissolve out any potash to supply its wants." This is one point in our criticism in the November number of the Journal; the other was, that plants have not the power to prepare their own food. If this is not an axiom in vegetable chemistry, we must go back to the period when research began, and commence study on a new basis. The opposite view is contrary to analogy and facts, and the quotation from Prof. Johnson do not, when carefully considered, support such hypothesis. Liebig's statement regarding the action of rootlets upon limestone pebbles does not afford satisfactory proof that the decomposition results from the labors of the plant to secure food, since the same furrowing occurs upon iron aqueduct pipes when the roots of trees twine about them. The mere contact of vegetable substances, living or dead, with limestone, above ground or below, will, under certain conditions, serve to promote decomposition. This is seen in marble tombstones, old marble buildings, and in limestone boulders. The cryptogamic plants found upon our planet, and to the existence of which all life is due, are presumed to have originated from seeds or germinal principles, and so have the lichens which live and thrive upon bare rocks. Have the little germs the power of manufacturing their inorganic food from the refractory rocks to which they cling? No. How then do they secure their food? The answer is obvious. Every rock exposed to rains, air, and sunshine is constantly subjected to decomposing influences. There is a trace of nitric acid brought in contact with rocks by rain water, which probably results from decomposition of air by electrical agency; this acts upon rock surfaces. Water itself has solvent powers; carbonic acid, always present in air, is an active decomposing agent, and moreover, the fact is established that all rocks, however bare they may appear to be, have *indeed a thin covering of dust*, sufficient in amount to afford ample nourishment to the low forms of plant life. The Creator has provided forces whose especial work it is to prepare inorganic food, so that it can be taken up by water and carried into plant structures, but he has not conferred upon plants the capability of dissolving and preparing their own food.

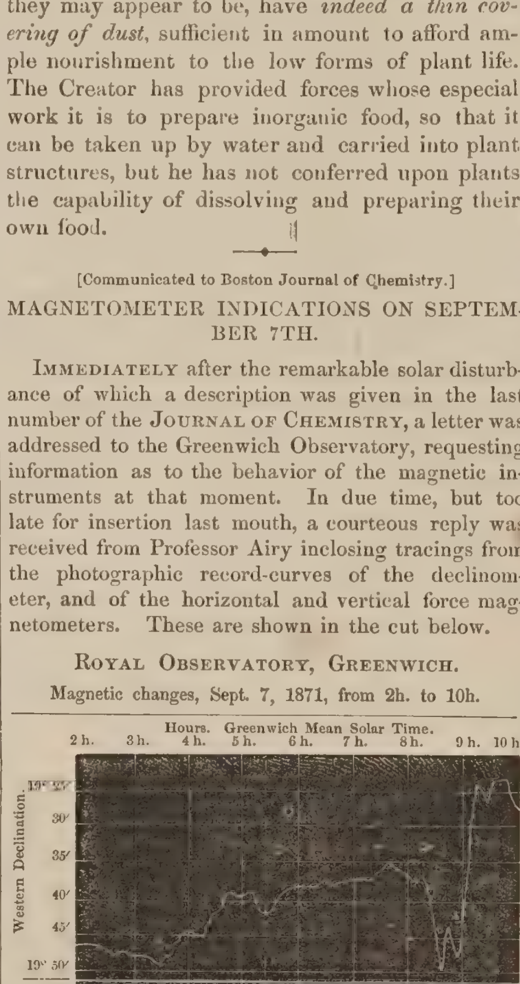
[Communicated to Boston Journal of Chemistry.]

MAGNETOMETER INDICATIONS ON SEPTEMBER 7TH.

Immediately after the remarkable solar disturbance of which a description was given in the last number of the Journal of Chemistry, a letter was addressed to the Greenwich Observatory, requesting information as to the behavior of the magnetic instruments at that moment. In due time, but too late for insertion last mouth, a courteous reply was received from Professor Airy inclosing tracings from the photographic record-curves of the declinometer, and of the horizontal and vertical force magnetometers. These are shown in the cut below.

Royal Observatory, Greenwich.

Magnetic changes, Sept. 7, 1871, from 2h. to 10h.



The vertical dotted line indicates the probable time of the explosion, 12h. 40m. Hanover Time.

Contrary to my expectation there was no specially marked disturbance of the magnets *simultaneous* with the "explosion" (if explosion it really was). It is not impossible that the small disturbances indicated on the first and second curves were really caused by it.

Professor Airy writes: "The day was one of magnetic disturbance, but it does not appear that any remarkable movement coincided with the beginning of your observation. There was a sudden movement nearly at the end."

About $2\frac{1}{2}$ hours after the "explosion" the magnetic storm began which developed into the beautiful Aurora of that evening.

It would seem accordingly either that considerable time is occupied in transmitting a magnetic perturbation from the sun to the earth; or else, what is perhaps more probable, that mere *mechanical* movements in the solar atmosphere, such as the phenomenon in question appears to have been, are less efficacious in disturbing our magnetometers than certain other actions which are less conspicuous.

While there can be no possible doubt that there is a close connection between the condition of the solar surface and magnetic disturbances on the earth, much further investigation will be required to elucidate the matter. C. A. Young.

Hanover, *Nov.* 14, 1871.

RAILWAY DUST.

A friend has sent us a copy of the Manchester (Eng.) *Guardian*, for October 8, 1871, in which we find a full report of the last meeting of the Manchester Literary and Philosophical Society. Among the papers read was one by Mr. J. Sidebotham on the microscopic examination of railway dust, which will, we think, be interesting to the readers of the Journal, and we therefore give the following abstract of it:—

While travelling by rail between Saltley and Camp Hill, I spread a paper on a seat of the carriage near the open window, and collected the dust that fell upon it. A rough examination of this with the two thirds power showed a large proportion of fragments of iron; and on applying a soft iron needle I found that many of them were highly magnetic. They were mostly long, thin, and straight, the largest being about $\frac{1}{150}$ of an inch, and, under the power used, had the appearance of a quantity of old nails. I then, with a magnet, separated the iron from the other particles. The weight altogether of the dust collected was 5.7 grains, and the proportion of those particles composed wholly or in part of iron was 2.9 grains, or more than one half. The iron thus separated consisted chiefly of fused particles of dross or burned iron, like "clinkers;" many were more or less spherical, like those from the flue of a furnace, but none so smooth; all were more or less covered with spikes and excrescences, some having long tails like the old "Prince Rupert's drops;" there were also many small angular particles like cast iron, having crystalline structure. The rest of the dust consisted largely of cinders, very bright angular fragments of glass or quartz, a few bits of yellow metal, opaque white and spherical bodies, grains of sand, a few bits of coal, etc. After the examination of this dust, I could easily understand why it had produced such irritation; the number of angular, pointed, and spiked pieces of iron, and the scoriæ or clinkers, being quite sufficient to account for the unpleasant effect. I think it probable that the magnetic strips of iron are laminæ from the rails and tires of the wheels, and the other iron particles portions of fused metal, either from the coal or from the furnace bars. The large proportion of iron found in the dust is probably owing to the metal being heavier than the ordinary dust, and accumulating in cuttings such as those between the two stations named. If I had to travel much by railway through that district, I should like to wear magnetic railway spectacles, and a magnetic respirator in dry weather.

EDITORIAL NOTES.

THE METEOROLOGY OF OCTOBER. — According to the report of Professor Loomis, of Yale College, the mean temperature of the month, at New Haven, was 53.3 degrees, which is 2.2 degrees above the average temperature of this month. The highest temperature of the month was 73.2 degrees on the 15th; the lowest was 28.5 degrees on the 21st. The range of the thermometer for the month was 44.7 degrees, which is a little less than the usual range. The first frost of the season occurred on the morning of September 21st, and the first ice occurred on the morning of October 21st.

The amount of rain for the month was 5.47 inches, which is nearly two inches more than the average fall. The amount of rain for the past twelve months has been 44.54 inches, which is exactly the average fall at New Haven deduced from observations of twenty-nine years.

DARWINISM. — An able article on this subject, from the pen of Mr. Chauncey Wright, of Cambridge, appeared in the *North American Review* for July, under the form of a review of Mivart's "Genesis of Species," the arguments of which were effectively answered. Mr. Darwin was so much pleased with the article that he obtained the permission of the publishers to reprint it in a pamphlet for distribution among men of science interested in the subject. The fact that Mr. Darwin appears to consider it the best reply that has yet been made to the opponents of his theory of evolution is likely to draw increased attention to the article in this country.

THE SEA SERPENT IN IRISH WATERS. — Our old friend, the sea serpent, has led a retired life for several years. Since he used to pay his occasional visits to Nahant, in the palmy days of that marine resort, we have heard no authentic news of him until within a month or two. The *Limerick Chronicle* informs us that he has now appeared on that side of the Atlantic, in the beautiful bay of Kilkee. A party of several ladies and gentlemen, one of whom, fortunately for the serpent, is "a well-known clergyman in the north of Ireland," saw an enormous head, shaped somewhat like that of a horse, emerge from the water. Behind the head and on the neck was a kind of chignon, or "huge mane of seaweed-looking hair, which rose and fell with the motion of the water." The *Chronicle* adds that "one lady nearly fainted at the sight, and all had their nerves considerably upset by the dreadful appearance of this extraordinary creature." The well-known clergyman, however, was equal to the occasion, for he minutely inspected the interesting monster, watching it, until after a few minutes the gigantic head ducked and disappeared beneath the waters. An English paper, commenting upon this Hibernian piece of intelligence, remarks that the serpent has probably "turned over a new leaf, and will in future make himself at home at various seaside places; nor can anything be more injudicious than to turn a cold shoulder upon him; or annoy him, on the other hand, by vulgar curiosity. He is evidently a most determined beast, of gigantic strength and stature, and it would be well, now that he shows a social tendency, to meet him respectfully but with self-possession. His appearance, it is true, is against him, but, for aught we know, his disposition may be good; and so far from there being any reason for ladies to faint away when he puts his head out of the water, there is, it is to be feared, far more reason to expect that the serpent himself will be overcome by faintness at some of the sights to be witnessed at many of the watering-places on our coast."

THE SCHOOLMASTER ABROAD IN ENGLAND. — The *Pall Mall Gazette* states that the following was one of the applications lately received by the Stafford School Board for the office of clerk: —

Septr 203, 1871

Sir i see in the Stafford paper a advertizement for a clerk to the school board I should be willing to Take the Sittuaction at 50 a year i am Not a Member of the Legal porfission i should be abel to Give all My time the Dutys of the office i Coud take to it at Once if I was Ellectd i have had a Good Eaducation this is my Own Handwriting i ham 305 years of age and I can have a Good Carachter I have Been employed on the Railway but I have left has I think i am Abel to take a Better Sittiation And i think the office would Suit Me very well plese let me no if i shall have to Come to stafford or wheather this will Be Suffischiant By Doing so yo will oblidge Sir Your most Obedient Servent, J—— J——

PHOTOGRAPHIC PROPERTIES OF COPPER SALTS. — In an article on this subject in the *Philadelphia Photographer*, Dr. Sellack announces an interesting discovery. He has found that the iodide and bromide of copper have the property of photographic development, like the salts of silver. "A plate of pure copper, iodized or bromized as in Daguerre's process and exposed in the camera, develops a picture in mercurial vapors. Also when the bromized or iodized copper plate is sufficiently exposed under a photographic negative, a picture is produced which can be fixed by hyposulphite. The sensitive copper plate, therefore, acts exactly like the Daguerrean plate. A process similar to the wet collodion process is impracticable with the salts of copper on account of their solubility in water." There is reason to believe, however, that these salts will prove more sensitive to the different colors than the silver salts, and the discovery may prove to have important bearings upon the photography of the future.

REMARKABLE STATEMENTS. — A popular journal after giving an item in regard to the sinking of the bottom of the Morris and Essex Canal near Broadway, New Jersey, comments on it as follows: —

"It is supposed that the lime in the limestone rock of which the ground under the canal in that region is composed, has been secretly burning for years by 'spontaneous combustion' and thus left an immense hollow underneath. The trickling of water through lime rock will set it on fire."

We have frequently heard of "burning limestone," but never suspected that it was liable to ignite from water contact. The information that water trickling through lime rock will set it on fire is certainly new. Water holding carbonic acid in solution will dissolve limestone, and in this way immense caves are formed. The Mammoth Cave of Kentucky is one of the best known and largest of these caverns, but every limestone region abounds in them. Occasionally the roof of a cave becomes too thin to bear the superincumbent earth, and a portion of it falls in, forming the well known "sink holes" of limestone regions. When one of these sink holes happens to be formed in the bed of a creek, the water of course runs into it, and if the cave has no outlet at a lower level, it forms a deep pond. But those caves almost always do have an outlet and the creek disappears, to appear again perhaps miles away. Instances of this kind are frequent through the limestone regions of the West.

A NEW WATER RAM. — If what is stated regarding a water ram, by a writer in the *American Agriculturalist*, is true, perpetual motion is certainly discovered. He says, "A No. 5 ram would, with a fall of three or four feet, use seven gallons of water per minute, elevating about half that quantity to a height of fifty or a hundred feet;" or, in other words, one gallon of water descending four feet would raise one gallon of water twenty-five feet. The very best water-wheels will not raise over 95 per cent. of the water to the same height from which it descended, and therefore we may be allowed to express doubts in regard to the above, especially as rams heretofore used utilize only about one half of the power developed by the fall of water. From 60 to 65 per cent. is the most that has ever been claimed for the best forms of the apparatus.

MICROPHOTOGRAPHY. — Apropos of this subject, on which Mr. Stodder has an interesting article in this number of the JOURNAL, the *British Journal of Photography* says that the process is becoming so perfect and so inexpensive that "we may soon have our daily paper of the size of a postage-stamp, and carry our favorite poets in our vest-buttons. We shall see 'a new edition of Macaulay complete in three shirt-studs,' or, 'the tiny edition of Dickens' complete in two sleeve-buttons. Every one will then carry a microscope as we now do a penknife."

ATOMS.

THE British War Department is about to appoint a committee of practical and scientific men to inquire into the manufacture and uses of gun-cotton and other explosive compounds, and their employment for artillery and in mining. — That curious work of ancient art, the "Bayeux tapestry," said to have been wrought by the hands of Matilda, queen of William the Conqueror, is to be reproduced for next year's International Exhibition at London, the reproduction to be half the size of the original, or large enough to show every thread and every mending; and a few copies will be printed of the full size (218 feet long by 19 inches wide) and colored in fac-simile. — A colossal bronze statue of Franklin, twelve feet and a half high, and standing on a pedestal fourteen feet high, is to be erected i. Printing House Square, New York; and the ceremony of unveiling will take place on the anniversary of Franklin's birthday, the 17th of January next. — A fine yacht was lately burned to the water's edge, off Montauk Point, Long Island, from the explosion of a pintle lamp filled with kerosene; in other words, another instance of "cheap naphtha used to adulterate or to substitute the more costly oil of safe character, and lives lost and property destroyed in order that some scoundrel could make five, ten, or twenty cents more on the gallon of illuminating liquid sold in his shop." — Speaking of kerosene, it has been proposed to invite the woman whose cow kicked over the lamp that kindled the Chicago fire to lecture on the danger of using cheap burning fluids, and she would undoubtedly "draw well." — The Collins steamer *Adriatic*, once renowned for her magnificent fittings and her high speed, after lying for some years in the Birkenhead docks opposite Liverpool, has been rigged as a ship, and has sailed from the Mersey for Rio Janeiro, with a cargo of 3,800 tons of coal. — Salmon from the Sacramento River, in California, are now sent eastward in large quantities, the fish being a drug in the home market. — At Spernberg, near Berlin, a deposit of rock salt was discovered, whose thickness, so far, has been found to exceed 2,962 feet, and whose horizontal extension seems to be equally great; and near Segeberg, in Holstein, another deposit has been discovered, which promises to be of similar magnitude. — A Philadelphia paper states that in that city there are eight thousand establishments in which persons are employed in productive or manufacturing industry, and the value of their products for the current year cannot be less than three hundred and fifty millions of dollars; and eighteen hundred of these factories are driven by steam-engines, whose aggregate power is that of fifty thousand horses. — The ivory keys to pianos or melodeons, when yellow, may be rendered white again by sponging them with diluted sulphurous acid and exposure to the sun. — An exchange says that "Some inconsiderate persons have recently developed a fine vein of coal near Corning, N. Y., a locality the geologists have repeatedly declared it

impossible for coal to exist in, and the indignant *savants* are contemplating an injunction." — According to *Dingler's Polytechnic Journal*, alcoholic solutions of perchloride of iron are not precipitated by carbonate of lime, and may therefore be applied to white marble for the purpose of imparting to it a yellow color; the depth of the color will depend on the degree of concentration given to the solution. — Everybody remembers Coleridge's epigram, in which he asks "what power divine" will suffice to "wash the river Rhine" after that stream has washed the unfragrant city of Cologne; and this very question seems now to be agitated, for sanitary reasons, by those who have to use the water, which has become so contaminated with sewage that measures must be taken for its purification. — The fact that horses and other animals with broken limbs do not appear to lose their appetites, has led some scientific men to raise the question whether these creatures suffer as much under the circumstances as men do; for a man could not sit quietly down to dinner just after breaking his leg. — *The American Builder*, though utterly burned out by the Chicago fire, issues its November number only a few days late, and in the same excellent style as usual, except that it has no engravings; and it promises its patrons that its next number shall be fully up to its established reputation in every respect. — The *New York Times* devotes more than a column to a review of Rolfe's editions of *The Merchant of Venice* and *The Tempest*, in the course of which it remarks that "the work has been done so well that it could hardly have been done better," and that "it shows throughout knowledge, taste, discriminating judgment, and what is rarer and of yet higher value, a sympathetic appreciation of the poet's moods and purposes." — The postal telegraph system appears to be working very successfully in Great Britain.

RESONANCE. — The experiment on *resonance* mentioned in the JOURNAL OF CHEMISTRY for March, can be very prettily made by connecting two glass jars containing water by means of a short flexible tube acting as a siphon. If one of the jars be raised or lowered, the water will rise or fall in the other jar, and the length of the column of air which gives the loudest note when the vibrating fork is held over it can be marked by pasting a slip of paper on the jar. If a few drops of red ink be put in the water, the rise and fall of the note corresponding to the length of the column of air may be made perceptible to a large class. If one of the jars be set on a stand and the other held in the hand of the experimenter, it requires but one person to make the experiment. H. T.

GREENE SPRINGS, ALA.

LITERARY NOTES.

A NEW issue in Mr. Baird's excellent series of works on industrial science is *The Manufacture of Russian Sheet Iron*, by John Percy, M. D., F. R. S., with Illustrations and an Appendix on American Sheet Iron. This little book, which is sold for fifty cents, is prepared by one who is an authority on all matters relating to metallurgy, and it has a special interest as treating of a subject which has long been a great mystery.

The Harpers have reprinted M. Reclus's *The Earth*, with all the maps and illustrations, at half the price for which the English edition has been selling quite largely in this country. They have published many popular scientific books, but no one on the list can take a higher rank than this. The author, as the London *Examiner* remarks, "drawing useful and instructive information from the great scientific writers of every age and every country, has endeavored to place before his readers a full and complete account of the globe which we inhabit, of its past history, its present condition, and its probable future; and he has succeeded admirably."

The "Student's Series" of historical manuals, published by the same house, is true to its name, being precisely adapted to the wants of the student in school or college. The *Student's Ancient History of the East*, just issued, is a welcome addition to the list. An abridgment of *Hallam's Middle Ages* is announced as soon to follow.

Henry the Eighth, with notes and illustrations, the third of Mr. Rolfe's series of select plays of Shakespeare, will be published in a few weeks.

Medicine.

☞ *In admitting to our columns communications from respectable sources, we must not be considered as endorsing the views or statements of the articles.*

MEDICAL PHILOSOPHY.

UNDER the above heading in the November number of your excellent journal appeared an article which may be embodied in the following propositions:

1. The regular profession has no comprehensive system of medical philosophy.

2. In the human organism there is no provision for the elimination of mineral substances foreign to it.

3. Therefore we should administer such mineral substances, and such only, as enter into the composition of the body.

In reply: 1. We certainly have a "comprehensive" but not a sweeping medical philosophy, and may the kindly shades of the God and of the Father of Medicine ever preserve us from the latter!

We have theories of healthy and diseased functions; theories for the genesis of the various diseases; theories for the "action of medicines;" line upon line and precept upon precept; indeed our works on physiology, pathology, practice, and materia medica are built on a well digested and comprehensive medical philosophy. Virchow, Paget, Headland, Wood, and numerous others fully vindicate our claim to such a philosophy.

2. There is — in the human organism — provision for the elimination of mineral substances foreign to it. Thus mercury passes out by the "liver, salivary glands, and skin;" zinc by the kidneys and liver; the mineral acids are variously eliminated; some salts pass out by the kidneys, others by the bowels, producing, respectively, diuresis and catharsis. "All those medicines must be secreted which have nothing in the natural blood to correspond to them." (Headland on the Action of Medicines, page 310.)

3. Experience (the one and only lamp by which our feet should be guided) disproves the truth of this dogma, which is evidently founded on the erroneous postulate that we invariably exhibit medicines for the purpose of correcting a deficiency of the normal tissue ingredients. Many of the diseases we have to contend with are functional and not organic; there is neither deficiency nor redundance, only deranged action of tissue elements. The homœopath reels under his burden of "similia similibus;" the allopath finds difficult sailing with his "contraria contrariis;" shall we, too, abandon our old and faithful monitor, experience?

WALLACE A. BRIGGS, M. D.

GENEVA, OHIO.

THE HOSPITAL AND MEDICAL SCHOOL OF VIENNA.

THE *American Practitioner* for October contains an interesting account of the Vienna Hospital and School, from the pen of Dr. Melvin Rhorer. It appears that the number of American students in Vienna is rapidly increasing; it being sixty at present, or more than fourfold what it was two years ago. This is not owing so much to the interruption of medical teaching in Paris on account of the war, as to the fact that French medicine seems to be declining, and even if there had been no war the other European universities would have drawn many foreigners away from the French capital.

Dr. Rhorer advises the student to get his elementary instruction at home. Our modes of teaching are, in his judgment, superior, or at least better adapted to our wants — to say nothing of the fact that seven years would be required for the purpose by the Vienna *curriculum*. It is for clinical instruction that the student goes thither, and nowhere can he find greater advantages in that department. In London and Paris the student is bewildered with a dozen hospitals and schools; and clinics are held at so nearly the same hour, and at places so far apart, that it is almost impossible to attend more than one or two during the same day. In Vienna, on the other hand, everything is centralized in the Imperial Hospital; and one may work from sunrise to sunset without loss of time.

The hospital was founded in 1787 by the Emperor Francis Joseph II., and covers an area of ten acres or more. It is two and a half stories high, with walls of brick, rough cast, and windows and doors of the plainest pattern. An arched gateway leads into the large court, containing about three acres, tastefully laid out with shade-trees, flowers, walks, and fountains. There are eight other courts connected with this, and at the end of the last court stands the pathological institute, which was erected by Rokitansky in 1859. This contains the dead-house, the lecture-room for chemistry and materia medica, and the various operating-rooms. To the right of this, on a hill, stands the building for the insane, which is a large round tower with narrow windows, and shut off from the rest of the world by a moat. The wards of the hospital are constructed in the simplest manner; scrupulously clean, but with no attempt whatever at embellishment. Their number is one hundred and ten, and they contain twenty-five hundred beds. There are also thirty clinical amphitheatres, the apartments for the various officers, and a chapel. "There are seemingly no modern conveniences about the hospital. The heating is done by stoves, and the water taken to the wards by the convalescents from the fountains in the courts."

The diet of the hospital and also the medicines used are supplied entirely by contract. About thirty cents per day is the cost of maintaining a patient in the public wards; but there also are private wards of various classes for those who can afford to pay more. An inhabitant of Vienna pays twenty cents per diem, a foreigner double that amount.

About twenty thousand patients are admitted annually, besides those in the lying-in wards. From eight to ten thousand children are born in the hospital during the year, about fifty per cent. of whom die in infancy. Those that live, and are not claimed by their parents, are either put into the army or assigned to other government work.

Of the teaching force, and the facilities for instruction, Dr. Rhorer says: —

"The faculty of medicine in the University of Vienna, although it has recently lost in Skoda and Oppholzer two of its greatest lights, is still filled generally by men of world-wide reputation. In fact, only from such men has the choice been originally made. There is no such thing as promotion by seniority, and a Viennese reputation alone is by no means sufficient. Bilroth made his name at Zurich, and was called here from Berlin. In most of the departments there are two separate chairs for each branch. Each professor has lectures in a different amphitheatre, and issues his own tickets, which students take or not as they wish. Of course the most popular teachers have the largest classes. Bilroth and Dumreicher are the surgeons Braun and Spät the obstetricians and gynæcologists, while

Hebra and Neuman hold the chairs of dermatology. Sigmund and Zeisel lecture on syphilis, Jäeger on the eye, and Rokitansky on pathological anatomy. The teaching by this brilliant array of professors is wholly clinical. The cases for illustration are seemingly without number. The greatest difficulty with the foreign student lies in the lectures being given in a strange tongue. If he has come unacquainted with the German, several months will necessarily be consumed in acquiring a sufficient familiarity with the language to follow the courses. . . .

Excellent as is the faculty and splendid the clinics, it is from the assistants that the most practical lessons are obtained. They teach everything. The bulletin-board at the University gate is crowded with the announcements of their courses — on the eye, the chest, the ear, on stricture, electro-therapy, minor and operative surgery, operative midwifery, etc."

SMALL-POX.

This loathsome disease made its appearance in several of our cities and large towns during the past summer, and many cases, both of confluent small-pox and of varioloid, were reported. In the city of Lowell it raged for several months, and many deaths occurred from it. A strange feeling has been engendered in England, and to some extent in this country, against vaccination, which is a most unjust and absurd prejudice. It is born of ignorance and vulgar conceit, and where it exists, small-pox will exist. The authorities in all cases should insist upon thorough vaccination in communities where the disease prevails. The following instructions for controlling small-pox contagion, enforced at Lowell, proved effective in arresting the spread of the disease : —

ISOLATION.

1. Persons attacked with small-pox or varioloid, and all infected clothing of the same, must be immediately separated from all other persons liable to contract or communicate the disease.

2. Nurses and the infected clothing of such persons must be treated as in quarantine.

3. None but nurses, and the attending physicians, will be allowed access to persons sick with small-pox or varioloid.

4. Patients must not leave the premises until they, together with the bedding and clothing, have been disinfected, and permission given by some physician of the Board of Health.

DISINFECTION.

1. All bedding and personal clothing infected with the small-pox contagion, which can, without injury, must be washed in boiling water.

2. Infected feather-beds, pillows, and hair mattresses must have contents taken out and thoroughly fumigated, and ticks washed in boiling water.

3. Infected straw and excelsior mattresses must have contents removed and buried, and ticks washed in boiling water.

4. Infected blankets, sheets, and pillow-cases, and all articles in contact with, or used by the patient, must be washed in boiling water.

5. Personal clothing and bedding, particularly comforters, which cannot be wet without injury, must be disinfected by baking or by fumigation.

6. Instead of using boiling water as the disinfectant, the following chemical process with cold water may sometimes be conveniently substituted : Dissolve in a wash-tub, containing eight gallons of cold water, one pound of the hyposulphite of soda, immerse all the articles of clothing and bedding used by or around the patient, and when thoroughly saturated add half a pint of sulphuric acid, first diluting it with one gallon of water; stir the whole and allow the clothes to soak an hour, then wring them out, rinse three times in cold water, and hang out to dry.

7. Disinfection of houses, clothing, and bedding by fumigation may be effected by filling the closed rooms with the fumes of sulphurous acid, or of chlorine gas. The first can be accomplished by putting half a pound of sulphur in an iron dish, pouring on a little alchohol and igniting it, thereby causing the sulphur to burn and give off sulphurous acid fumes. The second can be accomplished by moistening with water four pounds of chloride of lime, contained in an earthen or wooden vessel, and adding thereto a pint of muriatic acid, to liberate the chlorine gas. Clothing and bedding, to be well fumigated, must be separated as much as possible, and hung upon the walls and furniture of the room, so that everything will be thoroughly permeated. The rooms should be kept closed an hour or two after being charged with gas by either method, and then thoroughly ventilated. No attempt should be made to fumigate the sick-room in this manner, while it is occupied by the patient.

8. On the recovery, removal, or death of every case of small-pox or varioloid, the clothing, bedding, and premises will be disinfected, in accordance with the above rules, under the direction of one or more physicians employed for the purpose by the Board of Health

9. The physicians employed in disinfecting may cause the removal, destruction, or burial of such infected bedding and clothing as may, in their judgment, seem to require it, of which they shall keep a correct record, with date, kind of article, whether new or old, estimated value, name and residence of the owner. No person shall burn any contagioned articles unless authorized by the Board of Health.

10. The sick-room should be kept well ventilated, with such precautions as not to expose the patient to direct currents of air, and should be occasionally fumigated, slightly, by throwing upon a heated surface a few teaspoonfuls of a *solution of carbolic acid*, made by dissolving one ounce of crystallized carbolic acid in a quart of rain water. Pieces of cloth may be soaked in this solution, and suspended in the room, also in the hall-ways adjoining. All vessels for receiving discharges of any kind from patients, must be emptied immediately after use, and cleansed with boiling water. When convalescence has taken place, the patient must be thoroughly washed in warm water and soap, and put on fresh, clean clothes throughout.

11. Privies, water-closets, garbage-tubs, water-pipes, and all kinds of drains and foul places in houses, stables, and yards, may be disinfected with a solution made as follows : Dissolve eight pounds of copperas (sulphate of iron) in five gallons of water, add one quart of the solution of carbolic acid, and mix well.

12. It should be remembered that there are no substitutes for pure air and water. Let fresh air and sunlight purify every place they can reach; open and dry all cellars; keep the grounds about dwellings dry and clean, and let personal and domestic cleanliness be everywhere observed.

Vaccination, and re-vaccination, is of paramount importance, affording the best attainable protection against small-pox, and mitigating its severity when not preventing an attack.

LACTO-PHOSPHATE OF LIME.

We are indebted to Prof. B. W. McCready for the following note on the lacto-phosphate of lime : —

There are strong grounds for the belief that, besides being a necessary ingredient of the hard parts of vertebrated animals, the phosphate of lime is intimately connected with the process of cell-formation. According to Lehmann, it is found in appreciable quantity wherever cells or fibres are formed, even in those inferior animals in the hard parts of which the phosphate is replaced by the carbonate of lime; it is more abundant in the plastic secretions from wounds than in the serum of the blood; it is less abundant in the venous blood derived from parts, as the muscles, in which the metamorphosis of tissue is greatest, than in that coming from parts of inferior vital activity.

The phosphate of lime has been recommended in various forms of imperfect or depraved nutrition, particularly in cases of rickets; and the experiments of Milne Edwards seem to show that, under its use, fractured bones in dogs and rabbits show a quicker and more abundant formation of callus. It however has never obtained the general confidence of the profession. In a series of articles in the *Archives Générales de Médecine*, for December, 1869, and for January and February, 1870, Dr. L. Dusart reviews the whole subject, and, attributing the unsatisfactory results heretofore obtained to the great insolubility of the ordinary phosphate, recommends the use of a new preparation, which he terms the lacto-phosphate of lime, in which the lime-salt is dissolved in free lactic acid.

M. Dusart finds — 1. That the lacto-phosphate of lime injected through a fistulous opening into the stomach of a dog, during digestion, is not precipitated by the contents of the stomach, but remains dissolved in the chyme.

2. That in comparative experiments made on guinea-pigs, in which the bones of one of the extremities were fractured, that in the animals submitted to the action of the lacto-phosphated lime, the callus was more voluminous, and the consolidation of the bone more perfect, than in those submitted to a similar regimen, with the exception of the lime-salt.

3. In four cases of tardy union of bone observed in the Hôpital Beaujon, the administration of the lacto-phosphate was attended with marked improvement of the fractured part; in three of the patients, the appetite was at the same time greatly increased.

4. In a number of cases of rachitis, the influence of the lacto-phosphate was well-marked, the children rapidly improving under its administration, the appetite at the same time being greatly increased.

5. Several cases of diarrhœa and indigestion, after resisting other treatment, quickly yielded to the influence of the lacto-phosphate.

At my request, Mr. W. Neergaard, pharmaceutist, prepared for me, in June last, a syrup, by dissolving recently-precipitated phosphate of lime in concentrated lactic acid, and then adding a convenient amount of syrup. I have found it useful —

1. In cases of defective nutrition, with or without diarrhœa, but without any acute disease of the alimentary canal, particularly when these conditions have occurred in prematurely weaned children.

2. In rachitis.

3. In atonic dyspepsia. In most of these cases, not only were the digestive power and nutrition of the patient greatly improved, but the appetite for food was augmented, sometimes to an extraordinary degree. Dr. William A. Hammond has found it of very great value in cases of nervous derangement, attended with impaired nutrition; and Dr. Barstow, of Sandford Hall, has used it largely in similar cases. It is very probable that the free lactic acid may, in many instances, contribute greatly to the efficiency of the preparation.

In forming the syrup of the lacto-phosphate, Mr. Neergaard obtains the phosphate of lime, according to the United States Pharmacopœia, by acting on bone earth with muriatic acid, and precipitating the dissolved phosphate with ammonia. He saturates an ounce of concentrated lactic acid with the recent precipitate, and to the clear solution he adds six

ounces and a half of water, an ounce and a half of orange-flower water, and twelve ounces of sugar. Prepared in this manner, the syrup will contain from fifteen to twenty grains of phosphate of lime to the ounce. The variation in strength is caused by the want of uniformity in the strength of the lactic acid; that furnished by the best manufacturer — Merck, of Darmstadt — varying considerably in its degrees of concentration. The dose for a young child is one to two drachms three or four times a day, while an adult may take a tablespoonful frequently. The taste is pleasantly acid, and the syrup is not apt to disagree even with delicate stomachs. — *N. Y. Med. Jour.*

Note.— Messrs. J. R. Nichols & Co., chemists, prepare the syrup of the lacto-phosphate of lime of standard strength, and physicians and dealers can procure it of them.

MEDICAL MEMORANDA.

The Physician's Office. — The following is an extract from Professor McGraw's address to the last graduating class, at the Detroit Medical College: "I have been in doctors' offices where a skull grinned from one corner, ghastly anatomical plates hung from the walls, and splints, suggestive of broken bones, were placed conspicuously in every corner. What a delightful resting-place for a sick woman,— visions of death, disease, and injury greeting her on every side! Now, gentlemen, make your offices pictures of comfort and cheerfulness. Banish from them every sign of your professional occupation, so that your patients may enter them not only without disgust, but with actual elevation of heart. I think I need hardly say that your apartments should be scrupulously clean, although I can recollect too many rooms, occupied by physicians, whose windows were festooned with cobwebs and dried flies, and whose floors were stained with tobacco spit. I have been pleased sometimes to hear the occupants of such offices groan about the lack of custom, for if it is the duty of a physician to preach the virtue of cleanliness, he should himself be a living example of his own doctrine. Filthiness in a physician is like dishonesty in a merchant, the very worst of sins."

Humbug in Holy Garb. — The *Scientific Press*, of San Francisco, says: "A certain 'Reverend' advertises to send free, out of pure kindness, a valuable receipt for the cure of consumption, to all who forward to his address a postage stamp. This looks fair, but the readers of a thousand journals wonder how he can afford to pay, year after year, for so many advertisements. The mystery is unravelled when a cunning circular is returned with the receipt, saying the only safety in procuring the wonderful South American remedy is by sending $3.50 to the 'grateful' scoundrel 'snatched from the borders of the grave' who employs the title of Rev. to steal more successfully from 'gulls' who are silly enough to notice advertisements that promise to give 'something for nothing.' This is our answer to those who wish to make our advertising columns accessory to their despicable schemes."

The *London Medical Press* gives the following as a prescription for the "cure of consumption," coming from a clergyman in the West of England, reputed of great skill in diseases of the chest: "Isinglass, 1 oz.; eringo root, 1 oz.; garden snails, ½ pint; hartshorn shavings, ½ oz.; three dried vipers from Butler's, Covent Garden; 1½ pints water. Boil down to a pint."

The Spoon in Prescriptions. — A writer in the Canadian *Pharmaceutical Journal*, who appears to have investigated the subject very carefully, says that teaspoons have been gradually growing larger of late years, the spoon of the last century having been only about two thirds of the size of that in common use. He adds, however, that three sizes are made at the present time — large, medium, and small, containing 95, 85, and 60 minims respectively. Table-spoons also are larger, and vary from 4.5 to 6 fluid drachms in capacity. He infers that the dose of certain articles may be unsafe, if a teaspoonful or a tablespoonful be ordered, and proposes to abolish the dessert-spoon as a measure, substituting two teaspoonfuls. An exchange commenting on the article, says: "It is rarely, we apprehend, that more than a drachm is administered as a teaspoonful, or more than half an ounce as a tablespoonful. On the contrary, nine times in ten, an ounce mixture, when ordered in teaspoon doses, will afford more than eight doses, and an eight ounce mixture more than sixteen tablespoonfuls. Nurses seldom fill the spoon to its utmost capacity."

Patent Medicines in Russia. — A correspondent of the London *Chemist and Druggist* gives the regulations concerning the importation of patent and secret medicines established by the Russian Government. They are as follows: —

1. A petition has to be written on a (one rouble) stamped paper, to be sent free to the Manufacture and Foreign Commercial Department of the Finance Ministry (not to the Medical Department).

2. The exact composition of the remedy must be stated.

3. Only those remedies can be approved of by the Medical Council which have been examined and found useful by a foreign medical faculty, or any other scientific institution of equal standing.

4. The remedy should be so constituted that a long journey or time should not interfere with its properties.

5. It should not contain a decidedly poisonous substance.

6. Besides these regulations, it must require either difficultly obtainable apparatus and instruments for its preparation, or particular manipulation obtained only by long experience.

7. In reference to advertising it in the daily papers, leave has to be obtained from the newspaper censor.

8. All the cost of carriage, and other expenses connected with the remedy must be defrayed by the sender.

A Good Joke. — A capital burlesque appeared some time ago in the *Philadelphia Medical Times* under the title of "Microscopic Test-Objects," and some of the British medical journals have in all soberness taken it for granted that the American editor was the victim of a trick played upon him by some wag of a contributor. They actually plume themselves on detecting the "little game." One of them says that the article professes to be written "by a Dr. Neulenx, whose very name might have excited the editor's suspicions!" John Bull is proverbially slow to see a joke, but our readers will hardly believe that he could be blind to it in this instance, when we give an extract from the article in question. The following is one quoted by the astute critics over the water "as a fair sample of the whole:" —

"Having constructed a one-seventieth immersion objective on a new principle, having 191° aperture — the immersion liquid being fluoric acid — and, for illumination, having invented a new eccentric parallelopiped, to be used with fluorescent rays exclusively, some remarkable results have been obtained. I take great pleasure in stating that, with regard to test-objects, all previous observers have been totally wrong in every particular, and that *Pleurosigma angulatum* is, in the first place, constructed on the plan of the Nicholson pavement, and, in the second place, that it is not a pleurosigma at all. The most certain test-object is the *Neulensia difficilissima*, a very rare and remarkable diatom, in which my one-seventieth with the parallelopiped shows four kinds of beads and six sets of cross-lines, one of which se contains 147,229,073 lines to the inch: hence, l the well-known formula of Brewster, $\frac{dx}{du} = \surd \frac{\ }{o.x.p.}$ it is impossible that the undulations of light shoul pass without being previously deflagrated, an therefore no other lens can possibly show these line nor is it probable that this lens would with an other observer. The immense superiority of th test to Nobert's plate is apparent."

This, moreover, is not the first instance of th kind. A year or more ago, the *Boston Medical an Surgical Journal* published a burlesque article, b "A Surgeon in the United States Army," upon th medical value of the "ichthyocolla preparata Spa dingii" (in plain English, "Spalding's Prepare Glue"), which was seriously reviewed by the *Lo don Medical Press and Circular*, the critic sagel remarking that there are "far too many such prep arations in the American practice of medicine."

VALUABLE FORMULÆ.

To Administer Creosote. — As creos te i now frequently employed in the treatment of typhoi fever, and is exceedingly distasteful to some patients the *Canada Medical Journal* gives the followin formula which in great measure covers its flavor and is easily prepared: —

Creosote	3 drops;
Essence of lemon	2 drops;
Orange-flower water	1 ounce;
Spring water	3 ounces.

A spoonful to be taken at frequent interval throughout the day.

Cholera Pills. — A writer in *El Pabellon Medico* maintains that opium is as successful in cholera as quinine is in ague, and that it should be given in doses proportioned to the gravity of the case. He therefore has recourse to full doses of opium frequently repeated.

The following formula for cholera pills is that of M. Bourgone: —

Tannate of quinia	1 gramme;
Powdered opium	5 centigrs.;
Essence of aniseed	2 drops;
Simple syrup, to make	10 pills;

which may be taken in the course of one or two hours.

Salve for Chapped Lips and Hands. — Take two ounces of white wax, one ounce of spermaceti, four ounces of oil of almonds, two ounces of honey, quarter of an ounce of essence of bergamot, or any other scent. Melt the wax and spermaceti; then add the honey, and melt all together, and when hot, add the almond oil by degrees, stirring it till cold.

Tobacco in Certain Nerve-Diseases. — The *Doctor* says that M. Tamisier, in a recent French journal, states that, out of fifty-nine grave affections of the nerve-centres observed from 1860 to 1869 among men, forty occurred in smokers. In fifteen cases of hemiplegia, nine abused tobacco, and two used it moderately; four did not smoke. Of eighteen cases of paraplegia, five were great smokers, three moderate smokers, and ten abstained from tobacco. Out of twenty cases of locomotor ataxia, fourteen were great smokers, five moderate, and one abstainer.

Cincho-Quinine Pills.— The numerous requests from physicians in various parts of the country that cincho-quinine should be supplied in pill form, have led to their manufacture, and pills of 1, 2, and 3 grains each, elegantly sugar coated, can now be supplied in any quantity by the trade. They are packed in vials holding one hundred each, and the price is a little more than one half that of quinine pills, of corresponding sizes. The dose is the same.

Boston Journal of Chemistry.

VOLUME VI. BOSTON, JANUARY, 1872. NUMBER 7.

Familiar Science.

[Communicated to Boston Journal of Chemistry.]

ENCKE'S COMET.

BY PROF. C. A. YOUNG, OF DARTMOUTH COLLEGE.

THIS comet, now in its most favorable position 'or observation, and faintly visible even by the ıaked eye in the early evening, derives its name from the distinguished astronomer who first, in .819, determined its orbit, and afterwards through ıis whole life expended great labor upon the ınvestigation of its motions.

In itself a very insignificant object, it derives ts interest mainly from the fact that its average listance from the sun, and of course its period ılso, is less than that of any other comet. It completes its course in a little less than three years and four months; at aphelion receding to ı distance of nearly 380 millions of miles from he sun, a distance as great as that of the remoter asteroids, while at perihelion it approaches within 31 millions of miles, or nearer than the planet Mercury.

Another circumstance has added to its celebrity. Since its first discovery there has been noticed a gradual shortening of its periods, which, according to the calculations of Encke, cannot be accounted for by any known action of the planets. He inferred, therefore, and maintained with great ability, the existence of a *resisting medium* filling the interplanetary spaces.

This conclusion, however, is by no means acquiesced in by all astronomers, because the other comets as yet show nothing similar, and it is thought quite possible that a new computation from the more accurate modern observations of the last five or six returns might show the presumed acceleration to be due to the disturbance of the planets, or even to a collision with some flock of such meteors as cause our November star showers. The question cannot be settled without a re-investigation of the whole matter. This would be exceedingly laborious, and thus far no one seems to have inherited Encke's paternal interest in the "little stranger."

As seen in the telescope at present, it is a rounded mass of nebulous matter some 5′ in diameter, with no definite outline and without a distinct nucleus, although it is considerably brighter in the centre. Last evening (Dec. 5) I detected for the first time a tail about half a degree in length.

The diameter of the comet is between 40,000 and 50,000 miles, and yet so transparent is it that when on Dec. 1st at 6.04 P. M. (Hanover time) it passed centrally over a little star of the 9th magnitude it did not in the least dim the star's brightness. For a minute or two, even with a power of 200, it looked as if it had simply acquired a nucleus. Similar observations have been often made before, and show that the substance of comets is inconceivably rare.

But the spectroscope speaks still more distinctly. It indicates that the material is gaseous, and so far as my observation goes, gaseous only; for there is no trace of any continuous spectrum such as must result from the presence of solid or liquid dust, in a state of however fine division. The annexed diagram represents this spectrum,

as observed here on Dec. 1st, 2d, and 5th. It consists of three bright bands, the central of which is far the brightest. The wave lengths of the less refrangible edges of these bands are respectively 557.5, 517.5, and 470.4 millionths of a millimetre. The spectrum seems to correspond exactly with that of Comet II., 1868, which was investigated by Huggins and by him identified as due to *carbon*.

SALT, NOT ATTIC.

NOTWITHSTANDING salt is an article of daily use in every household, there are comparatively few who know how or where it is obtained, or who are acquainted with the chemistry of this most interesting and important substance. It seems paradoxical that it should contain two violent corrosive poisons, and yet in itself remain so harmless. But these substances are only poisonous when separate; in combination, they are not only innocuous, but really essential to the well being of all animals.

If we take pure hydrochloric acid, and add to it common washing soda, until it is in slight excess, and then evaporate the mixture to dryness, we shall obtain a beautiful snow-white crystalline mass of pure salt, fit for table use. From this experiment we infer that salt contains some of the acid and also a portion of the soda.

Let us ascertain what portion of each of these substances it holds. Hydrochloric acid contains hydrogen and chlorine, and we may readily obtain the acid again from the salt by treating it with strong sulphuric acid in a glass flask. We should be led to infer from this that the acid existed already formed in the salt, and such was the opinion of chemists for many years, until Sir H. Davy proved the view to be erroneous. It is only the chlorine of the acid, that is found in the salt. The soda used is a compound of the metal sodium and carbonic acid, and when we add hydrochloric acid to this compound, we break it up, and form two new compounds, one of which is common salt, and the other carbonic acid. This latter escapes into the air, it being a gas at ordinary temperatures. It will be interesting to consider some of the properties of these two substances, chlorine and sodium. Chlorine is a yellowish green gas of a disagreeable odor, and extremely injurious when inhaled into the lungs. Even very small quantities irritate the throat and air passages, and produce all the symptoms of a violent cold. Sodium is a soft, white metal, which oxidizes rapidly in the air, forming caustic soda. It floats on water, which it rapidly decomposes, combining with its oxygen, and setting the hydrogen free. Taken internally even in minute quantities, it would act as a violent poison. It is these two harmful agents which go to form common salt when they are chemically combined, and thus the change results in the production of a body palatable and useful to the human organism. Men and animals, when entirely deprived of salt, become diseased, and ultimately die. Many years ago they punished criminals in Holland by depriving them of salt in their food, and it is stated they died a miserable death.

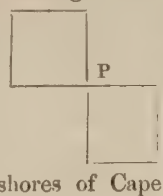
Salt is principally obtained from two sources: from the ocean, and from natural salt beds. Sea water contains on an average about 2.7 per cent. of the substance. Besides common salt, or sodic chloride, it contains several other substances, as is shown in the following analysis: —

Water	96.470
Sodic Chloride	2.700
Potassic Chloride	0.070
Magnesic Chloride	0.360
Magnesic Sulphate	0.230
Calcic Sulphate	0.140
Calcic Carbonate	0.003
Magnesic Bromide	0.002

Also there are found in sea water traces of iodine and silver. There are two methods of obtaining salt from sea water; one is by evaporation, and the other congelation. The latter method can only be used to advantage in very cold climates. It is a singular fact that when sea water is frozen, the ice formed is perfectly free from salt, water rejecting the saline ingredient in the act of crystallizing. The solution becomes more and more concentrated, and consequently it requires a greater degree of cold to form the ice.

In order to obtain salt by evaporation, the sea water is pumped by wind-mills into shallow wooden pans; or in countries where it can be done, it is allowed to flow over a salt marsh which has been previously prepared by removing all vegetation from its surface. The salt water is first received in a large shallow reservoir, where it is allowed to become moderately concentrated by the action of the sun's heat and the winds. From this it is conducted by a system of sluiceways into other reservoirs or evaporating basins more carefully constructed, and in these it deposits the lime salts. Finally, it is led into basins where it begins to deposit the salt; the water in these compartments being only a few inches in depth. Where the land is sufficiently below the level of the sea to allow the water to flow from one set of basins into the adjoining ones, of course the process is rendered quite easy; but if it is not low enough, the brine is raised at various stages by pumps moved by wind-mills. Salt produced in this way is called

bay salt, and can only be made in very dry countries, as a few hours' rain would spoil the labor of weeks. When wooden tanks are used they are generally protected from the rain by coverings. The tanks are made about ten feet square and a foot deep. The roofs are moved off and on by the aid of wheels running on rails; or, what is more common, two roofs are fastened together by their corners, and so arranged that they will turn about on a pivot, covering or uncovering two tanks by one movement, the tanks being arranged with regard to each other as shown in the diagram, the pivot being at P. The principal manufactories of salt from sea water, in this country, are along the shores of Cape Cod, and at Nantucket.



The deposits or beds of salt which are found in the earth, in various localities, are worked directly, and the salt is quarried in blocks, or detached from the mass in the same manner that coal is separated in mines. The most celebrated salt bed in the world is at Wielitzka, in Poland, where the substance has been mined for centuries. The salt from this mine is very pure, and may be used at once. The usual way of obtaining salt from the earth is by means of salt wells. These may either furnish a solution of salt ready for evaporation, or may only reach the salt bed without coming in contact with any water; in the latter case the water is supplied from the surface in the vicinity of the well. When water comes in contact with the bed it dissolves the salt, and the solution, being heavier than pure water, sinks to the bottom of the tube, from whence it is drawn by pumping.

Most of the salt wells in this country, however, are artesian borings, which furnish a constant flow of brine. The most extensive works of this kind are at Syracuse, N. Y. The salt water is received into tanks similar to those used upon the sea-shore, but the final concentration is accomplished in iron pans, heated by furnaces. The salt deposits in this country extend over the whole region between the Alleghanies and the Mississippi, but are in no case, if we except the bed at Petit Anse, Louisiana, of sufficient purity to admit of working directly upon the rock.

The bed at Petit Anse underlies 144 acres of ground, and has been penetrated to the depth of thirty-eight feet without showing any change in its purity. At some wells in the West the salt water is accompanied by large quantities of inflammable gas, which is utilized in evaporating the brine. The town of Fredonia, N. Y., is lighted with this gas, which has been flowing a number of years with no apparent diminution.

West of the Rocky Mountains salt is very abundant, often forming incrustations on the surface of the ground. The water of Salt Lake, in Utah, is almost a saturated solution, and the spray from its surface envelops everything with a crystalline covering.

Some time ago we analyzed a specimen of these saline crystals taken from a plain in California, with the following result: —

Sodic Chloride	94.39
Calcic Chloride	.86
Calcic Sulphate	4.05
Silica	.38
Water	.29
	99.97

Salt of this nature is pure enough for domestic use without undergoing any process of purification. These incrustations cover acres of ground on the Pacific coast, and look in the sun like vast fields of snow. Some of these salt plains are incrusted only at certain seasons of the year. When the rains come the salt is dissolved, and sinks into the earth, to reappear again during the dry season.

The use of salt is universal with all nations, civilized and savage, and when one barbarous tribe trades with another the first article of barter is generally salt. It is immensely valuable with those tribes who live remote from the natural sources of supply. Its use is also very ancient, for we find the same word used to designate salt in most of the languages of the world.

There is hardly a language that does not abound in proverbs relating to this substance. To eat salt with a man among the Arabs is a pledge of friendship. The Bible abounds with references to it, and one of these has no doubt puzzled many a reader. It is found in the Sermon on the Mount; "but if the salt have lost its savor, wherewith shall it be salted." This is explained by the fact that the salt used in Palestine is very impure, containing large quantities of magnesium, so that if kept in a damp place it becomes very bitter, and "is thenceforth good for nothing but to be cast out and to be trodden under foot of men."

Besides its use as an article of food, salt has numerous important applications in the arts. It is the source of all the chlorine that is so extensively employed in bleaching. In order to separate the chlorine from the sodium the salt is mixed with black oxide of manganese, and the mixture is then treated with dilute sulphuric acid.

Salt is one of the chemical agents provided for the use of man which is manifestly indispensable to his existence and happiness. It is furnished in the most bounteous manner, and the procurement and manufacture of the substance forms one of the great branches of industry of this and other countries.

THE SPHEROIDAL STATE OF LIQUIDS.

The remarkable phenomenon known as *the spheroidal state* was first observed in liquids, about a hundred years ago, by Leidenfrost, and has since been carefully investigated by scientific men. It is a subject of no little practical importance, as it furnishes the key to many otherwise inexplicable cases of boiler explosions.

If a few drops of water are allowed to fall upon a red-hot metallic surface (a silver or platinum cup is best for the experiment), the liquid gathers into a globule, which whirls about rapidly without boiling. It is also found that it does not evaporate nearly so fast as if it boiled, — only about one fifth as fast, according to the best authorities. When the metallic surface has cooled down to a certain point, it cannot keep the liquid in this spheroidal condition, as it is called, and a sudden and violent *boiling* ensues.

It is a singular fact that the temperature of the liquid while in this peculiar state is always below its boiling point. It is difficult to measure its temperature with precision, but in the case of water it is at least ten degrees (Fahrenheit) below its regular boiling point, and probably the difference is considerably more than that.

Another curious fact is that the liquid is not in contact with the hot surface. This has been proved in several different ways. The experiment may be so arranged that it is possible to *look* under the drop at a bright point or line beyond, and of course "seeing is believing." A fine wire connected with one pole of a galvanic battery may be made to dip into the liquid globule, and the other pole may be connected with the metallic surface or cup; so long as the spheroidal condition continues the galvanic circuit is not complete, but the moment that condition ceases the liquid touches the metal, and the galvanometer shows the passage of the electric current through the wires. There is a chemical demonstration of the same fact that is equally conclusive. A polished silver cup is used, and for the liquid a solution of sulphide of sodium. There is no action upon the silver while the liquid remains in the spheroidal state, but as soon as the cup has cooled enough for the drop to touch it, the instantaneous appearance of a dark spot upon the polished surface shows the formation of sulphide of silver. Nitric acid might be used as the liquid in this experiment, and it would not act on the silver so long as the latter was hot enough to keep up the spheroidal state.

How are these phenomena to be explained? As soon as the liquid comes near the heated surface, steam is produced beneath it, and acts as a spring to hold it up. In other words, it rests upon an elastic cushion of its own vapor, which is renewed by the heat below as fast as it escapes. When the cup cools down so that this vapor is not supplied with sufficient rapidity to buoy up the drop, the liquid falls upon the hot metal and boils.

The startling and paradoxical feat of freezing water in a red-hot vessel depends upon the property of liquids to remain below their boiling point while in the spheroidal state. A small quantity of liquid sulphurous acid is put into a red-hot platinum cup or crucible. It assumes the spheroidal state, and its temperature remains at about 12° F. or twenty degrees below the freezing point of water. If a little water is now added to it, the water instantly freezes, and the bit of ice may be thrown out of the red-hot vessel. This is but one of several ways in which the experiment may be performed.

The experiment of dipping the hand into melted lead is explained upon the same principle. The hand is instantly covered with a layer of spheroidal liquid, from its own moisture, and this prevents its coming in contact with the molten metal. The hand is exposed to radiant heat alone, which is mainly expended in forming the vapor that envelops it. The only danger is in not having the metal hot enough. Its temperature ought to be considerably above its melting point. If the hand is not naturally moist, it is well to wipe it with a damp cloth before immersing it in the metal. The experiment, if properly conducted, is a perfectly safe one, but few persons have the *nerve* requisite for trying it.

It is hardly necessary to explain how boiler explosions may be caused by the sudden change of water from the spheroidal state to that of violent ebullition. If the water is too low in the boiler, so that portions of the surface become red-hot, and water is then admitted, it may as-

ume the spheroidal condition, and as the over-eated metal cools down, its almost instantane-us conversion into steam may subject the boiler o a strain greater than it can bear.

A GREAT SUN SPOT.

PROFESSOR KIRKWOOD, of Bloomington, Ind., ommunicated to the *American Journal of cience and Arts* the following account of the reat sun spot of June, 1843: —

One of the largest and most remarkable spots ver seen on the sun's disc appeared in June, 1843, nd continued visible to the naked eye for 7 or 8 ays. The diameter of this spot was, according to chwabe, 74,000 miles; so that its area was many mes greater than that of the earth's surface. Now, has been observed during a number of sun-spot ycles that the larger spots are generally found at r near the epoch of the greatest numbers. The ear 1843 was, however, a *minimum* epoch of the even-year cycle. It would seem, therefore, that he formation of this extraordinary spot was an nomaly, and that its origin ought not to be looked r in the *general cause* of the spots of Schwabe's ycle.

As having a possible bearing on the question nder consideration, let us refer to a phenomenon bserved at the same moment, on the first of Sep-ember, 1859, by Mr. Carrington, at Redhill, and Ir. Hodgson, at Highgate. "Mr. Carrington had irected his telescope to the sun, and was engaged observing the spots, when suddenly two intensely minous bodies burst into view on its surface. hey moved side by side through a space of about irty-five thousand miles, first increasing in bright-ess, then fading away. In five minutes they had anished. . . . It is a remarkable circumstance, hat the observations at Kew show that on the very ay, and at the very hour and minute of this unex-ected and curious phenomenon, a moderate but arked magnetic disturbance took place; and a orm, or great disturbance of the magnetic ele-ent, occurred four hours after midnight, extending the southern hemisphere."

The opinion has been expressed by more than ne astronomer that this phenomenon was produced the fall of meteoric matter upon the sun's sur-ce. Now, the fact may be worthy of note that e comet of 1843, which had the least perihelion stance of any on record, actually grazed the solar mosphere about three months before the appear-ce of the great sun-spot of the same year. The met's least distance from the sun was about 65,000 iles. Had it approached but little nearer, the re-stance of the atmosphere would probably have ought its entire mass to the solar surface. Even its actual distance it must have produced con-lerable atmospheric disturbance. But the recent scovery that a number of comets are associated th meteoric matter, travelling in nearly the same bits, suggests the inquiry whether an enormous eteorite following in the comet's train, and having somewhat less perihelion distance, may not have en precipitated upon the sun, thus producing the eat disturbance observed so shortly after the met's perihelion passage.

BRIEF NOTES ON SCIENTIFIC TOPICS.

AN INTERESTING ELECTRICAL EXPERIMENT. — correspondent of the New York *Evening Post* ites as follows: "I connected the wire of a gal-nometer with the water-pipes of Baltimore, and e other end of the coil was joined to a gas-pipe a house in the southwest part of the city. Thus vast metallic system of electric nerves stretched ay three miles to the northwest, to the reservoir, d about as many to the east and southeast, over the city. A thunder storm was raging at the time, at so great a distance in the north that only the illumination of the clouds told when a flash oc-curred. Yet, whenever that flash took place, the needle was instantly deflected through ten or twenty degrees. The two occurrences were simultaneous, apparently, for I could detect no difference in the instant of their manifestation. Indeed, so sure an indicator of the flash was the galvanometer that when I shut myself up in a dark room, signalling to an observer of the storm whenever the needle moved, and receiving a signal from him when a flash occurred, our signals were always simultaneous. The next day it was ascertained that the storm was over twelve miles distant; therefore, at least five hundred square miles of the earth's surface were affected (inductively) at each flash of the light-ning."

ABSORBENT POWERS OF CHARCOAL. — Dr. H. Vohl, of Cologne, has been making elaborate ex-periments upon the absorbent powers of charcoal, and its use for disinfecting and deodorizing purposes. He thinks he has proved that the carbonic acid gas obtained by heating charcoal is not derived from the coal itself, but has been absorbed from the atmos-phere, and is held with such tenacity that it can-not be driven out by boiling in water, but that a temperature much below that of ignition is sufficient to expel it. This conclusion is the same as that which had been reached by another experimenter, to which we have previously made reference. Among other facts proving this statement, Dr. Vohl remarks that when charcoal has been once freed from its carbonic acid and saturated with pure oxygen, no trace of carbonic acid is appreciable, even when heated to a temperature of 680° Fahren-heit.

EFFECT OF COLD ON IRON AND STEEL. — For many years it has been almost an axiom among civil engineers, that great cold tended to produce a brittle condition of iron and steel, and that this hypothesis explained the alleged increase in the breakage of trees, axles, and rails in railroad traffic. According to the recent experiments of Joule and others, however, it would seem that iron and steel, instead of being weakened by freezing weather, are actually capable of resisting greater shocks than at a summer temperature. Dr. Joule refers the greater frequency of railway accidents in winter to the increased hardness of the *ground* caused by freezing, by which the iron is subjected to a greater strain or shock than in summer.

SIMPLE METHOD OF EXHIBITING ABSORPTION SPECTRA. — E. Lommel, in *Poggendorff's Annalen*, describes a method of exhibiting the absorption spectra of soluble coloring matters, whereby the employment of solutions in glass vessels is avoided. It consists in the use of gelatine plates colored by the required material, which, in order to avoid in-jury, are enclosed between glass plates. A collec-tion of various coloring matters can thus be made, which are at hand at any moment when required for demonstration. The preparation of perfectly homogeneous and transparent plates succeeds even with substances insoluble in water, but soluble in alcohol, such as aniline colors, chlorophyll, etc. Chlorophyll-gelatine, however, does not give the same absorption spectrum as a chlorophyll solution, but that of solid chlorophyll, as exhibited by leaves in transparent light. Such a difference in the spectra was not observed with any other coloring matters.

INFLUENCE OF GREEN LIGHT ON THE SENSI-TIVE PLANT. — In order to test the effect of green light on the sensitiveness of the *Mimosa*, M. Bert placed several plants under bell-glasses of different colored glass, set in a warm greenhouse. At the end of a few hours a difference was already appar-ent: those subjected to green, yellow, or red light had the petioles erect, and the leaflets expanded; the blue and the violet, on the other hand, had the petioles almost horizontal, and the leaflets hanging down. In a week those placed beneath blackened glass were already less sensitive; in twelve days they were dead or dying. From that time the green ones were entirely insensitive, and in four days more were dead. At this time the plants un-der the other glasses were perfectly healthy and sensitive; but there was a great inequality of de-velopment among them. The white had made great progress, the red less, the yellow a little less still; the violet and the blue did not appear to have grown at all. After sixteen days the vigorous plants from the uncolored bell-glass were moved to the green; in eight days they had become less sen-sitive, in two more the sensitiveness had almost en-tirely disappeared, and in another week they were all dead. Green rays of light appear to have no greater influence on vegetation than complete ab-sence of light, and M. Bert believes that the sensi-tive plant exhibits only the same phenomena as all plants which are colored green, but to an excessive degree.

CHANGE IN THE HABITS OF A BIRD. — A writer in *Nature* records a remarkable instance of the en-tire change of habits in one of the native birds of New Zealand since the colonization of the island by Europeans. The Kea (*Nestor notabilis*) is a mem-ber of the family of Trichoglossinæ, or brush-tongued parrots, feeding naturally on the nectar of various indigenous flowers, or occasionally on insects found in the crevices of rocks or beneath the bark of trees. For several years past the sheep in the Otago dis-trict have been afflicted with what was thought to be a new kind of disease, first manifesting itself in a patch of raw flesh on the loin, the wool gradually coming completely off the side, and death being often the result. It was discovered that this was caused by the attacks of the Kea, or mountain-par-rot, which threatens to become exceedingly destruc-tive to the flocks. It is supposed that the taste for this kind of food was first developed from the par-rots being induced in the winter season, when their proper food was scarce, to attack the "meat-gal-lows" on which the carcases of sheep were hung to dry the skins.

HOUSEHOLD RECIPES.

A GOOD WHITEWASH. — Mix up half a pailful of lime and water. Then make a starch of half a pint of wheat flour, and pour it into the whitewash while hot. Stir it well, and it is ready for use. This is one of the simplest and best recipes, and the whitewash made by it will not rub off.

TO CLEAN TIN COVERS. — Mix a little of the finest powdered whiting with the least drop of sweet oil, rub the covers well with it, and wipe them clean; then dust over them some dry whiting in a muslin bag, and rub bright with dry leather. This last is to prevent rust, which the cook must guard against by wiping them dry and putting them by the fire when they come from the dining-room, for if but once hung up damp the inside will rust.

SPOTS ON MAHOGANY. — Stains and spots may be taken out of mahogany with a little aquafortis and water, or oxalic acid and water, rubbing the part by means of cork, till the color is restored, observing afterwards to wash the wood well with water, and to dry and polish as usual.

A GOOD TABLE SAUCE. — Take one gallon of tomatoes, wash and simmer in three quarts of water until nearly done. Strain through a sieve. Add two tablespoonfuls of each of these spices: ginger, mace, black pepper, allspice, and salt, and one of cayenne pepper. Boil down to one quart. Pour in one half pint best vinegar, and then pass the whole through a hair sieve. Bottle in half-pint bottles; cork and seal securely, and keep in a cool place.

The Arts.

EARTH BORINGS FOR ILLUMINATING GAS.

THE subject of oil wells has been so often discussed, and the methods for procuring earth oil have been so fully described, that every intelligent reader is familiar with the whole matter. It may not be generally known that the earth is not only a vast oil reservoir, but a huge gas holder, and that borings have been made into the gas caverns below, through which immense quantities of the best illuminating gas have flowed to the surface. Professor J. S. Newberry, of Cleveland, writes as follows to the *American Chemist* regarding some gas wells in Ohio: —

In June, 1866, I visited two remarkable gas wells bored by Mr. Peter Neff, in the valley of the Kokosing, a few miles east of Gambier (where Kenyon College is located), in Knox County, Ohio; I wrote a description of them which was published in the *Cleveland Herald*. As gas wells are just now attracting some attention as sources of supply of gas for illumination and fuel, I have thought it might not be uninteresting to your readers to have this description repeated for their benefit.

It will probably add to the interest with which it will be read, to say that the wells described below *have been flowing gas in apparently undiminished volume to the present time.*

From Gambier our route lay down the valley of Kokosing, some twenty miles to the junction of that stream with the Walholding. Within this interval the valley has nearly an east and west course, and is excavated in the "Waverley" (lower carboniferous) formation, in the direction of the dip of the strata, which is here eastwardly about twenty-two feet to the mile. Near Millwood, however, a few miles below Gambier, we crossed a belt of a mile or more in width, in which the rocks are much disturbed, the dip being increased to 30° with the horizon. Such disturbances are hopeful signs in an oil region, as they indicate the existence of subterranean fissures and cavities in which the oil may accumulate, and without which no great oil wells are possible. Two wells have been bored near this break, one above, the other below. These are flowing, one three, the other eight gallons of oil per day, and are soon to be thoroughly tested by the pump. Two or three miles below, and near the mouth of the Kokosing, two other wells have been bored to the depth of 600 feet, penetrating argillaceous shale, with bands of sandstone. On reaching the third sand rock at the depth of 600 feet, the auger, in both wells, struck upon nearly vertical crevices, into which it penetrated several feet without resistance. From these crevices issued a volume of carburetted hydrogen gas without parallel, so far as I am informed, in all the oil explorations made in the country.

In both wells copious streams of salt water had been previously met with, and the wells were filled when the gas chambers were struck, but this water was ejected with such violence as to form intermittent fountains over one hundred feet in height. The first of these two wells was bored during the winter, and the water thrown out soon covered the derrick with ice, forming a kind of chimney sixty feet in height. Through this the water was thrown at intervals of about one minute, to double that height, or 120 feet. After, and with the water, came a great rush of gas, which continued until the pressure was relieved, when the water again began to accumulate and was again ejected. This series of phenomena has been repeated with unvarying regularity and undiminished force, for some months.

At the time of my visit an effort was being made to tube the well, by which the flow of water and gas was somewhat impeded, and I did not witness the full effect of the paroxysm, but a series of photographs which I saw, fully confirmed the description given me by Prof. H. S. Smith and others.

When the derrick was covered with ice, the gas escaping from the well was frequently ignited, and the effect, especially at night, of this fountain of mingled fire and water, shooting up to the height of 120 feet through a great transparent and illuminated chimney is said to have been indescribably magnificent.

In well No. 2, which has a history similar to that of No. 1, the gas chamber was opened on the 1st of March, but this well has been carefully cased and the water all shut off, so that the gas is permitted to escape without impediment. A pipe two inches in the clear is set in the well-head, and from this a constant stream of illuminating gas is now, and for three months has been, escaping with a sound audible some distance from the well.

At the time of our visit nearly 100 feet of pipe was connected with the well, and thus, at a safe distance, the gas issuing from it was ignited. The effect, even in bright sunshine, was surprising. A jet of flame was formed 20 feet or more in length and as large as a hogshead. By fixing a stop-cock on the pipe the gas was made to accumulate until, measured by a steam-gauge, the pressure amounted to 180 pounds to the square inch.

This was as great a pressure as the gauge would indicate, but it is evident that the pressure below is much greater than that, as the weight of the column of water, 600 feet high, lifted by it is 262 pounds to the square inch. When liberated after confinement of a few minutes, and ignited, the gas formed a volume of flame as large as a house. At night an exhibition similar to that witnessed by us at mid-day is said to be wonderfully impressive, the gas illuminating the whole country like a conflagration.

The gas from these wells seems to be pure, having no other smell than an agreeable one of naphtha, and has high illuminating qualities. Its volume is sufficient to light a large city, and, if differently situated, the value of the material thus wasted, for lighting or heating, would be greater than the product of the best oil-well known.

NEW THINGS IN THE ARTS.

SHEET IRON COATED WITH COPPER OR BRASS. — The coating of sheet iron plates with copper and brass is a new industry that promises well. Among the advantages claimed for such plates over those which are tinned or "galvanized," is the fact that they can be annealed to any desired extent during the process of stamping, without injury to the copper or brass coating; and that they also are superior to sheet copper or sheet brass, because articles manufactured from them are not so readily bent or dented as when they are made of brass or copper, and they can be burnished, planished, or spun, and so brought to any required degree of finish. On this account, the material is specially adapted to the manufacture of lamps, candlesticks, and all kinds of goods hitherto made by stamping from sheet brass or sheet copper, and at a greatly reduced cost.

A NEW AND CHEAP METHOD OF PREPARING PURE DEXTRINE. — For this purpose, 500 parts of potato-starch are mixed with 1,500 parts of cold distilled water and 8 parts of pure oxalic acid, and this mixture placed in a suitable vessel on a water-bath, and heated until a small sample tested with iodine solution does not produce the reaction of starch. When this is found to be the case, the vessel is immediately removed from the water-bath, and the liquid neutralized with pure carbonate of lime. After having been left standing for a couple of days, the liquor is filtered, and the clear filtrate evaporated upon a water-bath until the mass has become quite a paste, which is removed by a spatula, and, having been made into a thin cake, is placed upon paper and further dried in a warm place. 220 parts of pure dextrine are thus obtained.

ECONOMICAL STEAM ENGINES. — An engine builder in London is now constructing steam engines that are guaranteed to consume less than two pounds of coal per horse power, each hour; and it is claimed that in some cases these engines have consumed only one pound per horse power, each hour. This is nearly one fifth of the theoretical amount of power that is produced by the consumption of coal. One tenth has been considered very good work heretofore.

CONCENTRATED VEGETABLES. — A new process for preserving the solid parts of vegetables without impairing their flavor has been patented. The treatment pursued in the case of potatoes will serve as an illustration of the method. After being thoroughly washed they are boiled until done, and their skins removed. The potato is then divided into fine vermicular particles by mechanical means, and while in this state the water is driven off by exposure to heat. The material is left in a condition much resembling rice, and in this shape it may be ground to flour if desired. The extract of potatoes prepared in this way can be used for making soup and other dishes; and by adding boiling water, a dish in every way resembling mashed potatoes cooked directly from potatoes in the ordinary manner, is obtained, but, it is said, of superior flavor and quality.

AN ICEBERG ALARM. — A New Yorker has invented an apparatus to be attached to ships, so arranged as to sound an alarm on approaching the vicinity of an iceberg. The device is arranged on the bottom of the vessel, and is of such a nature that when the keel strikes any very cold stratum of water the alarm is sounded. It is well known that icebergs refrigerate the water around them for a considerable distance. This instrument will exhibit the exact temperature of the water below the vessel at all times.

MOTHS. — In India, both upholsterers and saddlers were badly troubled with moths in their work especially in the rainy season; and the upholsterers in that country follow a series of simple rules by which they entirely avoid the ravages of these pests. They never put on a burlap or cotton covering without first steeping it in a solution of sulphate of copper, made by dissolving about one ounce in one gallon of boiling water, and then quickly drying the material in the sun or by a hot stove. For over coverings, especially if of wool, a solution of corrosive sublimate dissolved in patent colorless alcohol is frequently used with good effect. The boiling solution of sulphate of copper is often applied to a floor previous to laying a mat or carpet, and invariably under heavy articles of furniture.

ENGRAVING BY ELECTRICITY. — An ingenious French mechanic has produced an invention by which a metal plate, upon which a design is drawn with a chemical ink of some kind, is slowly rotated with its face vertical; and several other similar plates, graded in size, are also slowly rotated by appropriate mechanism. The object of the invention is to engrave on the smaller plates the design traced upon the largest, on different scales of magnitude, which is accomplished by applying a cutting point to the face of each plate, which is pressed against it by means of an electric current whenever a blunt point, applied to the large plate encounters the ink in which the design is traced — the cutting points being at other times withdrawn. The point presented to the first plate is merely a "feeler," which determines by electrical agency

hether the ink is beneath it or not. If it is, the oints are pressed into the surface of the other lates; if not, they are withdrawn and prevented rom cutting. The feeler and the burins must, of ourse, all follow a spiral track. This is crude, and an be made applicable to the reproduction of certain kinds of designs only, but it is considered a ong step in the direction of practical success.

A NEW MANUFACTURING ENTERPRISE IN RANCE. — An important work of hydraulic engineering has been recently commenced with the view f utilizing the fall of the Rhone at Bellegarde, near eneva. By driving a tunnel about 600 yards ong, about a third of the water will be diverted om the river, and delivered into the neighboring alley of the Valseriane, with an available fall of 44 et, the supply being estimated at rather more an 2,000 cubic feet per second at the period of owest water. This corresponds to 10,000 horse ower, or as much as that which has made Lowell e Manchester of America. The promoters of the nterprise point out that the position is admirably tuated for the erection of cotton and woolen mills, s, in addition to furnishing power, the water is of xceptional purity.

A NEW USE FOR DYNAMITE. — This explosive as been most usefully employed in France in rending the roots of timber trees. In the Forest of Haye, Meurthe-Moselle, where an immense quantity f timber was blown down by storms, the roots emained, encumbering the ground. A hole being rilled from 9 to 15 inches deep, a dynamite cartridge f 50 grammes — about 800 English grains — provided with a fulminating cap and safety fuse, was laced in it. When the charge was exploded the tump was rent into pieces, which were easily removed.

PRACTICAL RECIPES.

GLYCERINE COMPOSITION FOR LEATHER. — As s well known, glycerine has found extensive application in tanning, as it has been discovered that it dds materially to the elasticity and strength of the eather. Especially has it been found of great alue in protecting leather bands of machinery from racking and drying. The partially tanned leather s immersed for a considerable time in a bath of lycerine, by which the pores are filled, and such an lasticity and softness is imparted that objects manufactured from it are much less liable to break.

In order to prepare a neutral gutta percha composition with glycerine, take 3 to 4 pounds lampblack and ½ pound ivory black; cover up in a uitable vessel, with 5 pounds glycerine and 5 ounds common syrup, and stir well until the whole s intimately mixed and free from lumps. Four or ve ounces of gutta percha, finely cut, are to be put nto a kettle, and, after melting, must be mixed ith 20 ounces of sweet oil and dissolved, and two unces of stearine added. While still warm, the utta percha solution must be incorporated with the yrup and lampblack, and after this is done, 10 unces of Senegal gum, dissolved in 1½ pounds of ater, is also added. In order to impart an agreeable odor to the mass, a small quantity of rosemary r lavender oil may be introduced.

In using, the glycerine gutta percha paste must e diluted with three or four parts of water. It ives a fine lustre, and, as it contains no acid, it oes not injure the leather, but makes it soft and lastic, and adds very much to its durability.

IMITATION AMBER. — 1. Boil turpentine with a ittle cotton — some add oil — stirring till thick as aste; set it in the sun for eight days, and it will e clear and hard. 2. Take yolks of 16 eggs, and eat them up well; take gum arabic 12 oz., cherry ree gum 1 oz.; powder, and mix with the yolks. Let the gums melt well, and put them in a pot well eaded; then set for six days in the sun. 3. Whites of eggs; beat them well, mix with strong white wine vinegar, stop close, and let stand fourteen days. *The Cabinet Maker* endorses these recipes.

CARBOLIC ACID IN PASTE, ETC. — To prevent the decomposition of paste, add to it a small quantity of carbolic acid. It will not then become offensive, as it often does when kept for several days, or when successive layers of paper are put on with the paste. In the same way, the disagreeable smell which glue often has may be prevented. If a few drops of the solution be added to ink or mucilage, they will not mould. For whitewash, especially when used in cellars and dairies, the addition of an ounce of carbolic acid to each gallon will prevent mould and the disagreeable odor which sometimes taints milk and meat kept in such places. It also drives away cockroaches and other insects.

RED FIRES WITHOUT SULPHUR. — The following gives a light which is nearly orange in color : —

Nitrate of strontia	4 parts.
Rosin	1 part.
Chlorate of potassa	1 "

The following produces a large, powerful, somewhat orange-colored flame : —

Nitrate of strontia	24 parts.
Chlorate of potassa	16 "
Lycopodium	3 "
Sugar of milk	2 "

A rose-colored flame may be obtained by the following : —

Chlorate of potassa	12 parts.
Nitrate of potassa	5 "
Sugar of milk	4 "
Lycopodium	1 part.
Oxalate of strontia	1 "

The ingredients must be perfectly dry, and must be carefully and thoroughly mixed. They may be burned in open pans, or packed in paper moulds.

Agriculture.

OXALIC ACID AND PLANTS.

THE frequent reference in agricultural and other journals to oxalic acid as a constituent of plants has awakened considerable inquiry regarding the history and nature of the substance. The eminent Swedish chemist, Scheele, first discovered the acid, having found it in the juice of the common sorrel, where it exists as a binoxalate of potash. It is generally known under the name of "salt of sorrel," and is very sour to the taste, and poisonous when taken internally. The crystals, in form and color, so closely resemble those of the sulphate of magnesia (Epsom Salts) that they have often been mistaken for them, and fatal cases of poisoning have resulted from the error. The name, oxalic acid, is derived from the Latin name of the common wood sorrel, *Oxalis acetosella.* The field sorrel, so plenty and so troublesome to farmers, belongs to an entirely different family of plants, the *Rumex acetosella*, and is classified among the docks. This contains considerable of the acid, as also do the lichens, in which it exists as oxalate of lime.

Oxalic acid is the most highly oxidized of all carbon compounds, with the one exception of carbonic acid. It belongs low down in the list of organized products, and may well be regarded as constituting the last stage in the oxidation of carbonaceous substances before they pass into the dead, inorganic condition of carbonic acid. In plants, it seems to be more the product of *decay* than of growth. In lichens, especially, this would appear to be true, as the oxalate of lime found in them forms nearly thirty-five per cent. of the weight of the plant, and it exists in them in its most insoluble form. In garden rhubarb, the acid is found locked up with lime, and it is a significant fact that it is more abundant in old, than in the new plants. We incline, so far as its connection with plants is concerned, to class it with lignin and some other bodies, — a material which the plant has no further use for, and therefore deposits in the cells in an insoluble condition. All the vegetable acids are inactive agents in plant organisms. They do not appear to perform any leading part in vegetation, and in all their physical and chemical relations are widely different from the active soluble salts, and other bodies which are found dissolved in the sap.

Oxalic acid can be produced artificially with great facility, and it is manufactured and employed in the arts in large amounts. It is curious that in *sawdust*, an utterly waste product, we have a material from which this acid can be produced to any extent, and nearly all of the substance found in the market is now made from sawdust. The sawdust is placed in large vats and moistened with a lye made of caustic soda and potassa. It is then taken out and dried on plates of iron, and the dry mass is washed with warm water to dissolve out everything except the sparingly soluble oxalate of soda. The mother liquors are evaporated to dryness and ignited, to save the potassa, which is used over again. The oxalate of soda is decomposed by boiling with caustic lime; the soda enters into solution and may also be used over again. The oxalate of lime in turn is decomposed by sulphuric acid, and the liquor decanted from the insoluble sulphate of lime, which, upon concentration, yields crystals of oxalic acid. This is a brief, imperfect description of an interesting chemical process, and serves to illustrate how science triumphs over obstacles, and produces substances peculiar to vegetables from waste materials. The cost of production is very small, not exceeding a few cents a pound, and if the acid would act upon feldspar, and liberate the potash it contains, as some suppose, its employment might supply a cheap method of procuring this most valuable plant food. But this idea is erroneous, as we have endeavored to show in some former statements.

If the acid is at any time swallowed by mistake, an antidote to the poison is found in any substance containing carbonate of lime, or caustic lime; as such, when brought into its presence, convert it into insoluble oxalate of lime, a substance which is harmless. Chalk, whiting, or plaster from the walls of a room, will serve a good purpose, and either one of these in quantity equal to the amount of acid taken, should be stirred in water and drank as speedily as possible.

NORTHERN CORN ON SOUTHERN SOILS.

SEVERAL of our friends and patrons in the Southern States sent to us last spring for seed corn, with the design of testing its adaptability to that climate and soil. We regret to learn that the experiments made have not proved satisfactory, the results showing that our Northern varieties of the maize plant cannot be raised successfully in that section. J. R. Maxwell, Esq., an intelligent and enterprising farmer at Tuscaloosa, Alabama, procured *twelve bushels* of our Lakeside corn, and planted 48 acres of land; and he writes that his crop was an entire failure,

having gathered only 25 bushels of *nubbins.* He remarks, that he could have raised of the white corn at least 750 bushels, so that the experiment has cost him about $600. The failure he attributes solely to want of adaptability of climate. "Experience," he says, "teaches some important lessons, and as regards the corn experiment, we have learned what neither you nor I knew before. We could see no good reason why the yellow corn would not grow here, but now we know it will not." If we had understood that so extensive a trial was contemplated, we should have advised a smaller one, as it is always best not to risk much where the way is unknown or uncertain. Mr. M. is now trying some other experiments of considerable magnitude, which we most sincerely hope will turn out better. He sowed in September a cotton-field of 180 acres, one half with barley and the other with rye, and in October he sowed 20 acres with red clover. His design is to save a few acres of the grains for seed, and turn under the balance in February and March, and plant to cotton. He will give to the land at the time of turning under, 25 bushels of crushed cotton seed, and about 150 lbs. of superphosphate to the acre. But few men at the South are more enthusiastic in soil cultivation than Mr. Maxwell, and his success has been commensurate with his enterprise. The influence of such gentlemen upon the agricultural interests of the country is very great, and the example he is placing before other cultivators in the South is of the most important and salutary nature.

PLANT GRAPE-VINES.

It is surprising that so many families in the country are willing to live year after year without cultivating a single grape-vine about their dwellings. They are compelled to purchase the delicious fruit for the table, or not taste it during the season. There is a common impression that to cultivate grapes properly a vast amount of knowledge and tact is required. To many, the simple trimming of a vine is a mystery, more difficult to comprehend than the hardest problem of Euclid. This is an erroneous view, and ought not to prevail. Any person of common intelligence can learn in one hour how to trim and nourish vines, and if instruction cannot be obtained from some experienced cultivator, there are books filled with cuts and illustrations which make everything plain. Three vines, of as many different varieties, planted in some sunny nook, or by the side of buildings, so as to obtain shelter, will, if properly cared for, furnish many bushels of delicious grapes every year. Select a Concord, a Delaware, and an Adirondack, make the ground mellow and rich by the use of the spade, and by employing old manure, fine ground bone, and ashes, and set out the plants. In three years the rich clusters will appear, and in four years the product will be abundant. It is well to have vines planted so that the waste liquids from the dwelling can be used in fertilization. If there is any food the vine specially loves, it is the soapy liquids which accumulate on washing days in families. Vines drenched every week with these liquids will flourish astonishingly, and extend themselves so as to cover large buildings, every branch bearing fruit. We say to our readers everywhere, plant vines.

AGRICULTURAL COLLEGES.

A meeting of officers and others connected with the agricultural colleges of the several States was held at Chicago last summer, for the purpose of consultation regarding the proper management of these institutions. Professor Flagg offered the following resolution at the meeting, which was voted down, and very properly we think: —

Resolved, That the object of the organization to be formed by this meeting should be the advancement of the interests of industrial education by assembling together persons engaged in agricultural and mechanical experiment and education, and with the view of increasing and disseminating industrial knowledge.

Professor Detmers said "that it made no difference whether knowledge was obtained from Nature or schools. It was a fact that those who obtained their knowledge from schools did not often succeed." The committee on experiments then offered the following resolutions which were adopted: —

The field of experiment in its widest sense, in relation to our colleges founded on the national grant, is large, and crowded with work. We want

I. Meteorological observations.
  1. Scientific, after Smithsonian plan.
  2. Practical, like those of the Signal Service.

II. Mechanical experiments.
  1. In strength of materials.
  2. In motive powers.
  3. In trials of agricultural and other industrial implements.

III. Experiments in physics, especially in the effects of different degrees of light, heat, electricity, and moisture, on vegetable life.

IV. Experiments in industrial chemistry, such as analyses of soils, of clays, and other earths used in the arts; of coals, lime and building rock, minerals, manures, plants, and their products, and of animal products.

V. Experiments and observations in mining and metallurgy.

VI. Experiments with soils in their drainage; pulverization by different implements, and their compaction; the application of different fertilizers; the variation of soils in adjoining plats, their continuous cropping without manure, and their irrigation.

VII. Experiments in special culture with different varieties of grasses, grains, roots, plants, etc., with variations in the time, distance, and depth of planting; modes of cultivation; harvesting; manuring; modes of propagation; and with diseases and insects affecting plants.

VIII. Experiments in the breeding and fattening of domestic animals, comparing different breeds and species, their diseases, etc.

It is undoubtedly very well that the agricultural colleges, so called, should have some plan, or should adopt some system of instruction, which may comprehend a unity of purpose, such as will enable the different institutions to compare results, and thereby obtain important facts applicable to the differing interests of the country.

But the resolutions adopted do not manifestly cover the right ground, or rather they do not point out the true work of agricultural colleges. As regards meteorological observations, we think the work is being done by the Signal Corps far better than it can be done by students or any association of private irresponsible persons; and besides, what is the need of such observations?

It is well enough to have students taught the elements of meteorology, but any further instruction or experimenting is a waste of valuable time, which might be devoted to more useful studies.

The second class of experiments, as enumerated, embrace points, or kinds of experiment which are unnecessary, because they have been quite satisfactorily settled.

The strength of materials and motive power have been made the subject of study by mechanical engineers for years, and the tables published are full and complete. Government engineers have in their experiments exhausted this branch of research. Of what use is it to continue such experiments in agricultural colleges? None whatever.

The remainder of the list of experimental labors proposed is certainly quite comprehensive and embraces about every branch of study open to investigation.

If everything is to be studied and settled why not attempt to solve some of the more intricate problems relating to the origin of man or why not make exact determinations of the atomic weights? The country is much in need of good practical educated farmers, and we suppose it to be the business of agricultural colleges to produce such, and send them out that their influence may be felt everywhere. Our colleges and high schools teach the classics and the higher mathematics; why is it necessary to introduce these and kindred studies into schools of agriculture? These schools are designed for special work, and that work is of the most practical and important character, and it seems to us that it would be a positive misfortune to have them diverted, so that the distinction between them and ordinary educational institutions shall consist only in the name.

SEEDS AND CUTTINGS.

How to make a City Garden. — Take barrels and bore holes around the middle, and one hole large enough to admit the nose of your watering pot. Fill the barrels with stones as high as the rows of holes, and fill in with good, rich, fine earth to the top, in which plant cucumbers, melons, squashes, tomatoes, etc. One barrel will be enough of each kind.

Be sure to have one flat stone lean over the large hole, where you will pour in water until it runs out of the holes you have made, and which will prevent the earth from filling this large hole up. Range the barrels around your yard, and plant your seeds. Keep the barrels filled with water up to the holes, and you have all the requisites for rapid, healthy growth, — air, heat, and moisture. You can raise all the vegetables you will need, in the greatest perfection, and they will last until late in the autumn, as they can easily be covered on frosty nights. Cucumbers and tomatoes may hang over the barrels, cutting them off when they reach the bottom. Melons may be tied to the wall fence. The stones have an important service in holding up the earth, and absorbing the heat during the day, which they give out at night, keeping the water at an even temperature. You will be astonished at the result if you have never tried it. — *The Prairie Farmer.*

Arranging Flowers for Bouquets. — It is an art, requiring no small degree of taste and skill to arrange cut flowers so as to form an attractive bouquet for the vase or basket. It is something, too, which comes to one intuitively, and it can hardly be described in words. However, it may be said in general that the more loosely and uncon-

ısed flowers are arranged, the better. Crowding : especially to be avoided, and to accomplish this, good base of green of different varieties is needed ɔ keep the flowers apart. This filling up is a very nportant part in all bouquet making, and the neg- ect of it is the greatest stumbling-block to the ninitiated. Spiked and drooping flowers, with ranches and sprays of delicate green, are of abso- ıte necessity in giving grace and beauty to a vase ouquet. Flowers of similar size, form, and color ught never to be placed together. Small flowers hould never be massed together. Large flowers, 'ith green leaves or branches, may be used to ad- antage alone, but a judicious contrast of forms is ıost effective. Avoid anything like formality or tiffness. A bright tendril or spray of vine can be sed with good effect, if allowed to wander over nd around the vase as it will. Certain flowers as- ort well only in families, and are injured by mix- ıg. Of these are balsams, hollyhocks, sweet peas, tc. The former produce a very pretty effect if laced upon a shallow oval dish upon the centre ıble. No ornament is so appropriate for the din- 'er table or mantel as a vase of flowers; and if you xpect visitors, by all means cut the finest bouquet our garden will produce, and place it in the room ıey are to occupy. It will tell of your regard and ffectionate thoughtfulness in a more forcible and ppropriate manner than you could find words to xpress. If a small quantity of spirits of camphor ; placed in the water contained in the vase, the olor and freshness of the flowers will remain for a ıuch longer period. Thus prepared, we have had owers to keep a week, and at the end look quite 'esh and bright. — *The Maine Farmer.*

Soil for Fruit Trees. — It will generally be ound that fruit trees in clay soils will be far more arifty than in sandy or loamy lands. The reasons re plain. A clay soil has more moisture and re- ains it longer than the others, which are more po- ous. But if the clay soil is not well drained, and as not a good subsoil, it may prove very injurious om an excess of water. A good loamy surface oil, with clay subsoil, is always desirable, and bet- er than clay undrained.

Deep Planting of Fruit Trees a Preven- ive of Blight. — Out of eight to ten hundred 'pple trees so deeply set that an ordinary spade ırust square down will not reach the uppermost oots, we have yet to see the first case of bark-burst- ıg or blight. We attribute the exemption of our ees from these diseases, or whatever else they may e called, solely to deep planting, and nothing else. Ve do not know of another orchard about us where ıe trees are set so deep, nor do we know of one of der or equal age wherein cases of blight or bark- ursting have not occurred. — *Western Pomologist.*

The Castor-Oil Plant. — This plant is a ative of India, and has been known from the earli- st antiquity, seeds of it having been found in Egyp- an sarcophagi. It was used by the Greeks. In s native country it is a perennial fifteen or twenty et high, with a thick stem. In cold climates it ecomes an annual. There are many instances of erennial plants becoming annuals by change of imate.

The rapid growth of the plant is illustrated by an ıstance reported in Tennessee. A castor bean was lanted in May, 1871, in a garden in Memphis, and ı November it had grown to the height of twenty- ıree feet, with a spread of foliage fifteen feet in iameter. The trunk, ten inches above the ground, as eighteen inches in circumference.

Emerson says: "In the great household of ature, the farmer stands at the door of the bread oom, and weighs to each his loaf."

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, JANUARY 1, 1872.

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All correspondence relating to editorial affairs should be addressed to the Editor, 150 Congress Street, Boston.

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The Time to Subscribe. — During the month of January we usually receive large accessions to our family of readers. We confidently expect that our list will be increased by several thousand during the month; it certainly will be if our friends aid us in calling the attention of those to it who do not understand its character. The name, Journal of *Chemistry*, repels many, as it is presumed that it treats of subjects which common readers cannot understand. This is a mistake, as all our patrons know; and it only needs brief explanations on their part, to induce friends and acquaintances to become its readers and strong supporters. Please speak a word for the Journal.

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ENGLISH OBSERVATIONS OF ENCKE'S COMET.

Since the interesting article by Professor Young which appears on our first page was in type, we have seen the reports of the meeting of the Royal Astronomical Society, of England, on the 17th of November. Dr. Huggins there stated that he had succeeded in obtaining the spectrum of the comet, which, as in the case of that of Comet II. of 1868, consisted of three bands, apparently identical with the bands in the spectrum of the vapor of carbon. The middle band, "near b," was much brighter than the other two, and he was quite satisfied as to its identity with the middle bands of carbon vapor, but the outer bands were so faint that he could not speak confidently concerning them. It will be perceived that this report from Dr. Huggins confirms the observations made by Professor Young, though in the early part of November the comet was too faint to permit the former to determine the position of the outer bands of the spectrum.

At the meeting just mentioned the Astronomer Royal called attention to the fact that the longer axis of the comet was directed almost exactly towards the sun, and that its head and nucleus were turned away from that luminary. This, he remarked, appears to be the rule with nearly all the smaller class of comets. "Unlike the sheep of little Bo-Peep, they carry their tails before them, and not until their smaller fan-shaped appendages have been well warmed by the sun's rays do they begin to shoot out large tails in the other direction." The aspect of the comet, according to a drawing made by Mr. Carpenter of Greenwich, was that of "a somewhat shuttlecock-shaped nebulous haze, with two wings of much fainter light, extending on either side, giving a flattened appearance to the head of the comet." A drawing made by Dr. Huggins agreed quite closely with the above. He thought he had detected a minute but distinctly marked nucleus in the head of the "shuttlecock."

Corrigenda. — The *American Journal of Science and Arts*, for December, reprints Professor Young's article on "An Explosion on the Sun," but accidentally transposes Figures 3 and 4, which makes one of the foot-notes rather "blind." In the original article, by a slip of the pen, the great prominence which so strangely "blew up" was said to be "on the eastern limb of the sun," whereas it was actually on the *western* limb.

"WHAT'S IN A NAME?"

The progress of scientific discovery in these latter days has called for large additions to our stock of English words. A glance at almost any page of "Webster's Unabridged" will show that a considerable fraction of the words are of this recent and technical character, and there are countless others that do not gain admission to a general dictionary of the language, however complete it may be. Each science has its special nomenclature, comprising, it may be, many thousands of words, only a scattered few of which find their way into general literature, or are often heard outside of "professional" circles.

What these technical names shall *be* is sometimes a perplexing question. It not unfrequently happens that the same thing — an animal or a plant, for instance — has several godfathers, and it may be difficult to decide which name is to be adopted. The first one given, if it can be ascertained, is entitled to the most respect; but the others often have to be mentioned as *synonyms*, in order that there may be no doubt as to the exact thing that is meant.

In the science of chemistry, names are thus multiplied by the rival *systems* of nomenclature which, in the last few years, have caused such a vexatious "confusion of tongues" in text-books and other chemical literature. "A rose by any other name would smell as sweet," and the odor of sulphuretted hydrogen is the same, whether we call it by that old-fashioned appellation, or designate it as hydrosulphuric acid, sulphydric acid, sulphide of hydrogen, hydric sulphide, or hydrogen sulphide, all of which are found in recent books. An ideally perfect nomenclature is unquestionably a desideratum, but a comparatively imperfect one, if universally accepted, would be far better than this Babel of antagonistic systems. Even the same names have their rival orthographies. *Oxide* and *oxyd*, *chloride* and *chlorid*, etc., have their respective advocates; and so with *glycerine* and *glycerin*, *benzole* and *benzol*, and all their kindred in *-ine*, *-ole*, *-yle*, *-one*, etc. When these competing systems of naming and of spelling are carried into those provinces of organic chemistry where each single title for a compound is a polysyllabic monster of "learned length," it is even worse. *One* such name as dimethylpropylcarbinol, or methylethylamylamine, or triethylphenylammoniumhydroxide (and these are merely average specimens taken at random) is quite enough for tongue, or pen, or memory, without the introduction of "synonyms."

How far shall *personal* names be admitted to scientific nomenclature, is a question which has more than once been raised. In botany, and the various divisions of natural history, such names have been extensively introduced, and a fearful array of Latinized hybrids has been the result. The "Flora" of any manual of botany bristles with such specific designations as *Smithii*, *Greenii*, *Buckleyi*, *Skinneriana*, *Muhlenberghii*, *Schlechtendahlii*, *Scheuchzeria*, and the like. That pretty flower, the *Eschscholtzia Douglasii*, bears the burden of two such honorary tributes, owing the former and more terrible one to the German botanist Eschscholtz, whose Californian researches have made his name as famous as its orthography is marvellous. But fortunately the vast majority of these botanical terms are not in every-day use. The fair and fragrant blossoms have simpler and more euphonious names for our familiar discourse, and their scientific appellations are seldom heard except in scientific circles. And the learned names of beasts, birds, insects, shells, etc., are for the most part similarly restricted in their use.

In astronomy, several attempts have been made to give personal names to planets, but it is now settled by general consent that this shall not be done. The planet *Uranus* was for many years generally known as *Herschel*, especially in Continental Europe, and Herschel himself wished to call it the *Georgium sidus*, in honor of his patron George III., but the mythological name prevailed; and so with *Neptune*, which was at first called *Leverrier.* When Hind gave the name *Victoria* to one of the asteroids he discovered, some astronomers opposed it as a dangerous precedent, although there was a Roman goddess Victoria. He succeeded in carrying his point, but Tempel was not allowed to christen *his* planetoid *Maximiliana*, and *Cybele* was substituted. If it had become the fashion to call planets after their discoverers, we might have such names among the starry host as Pogson, Ferguson, Schiaparelli, Tietjen, Watson, and Peters; and if the names of patrons and rulers were admitted, some celestial orb might have been known as Louis Napoleon or Thiers, Buchanan or Grant. This would have been as ridiculous as the "reconstruction" of the constellations proposed by Weigel, of the University of Jena, in the seventeenth century. He wanted to substitute modern heraldry for the ancient mythology, by placing in the zodiac the escutcheons of twelve illustrious houses of Europe, and metamorphosing the other leading asterisms in the same way; but the attempt proved as futile as that of the pious Julius Schiller, in 1627, to Christianize the heathen heavens by transforming Cassiopeia to Mary Magdalene, Perseus with Medusa's head to David with the head of Goliath, the zodiacal Aquarius to John the Baptist, and so on throughout the skies.

The subject is a tempting one, but our limits will not permit us to enlarge upon it. We will only add that the recent tendency to make use of personal names in the formation of technical terms in physics appears to us as objectionable as the astronomical vagaries just noted. We believe that Faraday proposed the word "franklinization," and "faradization" has recently been elaborated by somebody or other. *Voltaic* and *galvanic* are too well established to be repudiated, but we protest against enlarging the list of such derivatives. We do not desire to have telegraphing come to be known as "morsization," or to hear some new electrical process called "snooksization" or "stubbsization" in honor of its originator. Such words are readily adopted into the dialect of quackery, as "faradization" appears already to have been, and that would be a sufficient objection to them, even if we were not obliged to condemn them on philological grounds and also as being offensive to good taste.

A NEW AND SIMPLE TEST FOR PETROLEUM.

At the session of the American Science Association, in Indianapolis, Prof. Vander Weyde described a new test for the adulteration of kerosene, which seems to be of practical value. It is founded on the fact that all vapors given off by petroleum are combustible, and that if any kerosene or other preparation from petroleum gives off a vapor at the standard temperature of 110 degrees, it is not necessary to try whether it will burn, but merely to collect it in a proper vessel, by which we gain the additional advantage that we may measure the quantity of the vapor, while none of it can be lost by air currents incidentally passing over the surface of the liquid. He takes, therefore, a glass tube, closed at one end and open at the other, and fills it with the petroleum to be tested, then closing the open end with the finger inverts it in a vessel with water warmed to 110 degrees by mixing hot and cold water, and kept at that temperature by occasionally adding hot water. Any vapor given off will collect in the closed upper part of the tube, displacing the oil downward. The amount of this gas will be a comparative test of the different qualities of oil, and the tube may be graduated in order to measure the amount. This method is not subject to the discrepancies found in the usual way of testing, in which an impure and dangerous quality of oil may be made to appear better than it is by slow and gradual heating; and in which a light draft of air may carry off the vapors as soon as developed, so that it becomes impossible to ignite them. This new method gives freedom from the danger of using fire, more accuracy, a trustworthy means of measurement, and no chance for deception.

EDITORIAL NOTES.

Transparent Colors for Glass or Mica. — A correspondent has lately sent us an inquiry as to the best colors, and mode of applying them, for the painting of glass slides for magic lanterns. A writer in a recent number of the *Zeitschrift für Färberei*, states that the aniline colors are especially adapted for such purposes, as they have great intensity of color even in very thin films. The process he recommends is to prepare separately an alcoholic solution of bleached shellac or sandarach, and a concentrated alcoholic solution of the aniline color; then to add the latter to the former before using it, warming slightly the glass to be painted. The same authority states that colored solutions of guncotton in ether may be used for the same purpose, the coloring matters being dissolved in alcohol and ether. The addition of some turpentine oil increases the elasticity of the collodion fibre, which, if the liquid be applied cold, can be removed entire. It may then be cut into any pattern, and again attached to glass or mica. This latter process would sometimes be a convenient one.

The Separation of Chlorine, Bromine, and Iodine. — In a late number of Fresenius' *Zeitschrift für Analytische Chemie*, the following process is given for the separation of the above elements. The three elements are precipitated as silver salts. The mass while moist is heated with a solution of sesquicarbonate of ammonia, which is prepared by dissolving transparent crystals of carbonate of ammonia in 9 parts of water, and to each 10 cubic centimetres of the solution 5 drops of a 10 per cent. solution of ammonia is added. If the carbonate of ammonia is effloresced, a drop of the ammonia solution, is added for each cubic centimetre of the solution, and it is allowed to stand for a day in an open vessel. To the moist mixture 80 or 100 times its weight of the above solution is added, it is then boiled for a few minutes; the residue, consisting of iodide and bromide of silver, is then washed by decantation and treated with a solution containing 5 per cent. of ammonia, which dissolves the bromide of silver and leaves the iodide. The author has proposed this as a quantitative method, but the results as given by him do not seem to be sharp enough for successful employment, as both the iodide and bromide are slightly soluble in the sesquicarbonate of ammonia, and the iodide of silver is slightly soluble in ammonia.

Test for the Detection of Small Quanti-ies of Sulphur in Coal-Gas. — Dr. Wartha orms, first, before the blow-pipe, in the loop of a latinum wire, a bead of pure soda, and next passes his bead over the edge of the gas flame, after which he bead is held in the interior of the flame in order to deoxodize the sulphates and sulphites of soda nto sulphuret of sodium; the bead is then trans-erred to a porcelain basin, crushed, and some nitro-russide of sodium added, whereby the smallest race of sulphur will be detected. This reaction is fty times more sensitive than that upon silver foil; nd the test can be performed in about three min-tes, whereas Dr. Vogel's sulphur-copper reaction or this purpose takes four hours.

Good Kerosene and a Tough Skull. — It is efreshing to meet with a case like that which an xchange reports from New Bedford. "An old entleman, seventy years of age, fell down stairs ecently with an armful of books and a lighted erosene lamp. The lamp was shattered, but there as no fire. The old gentleman's head struck gainst and completely demolished a wooden pail, ut his skull remained in shape." Our aged friend as fortunate, both in regard to the quality of his erosene, and the thickness of his skull. We trust, owever, that his good luck will not make septuage-arians careless in going up stairs heavily laden ith lamps and literature, for such a happy com-ination of circumstances is not likely to occur equently.

ATOMS.

The electric girdle that will soon surround the lobe has had another link added to it by the tele-raph cable recently laid between Batavia, in Java, nd Port Darwin, Australia; and messages can ow be sent through from New York to Australia. — he fishermen of a single English town, Lowestoft, aught in two days twenty-two million herrings, orth at the retail price of a penny apiece, £91,666; ut, as it was impossible to take care of them all t time, many tons had to be sold for manure. — r. Needham, in the *Journal of Materia Medica*, lvises the use of the fluid extract of clover in can-er, and from the testimony of other medical jour-als it would appear that it has a far better claim ian cundurango to be considered a specific in that sease. — Gas is shortly to be introduced into okohama and Yedo, in Japan; the plans for the orks having been made by French engineers, and ie contract for their construction taken by a firm Glasgow, Scotland. — It is said, on excellent au-ority, that calomel applied dry once or twice a y to tumid and tender hæmorrhoids rarely fails cure them in a few days. — In Manila, twenty-ve thousand women and children are engaged in ie manufacture of the well-known Manila cigars, average wages at seven cents a day. — The *Rail-ad Gazette* shows that the idea of heating railway rs with steam from the locomotive boilers is im-acticable, as the best boilers yet made are barely pable of supplying sufficient steam for driving the igine. — Real estate is "going down" in Hyde ark, Pa., for the giving way of the top of a coal-ine under that village lately caused an area of enty acres to sink some two feet below its former vel, and there is danger of a further "depression" prompt measures are not taken to prevent it. — rofessor Wood, of King's College Hospital, is said to meeting with success in the treatment of pyæmia keeping the patient's body in a carbolized at-osphere, together with the internal administration the sulphocarbolate of iron. — In a single day ore than a hundred thousand bushels of oysters ive been taken from the Chesapeake Bay, which the greatest oyster-bed in the world, and is said be inexhaustible. — Dr. P. F. Whitehead, after effectual efforts with other agents, found that thirty grains of chloral hydrate immediately and permanently relieved a case of hiccough which had continued for thirty-six hours; and Dr. T. L. Leavitt also reports several cases of the same disorder promptly arrested by chloral. — The London and Northwestern and the Lancashire and Yorkshire, two companies which hold about one-seventh of the railway capital of Great Britain, have been consolidated with nearly $500,000,000 capital. — It is said that cod liver oil may be taken as agreeably as a sardine, if a small quantity of salt be first placed on the tongue; and castor oil may be made perfectly palatable by rubbing two drops of oil of cinnamon with an ounce of glycerine and adding to it one ounce of the castor oil. — To detect traces of iodine, M. Pellogio places the suspected solution, mixed with starch paste, in a porcelain dish, and then passes an electric current through it; when, if iodine be present, it is indicated by a blue coloration at the positive pole. — The new Opera House, in Providence, R. I., which is considered a model structure of its class, was the work of Mr. John A. Fox, a young Boston architect. — The 117th asteroid, to whose discovery by Dr. Luther, we referred in our last, was detected two days earlier by M. Borelli at Marseilles, and "Silliman's Journal" says it has been named *Lomia*, which we suspect to be a misprint for *Lamia*. — In an otherwise well-written article in the London *Building News*, we read that "the specific gravity of iron is 3.79, and that of lead 11.35, or almost exactly three times that of the former metal" (the specific gravity of *Yankee* iron is about 7.79), and the statement, though made some month or two ago, has not yet been contradicted.

Pharaoh's Serpents. — These, once so largely popular toys, have been almost entirely abandoned, owing to the poisonous character of their constituents and of their fumes. Dr. Puscher now announces that a mixture of 2 parts of bichromate of potassa, 1 part of nitrate of potassa, and 3 parts of white sugar will produce the effect of the serpents without the attendant inconveniences. He recommends the mixture to be done up in paper or tin foil cones, as the original "serpents" were; and also the addition of some balsam of Peru to perfume it.

Remarks. — We have prepared some of the composition as given above, and find when ignited it does not give a "serpent" at all comparable with those resulting from the sulpho-cyanide of mercury. The serpents are of a green color and break very easily. In order to make them, the materials should be mixed and then slightly moistened; they may be then moulded into cones, which should be several times larger than those made of sulpho-cyanide of mercury.

Thanks. — Mr. N. B. Morrison, of Odin, Ill., sends to the Journal a fine list of new subscribers, and writes as follows: "I take pleasure in sending the following list of new subscribers to your most valuable journal, as I am certain the amount of instructive and interesting information each one will obtain will be worth many times the cost of subscription." We print this as a specimen of many letters we receive, in which our friends send the names of new patrons which they take the trouble to obtain, without desiring premiums or discounts. They work for the Journal because they feel that its influence is good, and that its instructions are needed in every family.

The American Journal of Science and Arts. — Every friend of science in the United States ought to aid in the support of this excellent journal. It is an honor to our country, and is received in Europe and throughout the world as the representative of American scientific culture. It is devoted to pure science, and as journals of this class are not supposed to be of interest except to students and men engaged in scientific research, they usually receive inadequate support. The view taken of these journals by cultivated men even is a wrong one. Of course, "Silliman's Journal," as it is popularly designated, contains much that is not of general interest, but it also contains much that all intelligent readers can understand, and which is very important and instructive. But if it is not read at all, our men of wealth and culture ought to become its patrons, as by so doing they become the patrons of American science, and give encouragement to those who are laboring night and day to extort from Nature those great secrets, which have so important a bearing upon national wealth and individual happiness. The editors of the journal are Professors Dana and Silliman, aided by Professors Gray and Gibbs of Cambridge, and Professors Newton, Johnson, Brush, and Verrill of New Haven.

LITERARY NOTES.

Messrs. Putnam and Son, of New York, have published *Lectures on Natural Theology*, delivered before the Lowell Institute, Boston, by P. A. Chadbourne, A. M., M. D., of Williams College. The author certainly possesses a versatility of talent not usually found among our educators. He appears to be equally at home, whether he be at the head of an Agricultural College, or President or Professor in other Colleges; we hear of him at one time as the leader of a party of students to the icy shores of Greenland, and at another as botanizing among the everglades of Florida, or collecting minerals among the mountains of Brazil. One season he is among the silver miners in Utah, the next he is exploring the cliffs and valleys of the Sierra Nevada, or dredging in San Francisco Bay. As naturalist, chemist, botanist, metallurgist, agriculturist, and theologian, he is well qualified to consider and discuss the relations of science to theology as taught in nature; and in the lectures before us he has performed a difficult work in a creditable manner. The theme is one which has occupied the minds of some of the greatest men that have ever lived, and many able treatises have been written, but there is a freshness and originality in Professor Chadbourne's book which commands the respect of scholars, and holds the attention of general readers.

The *Twelve Lectures on Agricultural Topics*, delivered before the Lowell Institute, Boston, by Alexander Hyde, have also been gathered into a volume. They were well received at the time of their delivery, and the author has revised and enlarged them so as to form a general treatise upon soil cultivation. It is the work of a practical man, and contains many suggestions of much value, conveyed in a style which is simple, direct, and forcible.

Dr. J. H. Klippart, Secretary of the Ohio State Board of Agriculture, has sent us his Report upon the Agricultural Survey of the State. It is a very important and interesting document, and one which must be of great service to the agricultural interests of Ohio. It discusses in a very clear manner the nature of the soils, meteorology, forests, etc., of the different counties, and also has much to say regarding plant food and the growth of plants.

A Southern lady, Miss E. L. Howard, of Kingston, Georgia, undertook several years ago the task of translating Professor Ville's *Lectures upon Manures*, delivered at the experimental farm at Vincennes, France. Difficult as the undertaking was for one having but limited acquaintance with chemical terms and theories, she accomplished the work admirably, and we are pleased to notice that a third edition has just been issued at Atlanta. Miss Howard has conferred a great service upon agriculture by translating this little book, as it is a treatise full of important facts and suggestions.

Messrs. Hurd & Houghton have issued *Macaronic Poetry*, by J. A. Morgan, A. M., a collection which classical scholars have often longed to see, and which deserves a permanent place among the "Curiosities of Literature."

The Harpers publish for the holidays, Morris's *Dogs and their Doings*, and Du Chaillu's *The Country of the Dwarfs*, both of which are at once attractive and instructive, and may be cordially recommended as presents for the young folks; and the same may be said of Abbott's *Water and Land*, the third volume of the excellent series of "Science for the Young."

The Appletons add to their list of educational works a *Text-book of Geology*, and a *Text-book of Zoölogy*, both by Prof. H. A. Nicholson, of University College, Toronto. The author's views upon elementary teaching in the sciences are sound and sensible. He has treated his subjects in a purely scientific spirit, without attempting to lend them "any false glitter or embellishment." We believe that every true teacher will welcome books prepared on such principles.

Messrs. Chatfield & Co., of New Haven, have gathered up the first five numbers of their "University Scientific Series" in a neat volume under the title of *Half-Hours with Modern Scientists*. They have also issued President Woolsey's two sermons, *Serving our Generation, and God's Guidance in Youth*, and an *Elementary Music Reader*, by B. Jepson, intended for use in public schools.

Medicine.

HYDRATE OF CHLORAL AS AN ESCHAROTIC.

SOME time ago a correspondent of the *Scientific American* made the following statements regarding a new application of hydrate of chloral. We have not learned that any reliable experiments have been made with the agent, as regards its suppurative or rubefacient effects, but it would be interesting, and perhaps important to test its value in this direction.

Some months ago, when preparing a solution of the chloral, I held the stopper of the bottle containing it between my lips for a few moments. A small quantity of the crystals was sticking to it, and, on replacing the stopper, I found a red spot on my lower lip; this spot became quite sore, and continued so for several days. This fact led me to experiment with the chloral. The result is, I have found it to be one of the best, possibly *the best*, suppurative agent known. According to the time it is left on the skin, it becomes a perfect rubefacient, irritant, suppurative, or even escharotic.

I have given it fair tests personally, and strongly recommend its use; but *externally* only. When applied, the burning is precisely like that produced by a cataplasm of strong mustard; but, at the same time, a sedative action is perceived, which somewhat neutralizes the smarting, while it does not prevent an excessive irritation of the skin. It does not blister, but the part the choral has been applied to becomes exceedingly inflamed, and more or less swollen; and according to the length of time of application, shows a merely reddened skin, or a suppuration of several weeks' duration.

I give you my mode of application: Take a piece of fresh adhesive plaster, of the size wanted, and crush fine, on its surface, with an ivory spatula, enough of the crystals of the chloral to powder the piece of adhesive plaster quite evenly; use the edge of the spatula to take off the chloral where it is more than a mere dust in thickness, but distribute evenly, leaving one third of an inch margin for adhesion: heat the back of the plaster for an instant only, and apply. Leave it on about half an hour as a rubefacient, six hours as an irritant. To produce suppuration, put the chloral on the plaster in larger quantities, and leave on from twenty-four to thirty-six hours; on its withdrawal, apply a stimulating salve, and afterwards heal with cerate. For an escharotic effect, apply the chloral, thickly spread, and, after twelve hours, repeat the application, if necessary.

It is surprisingly active as a suppurative, and, for this reason it will not be prudent to apply it to any part of the surface of the abdominal cuticle, as, in one case under my inspection, having been left on too long, it occasioned a deep ulceration that was difficult to heal.

In this new mode of use, the chloral is truly invaluable; it is easily applied, cleanly, and perfectly reliable. It is a first-class derivative in facial neuralgia, ear-ache, headache, and any affection of the eyes; a small plaster, of a half inch diameter, that can be hidden by the hair, being sufficiently active, if prepared with enough chloral, to irritate in a very short time. I earnestly recommend the above facts to the notice of the medical faculty.

THE SMALL-POX AND ITS LESSONS.

THE Board of Health at Lowell have published a report upon the epidemic of small-pox, with which that city was recently visited.

The Board called to their aid a committee of seven "consulting physicians," and their report, drawn up by Drs. Nathan Allen, Gilman Kimball, and J. W. Graves, is appended to the document. The following remarks, with which the physicians close the record of their doings, are suited to other latitudes than that of Lowell, and it would be well if they could be published and pondered through the length and breadth of our land:—

This sad record of disease and mortality has its lessons of admonition and instruction. When this epidemic first made its appearance, our people were, unfortunately, but poorly protected against its ravages. There had been no general vaccination, by official authority, for six or seven years, and, in the meantime, an entire change had taken place in nearly one third of our inhabitants. Besides, the mixed character of our population, composed as it is largely of young persons, renders it more necessary that a thorough course of vaccination, by official order, should be resorted to frequently, as a safeguard against the disease. Again, our Boards of Health, as usually constituted, are not chosen with any particular reference to special qualifications to insure intelligent and efficient action, are changed almost entirely every year, and no compensation is allowed for services thus rendered. The medical profession, as such, has not been represented upon the Board for many years, and even the City Physician is not a member of it. We have a superintendent of streets, of buildings, of city scales, and of *burials*, even, but no superintendent of public health. Had our city been provided with such an officer, or had the advice of some of our oldest and most experienced physicians been followed, at the time, we believe the present epidemic would have been suppressed in its incipient stages. The city expends money liberally, every year, to protect property and make improvements of various kinds, but nowhere do we find any appropriation directly for the prevention of disease, or the preservation of human life. No small amount of sickness and mortality occurs here every year, caused by nuisances and various other sources, which might easily be prevented by the proper employment of hygienic and other agencies. The City Physician and City Marshal are, to be sure, charged in the ordinances with certain health duties, but they always have enough else to engage their time and attention, and neither is chosen with any special reference to qualifications in this particular department of public service. Neither can it be expected that such important duties will be properly performed, under a sense of personal responsibility to the public, without the appointment of suitable officers, accompanied with an adequate compensation.

How frequently, of late, has the whole community been shocked by the loss of life, in the fall of some building, some railroad disaster, explosion, or by the wreck of some vessel at sea; but here in our midst, this very year, have the lives of one hundred and seventy-five individuals been quietly sacrificed, which, apparently, might and ought to have been saved! Shall we not profit by such sad experience in the past, and ought we not now to prepare for another great epidemic, with which our country is seriously threatened the coming year? Let the suggestion be seasonably heeded.

ON THE ESTIMATION AND DETECTION OF SUGAR IN DIABETIC URINE.

THE first circumstance that attracted notice was the ordinarily high specific gravity of diabetic urine; yet some specimens loaded with sugar had almost a normal specific gravity. This was difficult of explanation, unless solids may be present in liquids in different molecular states. Ordinary urinometers are not to be trusted, some being correct within ten or fifteen degrees. The presence of torula cerevisiæ is not to be regarded as any proof of the existence of sugar. No less than three kinds of fungi are to be found in diabetic urine, and all three without a trace of sugar. With reference to the different kinds of sugar found in diabetic urine there was—(1) the ordinary grape-sugar; (2) a variety resembling misilæ; (3) one differing from both these, and remarkable in several particulars. Passing to the chemical tests, the author remarked that if carbonic acid was to be collected for the purpose of estimating the quantity of sugar, it was better collected over oil than any other way, and if great accuracy were required, he suggested allowing the carbonic acid to pass into baryta water, the precipitate being weighed as a sulphate. 1. Dr. Roberts, of Manchester, had suggested taking the specific gravity both before and after fermentation, and from this estimating the amount of sugar present. The test gave very variable results. At one time very accurate, at another very inaccurate, results had been obtained. 2. The copper test was valuable, although there were several bodies that interfered with its action, and, as a quantitative test, Dr. Tidy had very little opinion of it, as it was impossible to mark the exact point where the blue color had disappeared. 3. Moore's test: The dark color due to melassic acid produced when diabetic urine was boiled with potash solution. A series of solutions were placed on the table containing different but known quantities of sugar, but in each the same quantity of alkali. They ranged from 0.25 gr. of sugar to 2.0 gr., and the difference of tint was perfectly marked. Dr. Tidy proposed this, an adaptation of Vogel's method, for estimating sugar. The method of working was as follows: A potash solution containing 1 gr. of potash to every septem (7 gr.) of water having been made, take 10 septems of the urine, add 10 septems of the solution; boil for one minute, dilute with distilled water in a four-ounce vial (similar to those used for the test solutions), and then compare with the test solutions labelled as containing known quantities, until the exact tint is found. The small quantity of urine employed does not color the water so as to interfere with the test. If any precipitate is produced by boiling, it must be filtered. If the tint was more than that indicated by two-grain standard bottle, it must be marked and diluted. The experiment made gave:—

$$\left.\begin{array}{l}1.25 \text{ gr. in } 10 \text{ septems}\\ 12.5 \text{ gr. in } 100 \quad \text{"}\end{array}\right\} = 17.86 \text{ per } 1{,}000 \text{ gr. of urine.}$$
$$12.5 \text{ gr. in } 700 \quad \text{"} \qquad = \text{about } 8.6 \text{ per oz.}$$

Dr. Tidy proposes to get rid of the trouble of the standard solutions by using gelatine colored of different tints, as standards for comparison.—*Medical Times.*

ICE AND COLD WATER AS LOCAL APPLICATIONS IN SCARLATINA, CROUP, ETC.

DR. CARSON, in a series of able papers in the *Philadelphia Medical and Surgical Reporter*, calls attention to the happy results following the use of ice and cold water in scarlatina, diphtheria, croup, quinsy, etc. The good effects of ice-water applications to the throat externally, and ice in substance as a gargle to the throat, were almost magical. Fatality was vastly lessened, recovery was rapid, and sequelæ were uncommon. The cases of scarlatina were not selected, but all were given,—malignant, anginose, and simple. Dr. C.'s observations as to the effects of these agents run through some twenty or more years. As his experience with them has increased, so has his faith. He reasons that the diseases in question are originally local in their action, the systemic trouble being secondary. Combat and arrest the local trouble, and the systemic disorder will be prevented or lessened. He condemns the practice which consists in caustics, astringents, irritants, and poultices to the throat and neck, as but adding fuel to the fire. The indications are to cool the burning throat, to con-

·inge and tone up the blood-vessels, and lessen the ·er. All this is accomplished by allowing the tient to suck ice, to gargle the throat with ice-ιter, and by enveloping the neck in bags of ice, d by cold affusions to the general surface. This actice is to be kept up steadily throughout the ιole course of scarlatina. This, together with pport by nourishment, is all that need be done in e mildest as well as the severest cases. Albumi-ria and enlarged glands do not contra-indicate e use of ice and ice-water. Dr. C. contends that ere is no danger of retrocession of the disease un-r the use of these agents. He gives over one ndred cases of scarlatina in one year, all treated these means, with not a single fatal result.

The same treatment is equally successful in diph-eria, membranous croup, and quinsy. It is re-arkable that our text-books on practice and the seases of children have given hardly a passing no-ιe to these simple therapeutics in the management diseases so dangerous to life.

HYPOSULPHITE OF SODA IN VARIOLA.

In an epidemic of sixteen cases of small-pox on ιard of the U. S. S. *Benicia*, at Yokohama, Dr. 'm. A. Corwin, Asst. Surg. U. S. N., states (in ιe *Medical Record*) that not being able to get the *sulphite* of soda, "with the concurrence of Surgeon elson the *hyposulphite* was employed in drachm ses, and we had every reason to be gratified with ιe result. This treatment, used in the premonitory ver *only*, was commenced with the *fourth* case, and s effects carefully watched. They were those of ι *alterative*, mild *hypnotic*, and *laxative*; its admin-tration being in most cases followed by a subsi-ence of the fever, a tardy or incomplete develop-ιent of the eruption, and relaxation of the bowels ith watery stools. Upon the full development of ιe eruption the remedy was generally discontinued, ιd a supporting *régime* adopted, — egg and brandy ixture, with easily digested food. The good effects the salt were generally manifest after the first ose; the patient losing the heat and dryness of ιe skin, expressing himself as much more comfort-ble, and passing a good night. In two or three of ιe cases, the eruption was delayed from twelve to venty-four hours after the usual time for its ap-earance, and in one patient the eruption consisted irregular erythematous patches with successive ops of minute vesicles in the flexures of the limbs. he average duration of the first three cases (fatal) as six days. Of the cases that recovered, one was *alignant*, the rest of all degrees of severity. Their verage duration was *twenty days*. What I particu-ιrly wish to have noted is the fact, that in direct roportion to the early and free use of the remedy, ιally harmless for evil while so potent for good, as the disease ameliorated and its average dura-on shortened, and this in an epidemic of more than sual severity."

MEDICAL MEMORANDA.

The Formation of Sugar in the Liver. — 'rof. J. C. Dalton, in a paper on this subject, read efore the New York Academy of Medicine, de-cribes an extended series of experiments upon dogs, ιade with a view to settling the question whether ιe hepatic sugar which appeared with such rapidity fter death existed in minute quantity in the organ efore death or was entirely a *post mortem* produc-ion. As the most delicate test for glucose, he se-ected Fehling's solution, which is a double tartrate f potash and copper dissolved in an alkaline solu-ion, containing in a given volume a given quantity f copper. He experimented with twenty dogs, sing this test; in four cases the liver was placed n boiling water, and in sixteen in alcohol immedi-tely after removal from the body: the longest time that elapsed from the separation to the immersion in boiling water or alcohol being thirteen seconds, and the shortest time six and a quarter seconds, and in every instance the final watery solution gave a decided sugar reaction.

The conclusions to which Prof. Dalton comes, as the result of these experiments, are the following: —

I. Sugar exists in the liver at the earliest period at which it is possible to examine the organ after its separation from the body of the living animal.

II. The average quantity of sugar existing in the liver at this time is at least two and a half parts per thousand.

III. The liver-sugar thus found does not belong to the arterial blood with which the organ is supplied, but is a normal ingredient of the hepatic tissue.

The Mullein Plant. — Mullein is common in the United States, growing in recent clearings, along the sides of roads, in neglected fields, etc., flowering from June to August. According to the *Half-Yearly Compendium*, the plant has valuable medicinal properties. The leaves and flowers are the parts used. They have a faint, rather pleasant odor, resembling that of a mild narcotic, and a somewhat bitterish, albuminous taste, and yield their virtues to boiling water. Mullein is demulcent, diuretic, anodyne, and anti-spasmodic. The infusion is useful in coughs, catarrh, hæmoptysis, diarrhœa, dysentery, and piles. Its diuretic properties are rather weak, yet it is very useful in allaying the acridity of urine which is present in many diseases. It may be boiled in milk, sweetened and rendered more palatable by the addition of aromatics, for internal use, especially bowel complaints. A fomentation of the leaves also forms an excellent local application for inflamed piles, ulcers, and tumors. The leaves and pitch of the stalk form a valuable cataplasm in white swellings, and infused in hot vinegar or water, it makes an excellent poultice to apply to the throat in cynanche tonsillaris, cynanche maligna, and mumps. The seeds are said to pass rapidly through the intestines, and have been successfully used in intestinal obstructions. They are narcotic, and have been used in asthma, infantile convulsions, and to poison fish. The infusion may be drunk freely. The flowers, placed in a well-corked bottle and exposed to the sun, are said to yield an excellent relaxing oil.

Chloral in Toothache. — Dr. Page, in the *British Medical Journal*, states that for some time past he has employed chloral hydrate, not only as an internal sedative in dental neuralgia and caries, but also as a local application to a carious tooth. A few grains of the solid hydrate placed on a quill-point, introduced into the dental cavity, speedily dissolve, and the pain is either deadened or effectively allayed. A second or third application of the remedy may be necessary.

Action of Medicines. — Dr. Chambers, of London, in his late Harveian oration, made the following remarks on the importance of observing the action of remedies: "To the court of experience we are, one and all of us, called as jurors. There are millions of experiments performed daily by observers who can regulate their conditions. But how are we prepared for turning the experiments to account? What training does the medical student go through which shall enable him to exercise his franchise? I cannot but say that those of us who are teachers in schools have greatly failed of our duties in this respect. I have never yet, as examiner, come across a candidate for diploma instructed in the art of systematically observing and recording the action of medicines. What an awful waste of raw material is here! Surely the chairs of materia medica would be better employed in training a class how to observe than in discussing varieties of cinchona-bark or the shape of senna-leaves — a kind of knowledge which no one ever really gets from lectures, but, if he require it, either from a book or a warehouse."

Koumiss. — The use of koumiss may be regarded as a variety of "the milk cure." Koumiss is prepared in Russia by the fermentation of mare's milk; and a similar substance has been made in England from cow's milk. It is a sweetish, acidulous-tasting liquid, which can be taken in large quantities much more easily than other forms of milk. It is the chief diet of a hardy race on the steppes of Russia, near the lake of Baikal, where it is said consumption is unknown. This exemption attracted the attention of the Russian faculty and of the government. Establishments for the koumiss cure were opened in other parts, and a knowledge of the method of treatment is spreading over Europe.

Treatment of Footsoreness. — The *Lancet* states that the Inspector General has directed that every man suffering from feet blistered by marching is to be taken at evening parade to the medical officer, who should cause him to wash his feet, and then to pass a needle with a worsted thread through each blister, cutting off the thread a little distance outside the blister at each side, and leaving a portion in it. The part is then to be rubbed with common soap, the sock put on and wetted over all prominent points, and the soap again rubbed over them freely. When properly attended to, no man should be unable to march the following day on account of blistered feet, unless the cuticle has actually been removed, leaving a raw surface exposed.

Extract of Meat. — Kemmerich states in the *Deutsche Klinik*, that after administering the extract in the form of soup to animals, he found the mucous membrane of the stomach in a state of active hyperæmia, and especially at those places where the glands secreting the gastric juice are situated. It is to be assumed, therefore, that the use of the meat extract favors secretion of the gastric juice. He found that, under the moderate use of the extract, the pulse is quickened and becomes stronger, and that there is at least a temporary increase in the temperature. Too large quantities are injurious, especially to young and weakly persons, and for adults the average amounts should be only about five grammes in the day, and should never exceed fifteen. When given along with suitable food to persons recovering from exhausting diseases, the increase of weight is more rapid, and the period of convalescence materially shortened. As a stimulant it resembles alcohol and coffee, but has the advantage over them by aiding in building up the structures of the body.

Cundurango in England. — Our government some time ago forwarded a quantity of the cundurango plant to the government of England, in order that its alleged influence over cancer might be tested. A Mr. Davidson, the house surgeon of the Middlesex Hospital, to which some of the drug was forwarded, reports in the *Lancet* that "the results plainly show that cundurango is as futile as any of the cancer-cures which have preceded it. It was used in four cases: 1. In an ulcerated epithelioma of the roof of the mouth. 2. In primary cancer of the penis, and secondary injection of the lymphatic glands of both groins. 3. In an ulcerated epithelioma of the scrotum. 4. In an ulcerated scirrhus of the female breast. In all these cases the cundurango had positively no effect upon the progress of the disease."

Adulteration of Lard. — A writer in the *Canadian Pharmaceutical Journal* says that he lately obtained a quantity of lard from a respectable pork-dealer. It was beautifully white; indeed, he had never seen an article that looked better. His first trial of it was in preparing ointment of nitrate of mercury. The color, when the mercurial solution was added, was the reverse of citrine, indeed decidedly saturnine, developing in a short

time to a full slate color. Surprised at this unprecedented result, the usual precautions having been taken as to temperature, etc., the lard was suspected, and on examination was found to contain a large proportion of lime. Some time after, being in conversation with a lard renderer, a hint was dropped as to the relation of lime to color, when the information was confidentially imparted that a common practice among lard dealers was to mix from two to five per cent. of milk of lime with the melted lard. A saponaceous compound is formed, which is not only pearly white, but will allow of the stirring in, during cooling, of 25 per cent. of water. So much for appearances.

HYDROPHOBIA FOLLOWING THE BITE OF A CAT. — Dr. Brumwell reports in the *British Medical Journal* a fatal case of hydrophobia. The patient, a clergyman, aged 32, was bitten in the hand by a cat, which was believed to be mad, on May 14, 1871. On August 10, symptoms of the disease developed themselves, and on the fourth day of the attack death occurred. The symptoms did not differ from those usually presented by hydrophobic patients. There was good reason to believe that the cat had been bitten by a mad dog a short time before she bit the patient.

CAMPHOR. — When the mucous membrane of the nose, frontal sinuses, etc., is affected by catarrh, a strong solution of camphor frequently and for some hours snuffed up the nose, and five or six drops taken internally on a lump of sugar at first for every ten minutes, then every hour, will usually put a stop to the affection. Ordinary cold and even influenza, if treated in this manner at the *very beginning* of the attack, are generally controlled by the same treatment.

Attacks of incessant sneezing and profuse running of the eyes and nose will generally yield to a strong solution of camphor diligently sniffed up the nose. In summer diarrhœa no remedy is so efficacious as camphor, if employed at the very commencement of the disease; later it is without effect. Its influence over cholera is equally remarkable. Dose: six drops of a strong alcoholic solution of camphor, given at first every ten minutes; afterward, as the symptoms abate, less frequently.

USE OF IODOFORM. — This compound, first brought prominently into notice by Bouchardat, is now employed extensively not only for glandular enlargements, but also, owing to its anæsthetic properties, in skin diseases accompanied with intense pruritus; its odor is much more agreeable than that of chloroform, resembling that of saffron. Moretin and Humbert recommend it for internal use as possessing all the advantages of iodine, of which it contains ninety per cent., without any of its inconveniences. It exercises upon the sphincters a local anæsthetic effect so powerful that defecation is sometimes performed unconsciously after its use; it therefore forms an admirable suppository in cases of tenesmus, hemorrhoids, etc. Moûtre's formula is as follows; iodoform, powdered, twenty grains; cocoa butter, one ounce; melt and mix for six suppositories. For frictions, the ointment is used in the strength of one drachm to the ounce of simple ointment.

BRIEF EXCERPTA.

A WRITER in the *Lancet* suggests the use of an infusion of quassia as a dressing for open wounds and ulcers in hot climates or in hot weather. As flies cannot bear the smell of the wood, maggots are thus entirely avoided.

THE following is a good suggestion from a writer in the *Pharmacist*: "To secure dispatch in the mixing of extracts with ointments and cerates, we keep such extracts as belladonna, stramonium, opium, and arnica, in a fluid condition, by means of equal parts of water and glycerine. The diluted glycerine is added to its own weight of extract, and when the latter is prescribed in combination with a cerate, it of course is only necessary to substitute for the extract double its weight of the liquefied article.

PURE lard is readily obtained by rendering it from the "leaf lard" at the proper season; but it is difficult to keep it for any length of time. It is said that this can be best done by the method followed in the Apothecaries' Hall, at Glasgow, Scotland, where the freshly prepared lard is filled into bladders, which are afterwards tied at their necks, and suspended in a cool cellar.

HERR POPP has observed that castor oil turns polarized light to the right, and differs in this respect from all other fats. He also found all the commercial castor oil to contain nitrogen, and finds in these facts supports of his previously expressed opinion, that the purgative properties of this oil are due to a nitrogenated body, probably an alkaloid.

M. LEFEVRE, of Louvain, thinks that excessive smoking causes paralytic mania: because, 1st, nicotine causes in animals progressive enfeeblement of the muscles of motion up to paralysis, and congestion of the nerve-centres. 2d. Analogous symptoms have been noticed in numbers of persons who abuse tobacco in smoking or chewing. 3d. It has been found in all countries that there is a constant relation between the consumption of tobacco and the increase of general paralysis.

PROFESSOR HALFORD, of Melbourne, has been presented with a testimonial, consisting of a handsomely bound book and a purse of 120 sovereigns, as a recognition of the merits of his method of treating cases of snake-bite by the injection of ammonia.

SELECTED FORMULÆ.

A PRESCRIPTION FOR EPILEPSY. — Dr. Brown-Séquard is in the habit of using the following prescription:

℞	Potass. iodidi	ʒj.
	Potass. bromidi	ʒj.
	Ammon. bromidi	ʒiiss.
	Potass. bicarb.	℈ij.
	Inf. columbæ	f. ℥vi. M.

A teaspoonful before each meal and three teaspoonfuls at bedtime, with a little water. The medicine should be pushed until anæsthesia of the fauces is produced, and an acne-like eruption appears on the neck, face, shoulders, etc. Continue treatment for sixteen months after the convulsions have ceased, an occasional purgative being given.

FOR CHRONIC CONSTIPATION. — Dr. Bell recommends the following formula: Socotrine aloes, extract of hyoscyamus, of each twelve grains; disulphate of quinine, six grains; sulphate of iron, four grains. Make twelve pills. Of these he recommends one to be taken in the afternoon from four to six o'clock.

FOR CHAFES. — The *Pacific Medical and Surgical Journal* recommends two parts of powdered soapstone and one part of calomel as the most elegant and effective dry application to the chafed skin of infants.

ELIXIR OF CHLOROFORM. — The following elixir of chloroform is recommended by the Pharmaceutical Association at Washington:

℞	Chloroform, Tinct. Opii., Tinct. Camph., Sp. Ammon. Ar. . . .	āā. ℥iss.
	Oil of Cinnamon	♏ xx.
	Brandy	℥ij. M.

Dose: Half a fluid drachm, more or less.

FUMIGATING PASTILLES.

THE *Druggists' Circular* gives the following recipes, both of which are excellent: —

1.	Take Benzoin	2 ounces;
	Balsam of Tolu . . .	4 drachms;
	Yellow Sandal-wood . .	4 drachms;
	Nitre	2 drachms;
	Labdanum	1 drachm;
	Charcoal	6 ounces.

Mix with a solution of gum tragacanth, and div the mass into pastilles, cone-shaped, and dry th in the air. The foregoing is the formula of t Paris Codex.

2.	Take Benzoin	4 ounces;
	Cascarilla	½ ounce;
	Nitre	3 drachms;
	Gum Arabic	3 drachms;
	Myrrh	1 drachm;
	Oil of Nutmeg	25 drops;
	Oil of Cloves	25 drops;
	Charcoal	7 ounces;

All in fine powder. Beat them to a smooth m with cold water, q. s., and form into small cones a dry in the air.

SKIN-GRAFTING. — Dr. Chambers, of London, his late admirable Hunterian oration, thus allu to this interesting subject: "The becoming co scious of these invisible angels of death, hou drifting around us, reminds one of the opening that mythical box of evils with which Horace h made us familiar. Yet here too there is a hope germ at the bottom. We have to deal with (let say) an unhealthy stagnant ulcer. We strip out bit of clean skin, not so big as a mustard-seed, fr the patient or a friend, and we plant it among t torpid granulations; it sticks, it unites, it lives, feels, and becomes with its new home one flesh, n to be put asunder. John Hunter had taught us expect this. But, better still, it becomes a cent of new growth. Healthy skin begins to form rou its edges. Praise be to the All-merciful! not on disease, but health also is contagious; better still, is infectious; it has stepped over the gulf of feste ing stagnation, and is sowing growth along th neighboring margin, throwing out peninsulas a promontories to join the parent piece of grafte skin. One who has experienced in his own perso what uphill work cicatrization of a large surface i must be pardoned some exultation at this surgic promise, and may be allowed an Utopian dream o restoration which would throw present success f into the shade. Even the practitioner upon other ailments cannot but feel enthusiasm at the revela tion of this important law of Nature. Does it n promise to explain the hitherto inexplicable bene derived from firing, blisters, mustard, croton-oi caustic potash, and other means of cure by extern sores? It is when the artificial sore is getting we that the benefit arises: as the new healthy tiss shapes itself outside, it infects the diseased par with health."

A DRUGGIST SUED. — A suit was recentl brought in England against a chemist and druggi by a man to whom the former had given some me curial pills, with directions how to use them. Th pills salivated him, and an illness followed, whic the medical man in attendance ascribed to the e fects of the pills. The judge held that the law no was that every person who professed to follow an skilful employment was bound to bring to the exer cise of it a reasonable amount of skill. This ap plied to medical men, but not to chemists and drug gists, who were simply sellers of drugs. If a ma would be so great a fool as to go to a chemist an take any pills that he might give him, it was hi own fault. The matter having been argued at some length, his Honor decided that there was no case for the jury, so that, unless the plaintiff elected to be nonsuited, he should direct the jury to find a verdict for the defendant. The plaintiff preferred a verdict for the defendant, in order that he might be in a position to appeal.

It would be very well for this community if it understood that few apothecaries in this country have any knowledge of the therapeutic properties of drugs. — *Medical Times.*

Boston Journal of Chemistry.

Volume VI. BOSTON, FEBRUARY, 1872. Number 8.

Familiar Science.

CHEMISTS AND CHEMISTRY.

The idea very generally prevails among parents that their boys may readily become chemists by spending three or four years in some college laboratory, and attending the usual courses of lectures of professors and assistants. Operative or industrial chemists have many applications every year to receive young men into their laboratories, and they are assured by parents that the qualifications of their sons are first-class, as they have graduated at certain technological schools or colleges with credit. The true value of such assistance is well understood, and it is usually declined, often to the great disappointment of personal friends. Another class of applicants press their claims upon the attention of industrial chemists, — that is, boys who wish to learn the business. Parents are often very desirous of *making* chemists of their boys, as the vocation is regarded as quite lucrative or promising. Now, there is much misapprehension regarding this whole matter, and we will preface the observations we have to present by saying that chemists are not *made*, they are *born*. Parents can no more make chemists of their boys than they can make painters or sculptors of them. They may place them in the best schools in this country or abroad, they may spend large sums upon them, but after lavish expenditure of time and money sad failures result. It is equally true, that if a boy is born a chemist, all the efforts of parents to thwart his instincts, or all the endeavors to turn his mind into other channels, will prove abortive. The boy that *wastes* all his spending money in the purchase of sulphur, nitre, acids, alkalies, etc., for the purpose of making experiments, and constructs ingenious apparatus out of the most rough and scanty materials, will be quite likely to continue an experimenter to the end of his days. From such lads have come the Davys, Faradays, and Daltons, who by their discoveries have conferred benefits upon the race which it is impossible to estimate. But such boys are rare, each century producing a few, — enough, perhaps, to push the boundaries of science as rapidly as the welfare of the race requires.

What becomes of the scores of young men that graduate from our schools of chemistry every year? Comparatively few of them are ever heard of after graduation. Some we suppose become teachers; others conclude they have mistaken their calling, and seek more congenial pursuits; and thus they disappear one after another. A chemist, using the term in its proper sense, is one who has a peculiar genius, a special adaptation to comprehend problems and perform labors unlike any others which can possibly engage the attention.

Chemical investigation and manipulation demand a combination of talent seldom possessed by any one individual. Ingenuity, or the facility of devising and constructing, is of the first importance; clearness of perception, patience, a mind naturally logical and mathematical, cleanliness, order, industry, and above all enthusiasm and a love of the work are absolutely essential. To these natural qualities must be added a knowledge of the higher mathematics, and a thorough acquaintance with physics and the principles of chemical philosophy. The schools are incompetent to confer upon young men these requisites; the most they can do is to teach the elements of the science, and carry them through the routine of the general work of the laboratory.

The application of the principles of chemistry to art processes constitutes a branch of chemical labor which but few chemists are competent to carry forward. A man may be a very good theoretical, or even a good analytical chemist, and fail in practical laboratory work. The industrial production of the chemical substances which are employed in medicine, dyeing, bleaching, photography, printing, etc., requires a knowledge of processes which are not usually described in books, and which are not taught in schools. It is very easy in school laboratories to prepare a few ounces of chloroform, or isolate a drachm or two of the alkaloidal principles of opium, but to manufacture economically, in competition with the market, a hundred pounds of chloroform or a hundred ounces of morphia a day, requires a knowledge and skill not possessed by ordinary chemists. There are many little matters connected with the industrial production of chemical substances which are of immense importance, and which are only understood by those who are connected with the labor, and who have become acquainted with them by long and patient experimenting.

The services of ingenious, industrious, practical chemists are always in demand, and will command high prices. It is astonishing how few there are of this class. Those who have apparently the needed education and genius do not possess habits of industry, or their ambition is dwarfed, or they have no executive ability, or business habits. The discipline of our schools of chemistry is not, we fear, what it should be. Listless, lazy, vagabond habits are often acquired, which the pupil finds it hard to shake off when he enters upon the practical work of life. This is most unfortunate, and if possible the evil should be promptly remedied, by introducing such regulations into schools as will keep pupils actively employed during the hours of study.

It is certain that chemistry offers a useful and profitable field of research and labor to the youth who is by nature and education qualified to enter it, and it is equally certain that those who have no more than ordinary abilities, and no positive taste for the work, can only meet with disappointment in that field, and they should seek some other.

BAROMETRICAL MEASUREMENT OF THE HEIGHT OF MOUNTAINS.

It was observed soon after the discovery of the barometer that the column of mercury diminished in height when the instrument was transferred to an elevation, and rose again when the instrument was returned to its former position. This was readily accounted for by the fact that the air was less dense on the top of a mountain than at its base, as the column of air above the mountain was shorter than the column above the valley. Mathematicians at once went to work to determine the law of the variation in the height of the mercury and the relation it bore to the height of the mountains, and formulas were soon proposed by which the height of mountains might be determined. But these formulas were only approximate, and contained many empirical elements. It was reserved for La Place to make the first complete solution of the problem; and even his formulas, although they give very exact results, have certain empirical elements.

The mercurial barometer is the only one that is sufficiently reliable to be used in these determinations. The aneroid is regarded as worthless for this purpose, although some very fair determinations have been made with it. The instrument must be made with extreme care, and should be as light and compact as possible, since every pound added to the load when a man is climbing in the thin upper regions of air increases the toil and fatigue. Prof. J. D. Whitney has had made for use among the higher Sierras of California barometers which are only 27 inches in total length, and read only up to 24 inches. They are compact and portable, and are all that is required for any height above 7,000 feet. The standard barometers in use in this country are mostly made by Mr. James Green of New York. They are cistern barometers, the glass tube being inclosed in a light brass case which carries the scale, and by the aid of verniers variations may be read to the thousandth of an inch. The cistern is made of wash-leather, and by turning a screw which presses against the bottom of it the mercury may be forced to the top of the tube. When this is done the barometer is inverted, and it is always carried in this position or on its side. For transporting it, a wooden case is provided which exactly fits the brass tube, and which in its turn fits into a leather case provided with straps to be worn over the shoulder. Thus protected it may be carried on horseback even at a full gallop. Before starting on an expedition the barometer should be compared ten or twelve times, at intervals of half an hour, with the stationary instrument. This operation should also be repeated upon returning. The instruments should agree with each other within a few thousandths of an inch. If the difference is a constant one, it is most likely owing to one of

the scales being out of adjustment; this should be adjusted, and the comparison repeated.

Everything being ready for the ascent, directions are left with the one who has charge of the station barometer to observe it, together with the thermometer, every half hour until the return. This is necessary in order that if it is desired to determine the height of the timber-line or any other object, there may be synchronous observations for comparison. It is only such that are of any value, because the barometer is continually fluctuating with the hour of the day and state of the weather. Having found the difference in the height of the mercury in the two barometers, the height may be roughly estimated by calling each inch of difference a thousand feet difference in level. This is generally accurate enough for altitudes that do not exceed a few hundred feet. For those that are greater the other corrections become too serious to be neglected. The temperature of the air must also be noted, because when air is heated it is lighter than when cold, and the barometer will therefore stand higher in a cold atmosphere than in a warm one. The temperature of the barometer itself, for the same reason, must be observed. There are also other small corrections to be made, on account of the spheroidal figure of the earth and the diminution in the force of gravity as we recede from the centre of the earth. These corrections will be found tabulated in Guyot's tables, or in Loomis's "Meterology," together with La Place's formulas.

Even when all these corrections have been made, a single observation cannot be relied upon within one or two hundred feet, and therefore it is necessary to make a number if great accuracy is desired.

We venture to recommend to young men, or to girls even, the measurement of hills and mountains, as it is a pleasant and healthful summer occupation. It is quite fashionable in England and on the Continent to measure heights, and there is scarcely a hill or mountain which has not been many times measured by students of both sexes.

In this country we have accomplished but little in this direction. There are a few measurements of the White Mountains in New Hampshire and some of the higher peaks of the Alleghanies, but the Rocky Mountains are as yet almost unmeasured. The few lofty peaks that have been measured approximate closely to 14,000 feet. They are more than a thousand feet lower than the highest of the Alps, as Mont Blanc is 15,780 feet above the level of the sea. Mount Harvard, the highest yet measured of the Rocky Mountains, is but 14,272 feet in altitude. Mount Shasta and Mount Whitney in the Sierra Nevada of California are both higher, but neither exceeds 15,300 feet. The establishment of the government signal stations throughout the country will be of great service in determining altitudes, as the nearest station will always be a convenient reference for a standard of comparison. No doubt, any one wishing to make measurements could make such arrangements with the officer in charge as would enable him to dispense with any station barometer of his own.

All other conditions being the same, the vigor and richness of vegetation are proportionate to the quantity of light and heat received.

THE SARATOGA WATERS.

In a lecture upon Water, delivered in New York, Professor Chandler presents some interesting statements regarding the chemistry and geology of the Saratoga Springs. We make the following extract: —

The common origin of the springs is shown by analysis; all the springs contain the same constituents in essentially the same order of abundance; they differ in the degree of concentration merely. Those from the deepest strata are the most concentrated. The constituents to which the taste of the water and its most immediate medicinal effects are due are: chloride of sodium, bicarbonate of lime, bicarbonate of magnesia, bicarbonate of soda, and free carbonic acid. Other important, though less speedily active constituents are: bicarbonate of iron, bicarbonate of lithia, iodide of sodium, and bromide of sodium. During the great petroleum excitement, a New York capitalist conceived the idea of finding oil at Ballston, so he selected a spot on the margin of the Kayaderosseras Creek, a stream which flows through the village of Ballston into Saratoga Lake. Here this patient but ill-advised seeker after petroleum bored down through sand, clay, and hard pan, fifty-six feet, till he struck the solid rock. He tubed the well down to the rock with an iron tube six inches in diameter, and then continued the boring with a five-inch drill. For a considerable distance the drill passed through the Hudson River shales; then it penetrated the Trenton limestone, then the calciferous sand rock, and probably passed some distance into the Potsdam sandstone. At a depth of 571 feet, a vein of mineral water burst into the well, but, as oil was the object of the search, it was not heeded. Finally, our zealous borer was spared further labor in this direction by the steel reamer, which became so firmly fastened in the rock, at the depth of 651 feet, that it could not be extricated. No oil making its appearance, and further progress in the well being out of the question, attention was directed to the mineral water, when it was found that the most remarkable water of the county had been discovered. While the strongest natural springs of the county contain from 600 to 800 grains of mineral matter per gallon, this water contained over 1,200 grains. It is so concentrated that it will actually bear dilution with an equal volume of Croton water, which is more than one can say of our city milk, though the experiment is often made by the milkmen.

Like the enterprise of sending warming-pans to Cuba, this venture turned out an unexpected success. The well is now known as the "Ballston Artesian Lithia Spring." Soon after, the "Franklin" and "Conde-Dentonian" wells were bored at Ballston, and more recently the "Geyser Spouting Well" at Saratoga. All these have been successful in bringing up very concentrated waters of the same chemical character as the natural springs. It is probable, therefore, that water can be obtained anywhere in the southern portions of the county by tapping the underlying Potsdam sandstone. In all of these wells the water rises to and above the surface. Down in the rocky reservoir the water is charged with gases under great pressure. As the water is forced to the surface, the pressure diminishes, and a portion of gas escapes with effervescence. The wells deliver, therefore, enormous volumes of gas with the water, a perfect suds of water, carbonic acid, and carburetted hydrogen.

I will tell you about the High Rock Spring, the greatest natural curiosity of the county.

The High Rock Spring was the first to attract attention. It was well known to the Indians, who highly prized the medicinal virtues of its waters. The Indian name, Saraghtoga, means *place of salt*. In 1767 they brought Sir William Johnson to the spring on a litter. The spring rises in a littl mound of stone, three or four feet high, which a pears like a miniature volcano, except that sparklin water instead of melted lava flows from its little cr ter. When Sir William Johnson visited the sprin and in fact until quite recently, the water did n overflow the mound, but came to within a few inch of the summit, some other hidden outlet permittin it to escape. The Indians had a tradition, howeve which was undoubtedly true, that the water fo merly flowed over the rim of the opening.

A few years ago the property changed hands, an the new owners, convinced that by stopping the la eral outlet they could cause the water again to issu from the mouth of the rock, employed a number men to undermine the mound, and with a powerf hoisting derrick to lift it off and set it one side, tha the spring might be explored.

Just below the mound were found four logs, tw of which rested upon the other two at right angle forming a curb. I hold in my hand a piece of on of them. Under the logs were bundles of twig resting upon the dark brown or black soil of a pr vious swamp. Evidently some ancient seekers afte health had found the spring in the swamp, and t make it more convenient to secure the water ha piled brush around it, and then laid down the log as a curb. But you inquire, How came the roc which weighed several tons, above the logs? Th rock was formed by the water. It is composed tufa, carbonate of lime, and was formed in the sam manner as the stalactites and stalagmites I describe were formed. As the water flowed over the log the evaporation of a portion of the carbonic aci caused the separation of an equivalent quantity insoluble carbonate of lime which, layer by laye built up the mound. I hold in my hand a larg fragment of the rock; it contains leaves, twigs, ha zel nuts, and snail shells, which, falling from time t time upon it, were incrusted and finally imprisone in the stony mass.

ANALYSIS OF A FRAGMENT OF THE HIGH ROCK.

Carbonate of lime	95.1
Carbonate of magnesia	2.4
Sesquioxide of iron	0.0
Alumina	0.2
Sand and clay	0.0
Organic matter	1.1
Moisture	0.3
Undermined	0.4
	100.0

Below the rocks the workmen followed the sprin through four feet of tufa and muck. Then the came to a layer of solid tufa two feet thick, then on foot of muck, in which they found another log. Be low this were three feet of tufa; and there, seven teen feet below the apex of the mound they foun the embers and charcoal of an ancient fire. B whom and when could the fire have been built The Indian tradition went back only to the tim when the water overflowed the rock; how man centuries may have elapsed since even the logs wer placed in position? A grave philosopher of th famous watering place, remembering that botanist determine the age of trees by counting the rings on the section of the stem, and noticing the layers in the tufa rock, polished a portion of the surface, and counted eighty-one layers to the inch. He forthwith made the following calculation: —

High Rock, 4 feet, 81 lines to the inch	3,840 years.
Muck and tufa, 7 feet, low estimate at	400 "
Tufa, 2 feet, 25 lines to the inch	600 "
Muck, 1 foot	130 "
Tufa, 3 feet	900 "
Time since the fire was built	5,870 years.

As I have seen half an inch of tufa formed in two years on a brick which received the overflow from a spout of water containing only twenty grains of carbonate of lime in a gallon, I am inclined to think our antiquarian's estimates are not entirely reliable.

BRIEF NOTES ON SCIENTIFIC TOPICS.

A Novelty in Archæological Discovery. — In England, the discovery of skeletons by workmen engaged in making excavations is a matter of most daily occurrence, and excites only momentary tention. A skeleton belonging to past ages has, owever, been unearthed in Scotland which is somehat of a curiosity, inasmuch as it has clothes on. laborer was engaged in trenching at Racks, about e miles from Dumfries, when he came upon what rned out to be the remains of a man. Darkness ming on, further investigation was deferred until e next morning, when there was found the trunk a man's body, with the bones and clothing in a markable state of preservation, lying about nine ches below the surface. The coating of peat had en previously removed, so that originally the reains were embedded much deeper in the moss. he skeleton was headless; the garment in which was clothed was of a coarse woolen texture, and e boots were of the most primitive description, sembling specimens displayed in the Antiquarian useum in Edinburgh, each boot being one piece leather, awkwardly drawn into the shape of the ot by stitching up the back and front, and tied ith strong pieces of the same material. The *Pall 'all Gazette*, commenting on this discovery says: It is to be hoped that posterity will be spared the ain of discovering in a similar manner some of the othing worn by the present day. Our character r common-sense will be entirely lost if, for instance, pair of those high-heeled boots, such as some dies now wear, evidently with excruciating agony, e dug up ages hence, and exhibited as specimens clothing in the nineteenth century."

New Mode of Preparing Sulphuretted ydrogen. — This gas, which is so important a agent in chemical operations, may be conveniently nerated by heating a mixture of equal parts of lphur and paraffine (or with a larger proportion of lphur) in a flask to a temperature not much above e melting point of the sulphur; sulphuretted hyogen will be evolved with great steadiness. The thor recommends the process as the most convent of any yet devised for laboratory use. Where pound of the material is used in a suitable genering vessel, the evolution of gas may be prolonged several days with great regularity. The proiction of the reagent can be stopped and renewed pleasure by withdrawing or applying the lamp.

The Wear and the Repair of the Brain. The notion that those who work only with their ains need less food than those who labor with eir hands has been the cause of untold mischief. udents and literary men have often been the vicns of a slow starvation, from their ignorance of e fact that mental labor causes greater waste of sue than muscular. According to careful estiates, three hours of hard study wear out the body ore than a whole day of hard work at the anvil or the farm. "Without phosphorus, no thought," a German saying; and the consumption of that sential ingredient of the brain increases in proporn to the amount of labor which the organ is reired to perform. This wear and tear of the brain e easily measured by careful examination of the lts in the liquid excretions. The importance of e brain as a working organ is shown by the nount of blood it receives, which is proportionally eater than that of any other part of the body. ne fifth of the blood goes to the brain, though its erage weight is only one fortieth of the weight of e body. This fact alone would be sufficient to ove that brain-workers need more food and better od than mechanics and farm laborers.

The Nature of Alloys. — It has been prosed in England to call alloys "chemical mixtures." at they cannot be called mechanical mixtures, e fact that only the forces at the command of the chemist can separate them into their constituents proves. By no merely mechanical means could alcohol be separated from water or the zinc from brass; heat would, in both cases, play the principal part — and this force belongs to the domain of chemistry. As some metals will mix in any proportions, but still partially retain the character of chemical compounds, no objection can be made to the new definition. The term seems a fit one to rank between "chemical compounds" and "mechanical mixtures."

A New Application of Electricity. — It would be rash to say in these times what may or may not be accomplished by means of electricity. We can hardly be surprised at any triumph the versatile agency may achieve in new and unexpected fields. We cannot, however, help being a little astonished at the novelty of one of its recent applications. Dr. Bernier, a French physician, has proved it to be an efficient remedy for the evil effects of excessive drinking on the human nose. The doctor maintains that by application of an electric current to noses even of the most Bacchic hue, the flesh may be made "to come again as the flesh of a little child," and supports his assertion by a case performed on a female patient of his own, a woman of high rank. "Knights of the burning lamp," who have still some regard for personal appearance, will appreciate Dr. Bernier's discovery, as it promises them immunity from the dreaded outward testimony to their pet vice. We fear that the temperance reformers will consider the discovery as an unfortunate one, since its tendency may be to encourage habits of secret intemperance.

Sunflowers as Disinfectants. — More than a year ago we referred to the sanitary advantages of the cultivation of the sunflower in malarious districts. The subject has since attracted considerable attention abroad, and we see it stated that the British Government has addressed an inquiry on the subject to the Dutch colonial authorities, the answer to which has not yet been received. The *Militar Wochenblatt* has published an article by Dr. Valentine, of Frankfort, who gives many facts to show that the sunflower has the property of purifying air laden with marsh miasm, absorbing a great quantity of moist and noxious gases, and exhaling an ozonized oxygen. The plant, it is said, has proved itself particularly useful in this respect in the neighborhoods of Washington and Philadelphia, where its cultivation has rendered whole quarters healthy and fever-free, which had previously been rendered uninhabitable by the prevalence of fever. A Dutchman, Von Alstein, whose property was situated on some flooded land on the bank of the Scheldt, has planted three or four plots, thirty or forty yards from his house, with the effect of so much improving the air that for ten years no one on his property had been attacked with miasmatic fever, which continued to prevail on neighboring properties, where similar precautions were not taken. Besides this, as the French Sanitary Commission lately pointed out, the sunflower is a most useful plant. It yields about 40 per cent. of good oil, the leaves furnish an excellent fodder, and the stem, being rich in saltpetre and potash, makes a good fuel.

Popular Natural History in the Last Century. — A writer in *Land and Water*, in contrasting the past with the present, remarks that the study of natural history has increased to an extraordinary extent since the days of Bewick. Previous to that time the ignorance on the subject was often very entertaining. In the old version of the Psalms, by Sternhold and Hopkins (1787), we find, in Psalm ciii., —

"That filled with goodness thy desire,
And did thy youth prolong;
Like as the eagle casts her bill,
Again becoming young."

The authors probably believed that the young eagles were produced in this manner. In Holland's translation of "Pliny's Natural History," we read of eagles — "They die not for age, nor vpon any sicknesse, but of very famine, by reason that the vpper beake of their bil is so far ouergrown that they are not able to open it and feed themselves."

SATURN'S RINGS.

The rings of Saturn, formerly supposed to be solid and continuous, are now regarded as consisting of an indefinite number of extremely small satellites. They are, in short, a compact cluster of secondary asteroids, analogous to the primary zone between Mars and Jupiter. In the latter, it is true, a large proportion of the primitive matter has collected in distinct, planetary masses; while a similar result has been prevented in the Saturnian rings by their proximity to the central body. In one respect, however, we observe a striking correspondence. It has been shown that several positions occur in the asteroid zone where planetary periods would have simple relations of commensurability with the period of Jupiter, and that portions of the original ring occupying these positions would be liable to great disturbance. Now, the ring of Saturn is evidently subject to like perturbation by the nearest satellites. Hence gaps or chasms, analogous to those in the zone of asteroids, ought also to be found in the secondary ring. It has accordingly been noticed that Cassini's, or rather Ball's division occurs precisely where the periods of satellites would be commensurable with those of the four members of the system immediately exterior.

But astronomers have sometimes seen the ring of Saturn apparently separated by several black lines into concentric annuli. At other times, however, no such division could be detected. The fact, therefore, of the permanence of these gaps is extremely doubtful, except in the case of a division of the exterior bright ring. This has been frequently seen by eminent astronomers; and it is probable, though not absolutely certain, that it is never entirely closed. Most observers agree in placing it outside of the middle of the exterior ring. — *Prof. Kirkwood.*

HINTS FOR FRUGAL HOUSEWIVES.

To Preserve Bread a Long Time. — Cut the bread into thick slices, and bake it in an oven, so as to render it perfectly dry. In this condition it will keep good for any length of time required. It must, however, be carefully kept from pressure; otherwise, owing to its brittleness, it will soon fall to pieces. When required for use, dip the bread for an instant into warm water, and then hold it before the fire till dry; then butter it, and it will taste like toast. This is a useful way of preserving bread for voyages, and also any bread that may be too stale to be eaten in the usual way.

Fried Bread. — Put into a common biscuit pan a heaping teaspoonful of butter, and let it melt and spread over the pan; then take enough slices of bread (stale answers as well as any) to cover the bottom of the pan, and make a mixture to dip them in by beating well two eggs, and pouring in milk enough to soak the bread, seasoning it with a little pepper and salt; make the bread quite moist; then lay it on the butter and fry brown one side, and if too soft to turn, put it into the oven to brown on the top.

A Good Pudding. — The following recipe is specially commended by that excellent paper, the *Germantown Telegraph*, of Philadelphia: Pare and core half a dozen easily cooked apples, chop them into small bits; dry some bread in the oven — stale is the best — until it is crisp, then roll it into crumbs; butter a deep dish and place in it a layer of crumbs; then put in the apples, with a little

sugar, and such spices as you like; cover the apples with another layer of crumbs, and so on, adding a little beef suet, chopped as finely as possible; pour in half a pint of milk; bake till nicely browned, and serve with hard sauce.

Cracked Wheat. — For a pint of the cracked grain, have two quarts of water boiling in a smooth iron pot, over a quick fire; stir in the wheat slowly; boil fast, and stir constantly for the first half hour of cooking, or until it begins to thicken and "pop up;" then lift from the quick fire, and place the pot where the wheat will cook slowly for an hour longer. Keep it covered closely, stir now and then, and be careful not to let it burn at the bottom.

Wheat cooked thus is much sweeter and richer than when left to soak and simmer for hours, as many think necessary. White wheat cooks the easiest. When ready to dish out, have your moulds moistened with cold water, cover lightly, and set in a cool place. Eat warm or cold, with milk and sugar.

Potato Puffs. — The following is from a late English journal: "Take cold roast meat — beef or mutton, or veal and ham together — clear from gristle, cut small, and season with pepper and salt and cut pickles (if liked); boil and mash some potatoes, make them into a paste with an egg, and roll out, dredging with flour. Cut round with a saucer, put some of the seasoned meat on one half, and fold it over like a puff; pinch or nick it neatly round, and fry it a light brown. This is a good way to cook meat which has been dressed before.

Economy in Housekeeping. — The *Pall Mall Gazette*, commenting upon the Report of the Coal Commission, makes the following very sensible remarks: "The renewed apprehensions of an exhaustion of coal will possibly have the good effect of hastening certain reforms in our domestic arrangements which will economize not only coal but also other articles of consumption, and diminish the difficulties of housekeeping. One kitchen fire might do the work of a dozen by a well-arranged system of table-d'hôtes; this would reduce not only the coal merchant's but also the butcher's, the grocer's, the greengrocer's, and the baker's bills, and enable several families to have their dinners well cooked by one servant instead of ill cooked by many. The waste which takes place owing to the want of organization in our social and domestic arrangements is beyond belief; indeed it is not too much to say that, if the commissariat arrangements of a village full of agricultural laborers and their families were properly conducted on a system such as that pursued in a workhouse or convict prison, each bread earner in that village would receive a benefit equivalent to at least the doubling of his yearly income, and would, moreover, learn the meaning of the word comfort, which is not at present to be found in his vocabulary. Dwellers in cities would equally profit by learning the truth that waste and discomfort go together. If districts were to coöperate or establish stores, and make contracts for the supply of articles that are required in large quantities, they might obtain the same advantages as those possessed by regiments of soldiers and other organized bodies of men; but this would involve a system of order at home as well as at the store. So many ounces of bread, so much meat "without bone," are necessary in the course of the day for each member of a household — all beyond this is sheer waste. But few have studied housekeeping as a science, and the generality of people are as ignorant on the subject of quantity as on that of quality. Their only idea of food is some mass of provisions that will take away the appetite."

The soil of India produces no less than seventy-seven different kinds of rice.

The Arts.

A NOVEL WAY OF CUTTING GLASS.

Modern invention is remarkable for the novelty of the methods by which it accomplishes its ends. Its devices often surprise us by the utilization of some instrumentality which is the very last one that would have occurred to us as suited to the purpose. If it had been described to us as the wild dream of a madman whose insanity took an inventive turn, or as an ingenious burlesque of some of the singular "Yankee notions" that are sent to the patent office, we might be amused at it; but we can hardly believe in it as a sober reality. Many illustrations might be given of these "surprises" in the field of invention; but among recent instances of the kind we know of none more striking than what is known as "Tilghman's sand-blast," or the application of a jet of sand, driven by pressure, for the purpose of cutting or abrading glass and other hard surfaces. We are aware that sand *cuts* when it is driven against our faces by a violent wind, and geologists have called attention to the wearing away or furrowing of rocks in narrow mountain passes by long continued action of a similar kind; but we should never have anticipated that flying particles of sand could be made to do their work with perfect regularity, and that even the most delicate effects of engraving could be produced by such an agency. But all this, and more than all this, is achieved by Mr. Tilghman's machine, which consists essentially of a hopper, into which sand is fed in a dry state, and passes thence into a flexible tube, terminating in a smaller tube of metal, which passes through a larger tube or chamber, where the supply of air or steam is admitted. The sand, as it leaves the inner tube, is met by the air or steam blast, and is thus driven from the nozzle. The sand and blast tubes being flexible, they can be moved so as to apply the cutting to a considerable surface. An air pressure of seventy-five pounds to the square inch is sometimes used, but a blast of sand sufficient for many purposes may be driven by an ordinary fan wheel. A small quantity of sand is drawn into the current of air at the centre of the fan, and driven with great rapidity from the nozzle upon the surface to be cut or frosted, the latter being fixed to a table which is slowly moved before the machine. In a few seconds the smooth surface of a plate of glass is entirely effaced, and a beautiful frosted appearance is imparted to it. The sand, after it has been driven upon the surface, is conveyed again to the fan, and is thus kept in constant circulation.

The invention may be used for frosting, engraving, and grinding the surface of glass; cleaning and frosting of silver and other metals; cutting and lettering stone; embossing and engraving wood; and many other processes in the arts. Some of the effects of the sandblast are no less curious than they are wonderful. If the surface upon which the sand impinges be partly covered with a thin india-rubber cloth, paper, muslin, or even a coat of paint, the covered portions will be protected from the cutting action, their elasticity causing the grains of sand to rebound. By covering the surface with designs cut in these materials, beautiful etchings and engravings on glass and other hard substances may be obtained. In this manner perfect *fac-similes* of the finest lace may be transferred to glass without the slightest injury being done to the fabric of the lace. Even delicate leaves will resist the action of the sand-blast long enough to permit their outlines to be engraved on glass.

By increasing the pressure of the blast the hardest substances may be cut through. With a jet of three hundred pounds pressure, even corundum one and a half inches thick was pierced in twenty-five minutes with a hole an inch and a half in diameter. Iron and steel are cut away with the utmost facility. Marble may be lettered and carved in relief; wooden type may be cut; and it is even proposed to utilize the invention in coal mining to cut the mineral from its native bed. Altogether, the novel character and great utility of this invention give it an important place in the arts; and though its uses now seem to be extensive, yet there is no doubt that it will eventually be employed in many departments of industry where it has not yet been tested.

A NEW BLEACHING PROCESS.

An improved method of bleaching has been introduced by M. Pubetz, of Prague. He first prepares a vat in which 4 kilogrammes of permanganate of potassa or soda (soda generally being lower in price) have been dissolved, and adds to this $1\frac{1}{3}$ kilos. of sulphate of magnesia dissolved in water. The color of the liquid is then a very fine violet. These are the relative proportions for each 100 kilos. of wool, flax, or cotton goods to be bleached. A sulphurous acid bath is also prepared, containing 30 volumes of the gas to each volume of water. This bath must be heated to 25° C. when it is used.

The thoroughly cleansed materials to be bleached are first kept in the permanganate bath for a quarter of an hour, on being withdrawn from which they are found to be covered with a deposit of peroxide of manganese, the bath at the same time losing its beautiful hue. They are then plunged in the sulphurous acid bath, which reduces the peroxide of manganese to the state of protoxide, the salts of which, being very soluble in water, are readily removed by subsequent washing. If the yarns or fabrics resist the bleaching process, they should be treated with dilute hydrochloric acid, containing 1 part commercial acid to 20 parts of water.

This process of bleaching by alkaline permanganates deserves attention, and particularly because it affords a means by which even indigo may be discharged by a series of successive bleachings, leaving the stuff fit for re-dyeing.

NEW THINGS IN THE ARTS.

Black-Brown Varnish for Metallic Bodies. — The lustrous coat of black with which earthenware becomes coated, when long exposed to the action of hot coal smoke, is well known. Mr. C. Ruscher has conceived the idea of utilizing the property of the empyreumatic oils from coal, for the purpose of coating small articles of iron and steel, such as hooks and eyes, buttons, etc. For this purpose the metallic objects are placed upon an iron grating, over a layer of coal dust about half an inch thick, in a cylindrical vessel 18 inches high. The vessel is then securely closed, and being placed upon a bright fire, the bottom is brought to a red heat for about a quarter of an hour; it is then taken from the fire, and allowed to cool before it is opened. On the removal of the lid, the articles will be found to be covered with a tough, durable varnish, which does not crack with bending, and will resist a considerable elevation of temperature. The smaller objects may be rotated over a fire, in a machine like a coffee roaster, with a small quantity of coal

dust, by which the same kind of lustrous black coating is given.

Engraving on Glass. — A new mode of accomplishing this has been invented in Europe. Words and designs are printed on glass, by the use of type made of any suitable elastic material. The printing ink contains fluoride of calcium incorporated with it, and when the glass which has been thus printed on is submitted to the action of hot sulphuric acid, sulphate of lime is formed, and hydrofluoric acid set free, which immediately attacks the glass in the place of its birth. On subsequently washing off the ink stains, the design is found to have been beautifully etched upon the plate.

A Unique Device for Closing Beehives at Night. — A Missouri genius has recently taken out a very novel patent. The invention consists in so combining and arranging a poultry roost with the gates of one or more beehives, that the perching of the poultry upon the roost will serve automatically to close the hives. The object is to ensure the closing of the hives at night, so as to exclude the bee moth, and the opening of the same in the morning to permit the passage of the bees in and out during the day.

We wonder if the parents of this inventor did not emigrate from Connecticut, or some other portion of the original domain of Yankee ingenuity.

Lubrication of Steam Engines. — It has been a long time the practice with horologists to use graphite as a reducer of friction, in even the most delicate pieces of mechanism. In blowing engines also, if the gearing is copper, graphite is the only lubrication used. These facts led M. Thoma, of Memmingen, to try a mixture of graphite (prepared by decantation) and hog's lard, first in the stuffing box of a pumping engine, and subsequently upon a steam engine. The result was very satisfactory; the only care requisite was to keep up the quantity of graphite in the mixture, as otherwise it becomes too fluid. The next experiment was made with a paste of graphite and water. The result was equally good; the slight escape of steam into the stuffing box was sufficient to keep the graphite moist, and the lubrication seemed quite perfect, although there was no fatty matter present.

Filtering Alcohol. — The following method of filtering alcohol, or its solutions, is said to be very satisfactory, and is used extensively in Northern Germany. Clean, unsized paper (Swedish filtering paper is the best), is to be torn into shreds and stirred into the liquid to be clarified. The whole is then to be strained through a flannel bag, when the resulting liquid will be found to possess the utmost clearness and limpidity. A filter may also be made by spreading thin paper-pulp evenly upon stretched flannel or woolen cloth. When dry, the cloth so coated will be found to give better results than the felts, etc., commonly employed as filters.

PRACTICAL RECIPES.

Cement to resist Sulphuric Acid. — Take caoutchouc; melt this by a gentle heat, add from 6 to 8 per cent. of the weight of tallow, taking care to keep the mass well stirred; add dry slaked lime, so as to make the fluid mass the consistency of soft paste; and, lastly, add 20 per cent. of red lead, whereby the mass, which otherwise remains soft, becomes hard and dry. This cement resists boiling sulphuric acid. A solution of caoutchouc, in twice its weight of raw linseed oil, aided by heating, and the addition thereto of an equal weight of pipe-clay, yields a plastic mass which also resists most acids.

Green and Blue Fires without Sulphur. — In our last we gave some recipes for red fires in which no sulphur is used, and which are therefore to be preferred to the ordinary formulæ, especially for in-door experiments. The following recipes for green and blue fires have the same advantage: —

Green fire: 9 parts nitrate of baryta,
3 " shellac,
$1\frac{1}{2}$ " chlorate of potash.
Blue fire: 8 parts ammonic sulphate of copper,
6 " chlorate of potash,
1 " shellac.

The shellac must not be powdered, but only bruised into small fragments.

Glue for Card-Board. — For uniting card-board, paper, and small articles of fancy-work, the best glue, dissolved with about one third its weight of coarse brown sugar in the smallest quantity of boiling water, is very good. When this is in a liquid state it may be dropped in a thin cake upon a plate and allowed to dry. When required for use, one end of the cake may be moistened by the mouth and rubbed on the substances to be joined.

Cleaning Polished Brass. — First, remove all grease, which may be done with a solution of concentrated lye, and fine pumice or rotten-stone. A weak solution of muriatic acid and clean scouring dust will then brighten it, after which it may be oiled, with olive or cocoa-nut oil. Vinegar and common salt may be used instead of the acid. Weak vegetable acids are preferable on fine work, and vegetable oils better than animal fats.

Another method, which a correspondent of the *Scientific American* says will clean the dirtiest brass quicker and better than anything else, is as follows: Take eight parts water, and one part muriatic acid; mix them, and put in common water lime, until the mixture is thicker than water. Shake up well before using. Pour some on a rag, and put on the brass. Let it stay a minute or two and then rub.

Agriculture.

FARM PENCILLINGS AT LAKESIDE.

COST OF MILK.

Of the herd of cows at the farm, twelve are in milk the present winter, and wishing to ascertain the exact cost of the lacteal products at present prices of hay and grain, we instituted a series of experiments which extended over a sufficient length of time, and were conducted with the necessary care to settle the question. We find that the twelve cows consume in 24 hours 212 lbs. of good upland hay, 60 lbs. of corn meal, and 40 lbs. of fine feed. They drink 120 gallons of water, which is 10 gallons to each cow. The cash value, at the barn, of the hay consumed ($30.00 the ton) is $3.18, and the meal and feed cost $2.05. The aggregate cost of the food consumed each day is therefore $5.23. The total quantity of milk obtained, averaging the products of twelve days, is 96 quarts per day. The price of milk to milkmen, at the barn, is 5 cents per quart, which gives the aggregate value of the products in cash $4.80. This proves that the cash value of the food consumed by the herd of cows exceeds the cash value of the products by 43 cents each day, or in other words, the actual loss is 43 cents a day, not estimating the expense of taking care of the animals, milking, and other expenses incident to a herd of cows.

It shows that milk cannot be made, under the conditions existing at the farm, at less than 6 cents per quart, and in this estimate we assume that the manure pays for the care of the animals, risk, deterioration, etc. Now the question arises, Are the conditions under which milk is produced from this herd favorable or unfavorable? Is the food larger in amount, or more costly, or is the yield of milk less, than that of others in Massachusetts? We think not. It is probable that but very little of the pure milk sold in this city gives to the producer any profit; indeed, it is quite certain its production is attended with positive loss. There are but few towns in the State, or in New England, where the best hay is worth less than $30.00 the ton, and grain is not less in price than our estimate. We think also that there are but few herds of cows which in the dead of winter will average more than 8 quarts per day each; as a rule, the average is less. It is evident there is nothing very "gorgeous," as Ik Marvel would say, in the business of manufacturing milk. We suppose milk is sold by farmers to market men at less than 5 cents per quart, in many parts of the State; and when this is the case the loss is a serious one. In a few of the warm months of the year, when the pastures are in good condition, and the flow of milk copious, the cost of milk is not felt, but a mistake is made in assuming that it costs *nothing*. The feed of pastures even in remote sections has a *value*, and having regard to that value, the labor of taking care of cows, and the risks and losses incident to maintaining a herd, milk cannot be made for much less than five cents a quart even in the summer time. The farmer must have a higher price for his milk; common justice and fair dealing demand it, and every right-minded consumer doubtless is willing to pay for an article at least what it costs. The producer has the staff in his own hands. If his customers refuse to give a fair price for the article, let him imitate one of the bad practices sometimes seen in his cows, — let him "hold up" on the milk. A "milk famine," to be sure, would not be quite as bad as a water famine in a large city, but it would be decidedly inconvenient, and would serve to show the importance of the article, and the necessity of encouraging its production.

ABOUT COWS.

"What breed or kind of cows do you prefer?" asked a friend who was contemplating the stocking of a farm just purchased. "Well," we replied, "for our work, we prefer the good old-fashioned domestic cow, a cow purely 'native,' such as have been in New England for two hundred years." "But what do you mean? do you not admit the great superiority of the Jerseys, the Alderneys, the Devons, the Short Horns, the Dutch, the Kerry, the" — "No sir," interrupting him, "we do not admit that for stocking a New England farm, for real practical work, there is any cow so useful, so profitable, as a carefully bred, well-taken-care-of domestic cow." If one has a fine lawn, or a fancy farm, which he desires to ornament with attractive animals, put in some of the beautiful Alderneys or Jerseys; or if he has broad, rich pastures, such as are common in Holland, a few of the large, black Dutch animals will do very well, and be pleasing to the landscape, but none of these will flourish on our brown hills, and under ordinary farm treatment. We have in our herd a few of the finest, pure-blood Jerseys, and some grades of the different breeds, and they are our pets. The Jerseys are so docile, intelligent, and beautiful, they become great favorites wherever kept; and if a family desires a single cow, to receive extra care and feeding, they are indeed desirable. In our climate the winters are long and severe, the summer feed scanty, and no foreign breeds of cows will do as well, looking not alone to milk, but to beef, as

our common hardy cows. If we would take as much pains to improve our native breeds as is bestowed upon the imported, great good would result to our dairy farming. We have a cow, of pure, unadulterated native blood, which in September, soon after dropping her calf, gave *twenty quarts of good milk at one milking.* She is now giving fourteen quarts each day. If any of the fancy imported varieties do better than this, they have not come under our notice.

THE BUTTER QUESTION.

One thing is certain, if the statements of writers in our agricultural journals are reliable, the quality of milk, as regards the yield of butter, is very variable. Some observations made a few months ago in the JOURNAL, regarding the number of quarts of milk required to make a pound of butter, have created considerable excitement among milk producers, and the important question now is, Who has obtained a pound of butter from the least number of quarts of milk? So far as we have seen, no one reports success equal to that of the "Great American Butter Company," whose agent was in this city some months since, manufacturing the butter and selling "rights to make," etc., to the wondering crowd. It will be remembered that he claimed to make a pound of good butter from *a pint of milk.*

Mr. D. F. Appleton, of Ipswich, stated in the *Ploughman*, a short time since, that he was procuring a pound of butter from eight quarts of milk. This we regarded as an extraordinary result, even when we considered that Mr. Appleton's herd is composed of the choicest animals from the best breed of butter cows, and that their keeping is unexceptionable. But Mr. Call, of Windham, N. H., reports in the same journal that he procures a pound of butter from seven and a half quarts of milk, and his cow is fed on *meadow hay*, with a fair sprinkling of corn meal. This is a remarkable cow certainly. The more closely we examine the statement, the greater the wonder. Fifteen pints of milk, legal measure, weigh about 16 pounds, or 256 ounces avoirdupois. The very best milk we have ever analyzed contained 87 per cent. of water, and therefore if this milk was no better, 223 ounces of the 256 from which the butter was procured were simply *water.* It is safe to assume that the buttermilk left from Mr. Call's churnings does not have much nutritive value.

A QUESTION.

WOULD it not be more sensible, and conducive to the interests of honest husbandry, for the gentlemen who so freely certify to the extraordinary virtues, as a destroyer of insects upon plants, of an inert rock powder found in New Hampshire, to reflect before signing such documents, that any dusty substance, like plaster, ashes, lime, etc., will in a great measure protect vines and plants from the depredation of insects? We have used plaster many years for these purposes with satisfactory success, and so long as it can be bought for half a cent a pound, we shall not recommend our neighbors to purchase powdered dolomite, at three times that cost. Both act alike, and protect plants from insects, simply by their presence. They have no power of destroying insects, but by covering the leaves and the ground, the insects do not readily get at the plants. That is all. It is not necessary to pull the mountains of New Hampshire to pieces to obtain a dusty rock powder to put about our pumpkin and melon vines, and upon our onion beds. Fine road dust answers a good purpose, if neither plaster, lime, or ashes can be obtained.

We don't suppose these certifying gentlemen *pay anything* for the rock powder *they* use, but the evil consists in inducing unsuspecting and maybe indigent farmers to part with their money in purchasing such articles.

ANALYSIS OF FISH GUANO.

TWO specimens of fish pomace, or fish guano, made in Gloucester, Massachusetts, have been subjected to analysis during the past month, with the following results: —

No. 1.		No. 2.	
Water,	17.26	Water,	20.01
Ash,	10.43	Ash,	29.92
Organic matter,	72.31	Organic matter,	50.07
	100.00		100.00

No. 1.		No. 2.	
Contained nitrogen,	6.82	Contained nitrogen,	6.50
Phosphate of lime,	8.01	Phosphate of lime,	24.74

The amount of water may seem large, but it is difficult and expensive to carry desiccation to a higher point; and therefore it may be assumed that about twenty per cent. of water in the substance is an unavoidable quantity, and may serve as a standard in estimating its value. The amount of phosphatic and nitrogenous matter contained in these specimens proves that they are valuable manurial agents, and well adapted to all the grass and grain crops.

FARM PAPERS.

WE desire to say to farmers and gardeners who write to us at this season of the year, requesting copies of our papers relating to the manufacture and use of fertilizers, farm experiments, etc., that the book just published by Messrs. Hurd and Houghton, "FIRESIDE SCIENCE," contains them all. The titles of the essays are, "The Food of Plants," "Farm Experiments at Lakeside," "The Relations of Water to Agriculture," "Farm Pencillings at Lakeside," etc. These practical papers upon agricultural matters occupy nearly one third of the 300 pages which the volume contains. It may be found, we presume, at most bookstores throughout the country, or it may be ordered from Messrs. Hurd and Houghton, New York, direct. The price is $1.50. The publishers of the JOURNAL will send the book, as a gratuity, to any one who will send four dollars and the names of four *new* subscribers.

CORN AS AFFECTED BY CLIMATE AND SOIL.

MR. T. H. WEST, of Haverhill, Mass., writes us as follows, regarding Northern corn on Southern soil: —

In confirmation of Mr. Maxwell's experience in regard to raising Northern corn on Southern soil, I would say, that in the year 1835 I took some superior Northern seed corn, raised in Massachusetts, to the State of Mississippi, where I planted it.

The result was that it grew only about three feet high, and I am not sure that it had even "nubbins." It was an entire failure. It was planted on a rich limestone soil, where the common gourd-seed corn of the country would have grown nine feet in height, and produced large, well-developed ears. I think the failure of Northern corn, in that latitude, is due to the climate, although the soil differs very much from ours. There, the soil is a deep, heavy limestone, containing much humus and all the elements of fertility — especially on the river bottoms, or canebrake land, where I have seen a cornfield of a hundred acres, the corn entwined with the flower we call "morning glory" (convolvulus), and over the field the pumpkins lay so thick that a man could walk without stepping off a pumpkin. Upon such land it is inconceivable why Northern corn will not grow, unless it is on account of climate.

I think the climate will also be unfavorable to clover, on account of causing the soil to bake in time of drought (although the leguminous cow-pea grows luxuriantly), but it would be more likely to succeed on the pine-lands. In what was known as the switch-cane region, not far from Tuscaloosa, supposed to be the richest and best cotton land in the State, I should hardly suppose such soil would need the aid of green crops ploughed in. But in the more healthy and higher pine-land, whose fertility fails after about ten years' cultivation, I should suppose such a course judicious, as a means of renovation.

GOOD ADVICE FROM THE ANTIPODES.

OUR own country is not the only one where decreased production and wornout lands are beginning to admonish the farmer that Nature's laws cannot be transgressed with impunity. At a meeting of the Victoria Agricultural Society, at Heidelberg, Australia, Mr. Josiah Mitchell, of the Royal Park Farm, called attention to the fact that "the American system," as he termed it, by which "the settler subdues a piece of land, flogs it to death, and abandons the carcass, and then repeats the operation on a new subject," is prevalent among the British colonists there. Indeed, it would appear that some of them, having disposed of their first victim, are now attacking a second; for the farmers, from already exhausted districts of South Australia, are removing to Victoria, to take the benefit of a recent land bill, and of course to pursue the same ruinous system there. We make a few extracts from Mr. Mitchell's able address on "Rational Cultivation:" —

WHAT IS NOT RATIONAL CULTIVATION.

In the first place, then, the growth of the same crop year after year on the same land, "wheat after wheat" for instance; the production of successive grain crops without any manure, and with only an occasional bare fallow when the land becomes foul; burning straw instead of converting it into manure by the aid of stock, and restoring it again to the land; the laying down of land to grass after it has been exhausted by the growth of grain, — these are some of our practices that are not rational, because opposed to the laws of Nature, — rotation and restitution, — which govern the growth of plants and the continued fertility of the soil.

ROTATION OF CROPS.

Rotation, I have said, is a law of Nature that governs the growth of plants; it compels change of soil or situation. No plant will thrive continuously on the same spot. This applies as well to oak and pine forests as it does to wheat, oats, or any of our cultivated crops. The necessity for rotation or change of crop is caused partly by exhaustion in the soil of elements essential for the healthy growth of the plant, and partly in consequence of the excretory matter thrown off by the roots, rendering the soil unfit for its further growth. Yet one plant, by its death and decay from these causes, makes the most suitable preparation for the healthy growth of some other plant belonging to a different order. In

this way the great globe we inhabit has been converted out of barren rocks into the thing of beauty we now see it, and became fitted for the sustenance of man. It is upon this law, that the modern practice of British agriculture is founded, and no system of cultivation can be deemed rational if it does not embrace some rotation of crops. I need only instance the well-known success of wheat grown after peas, beans, or clover, to illustrate the advantages of rotation.

RESTITUTION OR COMPENSATION.

In conjunction with rotation we must also have restitution, or compensation, if we would maintain the fertility of the soil and avoid barrenness. Restitution and rotation should be the watchword, the creed, not merely as a matter of faith, but the everyday practice of all who desire to cultivate rationally. We cannot go on ploughing and sowing, reaping and mowing, taking all away, and giving nothing back to replace the mineral substances removed from the land. We cannot, I say, long continue this system of robbery, even with some sort of rotation, without being brought face to face in the long run with one of these two alternatives, restitution or barrenness. The time, of course, will vary with the quality of the soil, but the end must come. How little this inexorable law of restitution seems to be understood, or, if understood, how much we, by pursuing our present exhaustive practice, seem to disregard it! Yet it is no light matter, but one fraught with serious consequences to any community where a system of spoliation is carried on, instead of rational cultivation.

BEGINNING AT THE WRONG END.

In colonial agriculture generally the natural tendency seems to be to begin at the wrong end. Instead of starting from grass and the depasturing of stock, the production of grain is made the starting point. By the continued production of grain alone, the land becomes exhausted, and thereby unable to produce grass except of the most worthless and innutritious description. Now the rational course would be to start from grass as a basis, and in conjunction with this, through green crops, stock, and manure, advance to grain; then, in the course of any rotation, back again to grass. The laying down of cultivated land to grass, after a course of cropping, may be likened to putting it to bed; of course the more comfortable we make it the better it will rest, and consigning it for a time to "Nature's sweet restorer, balmy sleep," which, if I may be allowed a slight liberty with poetic diction, —

Swiftly on dewy pinion flies from fields
Of woe, too often cropped with golden grain,
And lights on slopes unruffled by a plough.

The bare fallow is like poking up the fire to make it burn away all the faster. But a green crop put in with plenty of good muck, and fed off on the land, is the true "roast beef of old England," and will be followed by plenty of bread, and cheese, and beer.

KINDNESS IN THE TREATMENT OF COWS. — Since referring to this subject in the JOURNAL we have seen in an exchange certain "rules for the cow stable," quoted from *The Scottish Farmer.* The fourth and fifth of these rules are as follows, and the owners of milch cows should see that they are invariably obeyed by their employees: —

"Gentle words and kind treatment are enjoined. Striking cows with stools, clubs, or heavy sticks will under no circumstances be allowed.

"In driving the cows to and from pasture, great pains must be taken not to hurry them."

A TEXAS paper reports that since last September 19,000 emigrants from Tennessee and Georgia, with 1,664 wagons, have entered the "Lone Star State," and that is but a part of the great tide-wave of population flowing to the Southwest.

Boston Journal of Chemistry.

JAS. R. NICHOLS, M. D., *Editor.*
WM. J. ROLFE, A. M., *Associate Editor.*

BOSTON, FEBRUARY 1, 1872.

ANALYSIS OF JOURNALS AND NEWSPAPERS.

WE suppose our publishing friends at home and abroad will pardon us for subjecting their journals to the action of fire and acids, so as we do not throw into the crucible the learned opinions, essays, and statements which they contain. Having been employed by a paper dealer to make chemical examination of two specimens of paper which were offered at the same price, results were reached which were somewhat surprising. One specimen gave only 0.68 per cent. of ash, while the other gave 9.61, and both in appearance were equally good. The ash of the first specimen was almost wholly composed of silica, tinged with a little oxide of iron, while the second was made up largely of *kaolin,* an aluminous earth, very fine and white. With each one hundred pounds of this paper there was incorporated $9\frac{1}{2}$ pounds of the clay, which cost the manufacturer about one cent a pound. If pure paper costs the manufacturer 10 cents a pound, the adulterated could be made at about 9 cents, which affords a fine margin for profit.

The results of this investigation led us to examine the paper used by various publishers whose journals come to us by way of exchange. We present below the names of some of these journals, and in connection give the ash determination of each. The percentage of ash is given as found after drying the paper at a temperature of 100° C.

Scientific American, New York	14.50
Artisan, Athens, Ga.	10.62
Independent, New York	8.71
Telegrapher, "	7.89
Nation, "	6.21
Tribune, "	3.23
Herald, "	3.06
Post, Boston	4.50
Advertiser, "	2.69
Herald, "	.98
Boston Journal of Chemistry	.46
Foreign Journals.	
Science Gossip, London	21.59
Chemical News, London	17.38
Academy, "	17.26
Land and Water, "	17.25
English Mechanic, "	15.32

From these determinations it will be seen that some of our journals are indeed "of the earth earthy." Among those examined from this country, our esteemed neighbors of the *Scientific American* send out weekly the heaviest freight of *terra alba.* Their paper-maker gives them 14 pounds of clay in each one hundred pounds of the paper; and if, as is probable, they use 3,000 pounds weekly, he sends them for distribution something over *eleven tons* annually.

We are disposed to claim that our transatlantic cousins fail to excel us in most industrial processes, but it must be conceded that the paper-makers across the big ferry are more expert than ours in fabricating paper from clay. That useful and entertaining journal, *Science Gossip,* gives in its paper *rather more than one ton of earth in every five,* and the others in the list follow close in the amount distributed.

The use of clay in paper may or may not be fraudulent; it depends upon the conditions under which it is sold. The papers containing large quantities of clay are apparently good, and probably satisfactory to publishers and patrons. If so, there is no fraud committed in using clay, provided the purchaser understands it, and the price corresponds with the price of the cheap material used in the manufacture. We wish good paper could be made *entirely* of clay: we could then double the size of the JOURNAL without increasing the expenses of publication. Our paper-maker, it will be seen by referring to the list, ignores the use of it altogether, the amount of ash being less than half of one per cent. There is a heavy, crisp quality observable in the English journals, which is somewhat disagreeable and inconvenient. It is probable that considerable tough vegetable fibre and peculiar sizing is necessary in paper which contains much clay. If journalists know regarding the materials used in fabricating their paper, they will be better able to fix upon just prices for the material, and hence the investigations here presented may be of some service to the craft.

WATER CONTAMINATED WITH SEWAGE.

No one could doubt the great importance to the health of families, of a proper disposal of town and house sewage, who had opportunities of becoming acquainted with the character of well and spring waters brought to chemists for examination. It is certain that waters are used in hundreds of families in the cities and towns of this country, which contain the germs of some of the most distressing and fatal diseases. Waters have been brought to us for chemical examination, during the past year, which were found to be loaded with impurities resulting from defective sewerage, and the cause of sickness in the families was unsuspected. We have for many years persistently urged this matter upon the attention of medical gentlemen, and we again place it before them. Our journal is read by more physicians, probably, than any other published in the country, and therefore we should fail in our duty if we did not endeavor to awaken the attention of this large army of men who do battle against disease, to the agencies which *cause* disease.

As regards private dwellings, the drainage is usually very imperfect. Among farmers, and others living in the country, all the waste waters and refuse matter are thrown out of kitchen windows, or a wooden spout leads from the sink through the walls of the house, and this affords a conduit for the filthy fluids to flow to the ground outside. Some dwellings have a loose stone drain which leads a short distance to a low place, and here the impure liquids accumulate, fermenting in summer, and spreading over the frozen ground in winter, seeking lower levels in which to repose. Now it often happens that wells are located in close proximity to these open or concealed cesspools, and into them the sewage flows. It is not safe to assume that a well is secure from contamination because it is situated a little higher than a drain or cesspool, or at a considerable distance; the character of some soils is such that it will allow the fluids to percolate through and reach the waters in the well even when they are many rods away. How disgusting the thought of using these filthy waters in families! They are usually clear enough, and often the taste is unaffected, but the organic *débris* and the soluble salts they contain are positive poisons. A physician when called to a case of typhoid fever, or any of the eruptive or the zymotic diseases, should immediately set himself to the work of *investigation*, with the view of discovering the *cause* of the affection. Nearly all acute and chronic affections originate from some specific poison which may or may not be removable, and in the search for the sources of physical maladies the sewerage of the house or neighborhood should receive special attention. The benefits which intelligent cultivated physicians confer upon families do not consist entirely in prescriptions for the sick, but in the sagacious care exercised over those who look to them for advice when medicines are not needed.

But it must be understood that the evils from bad drainage do not always concentrate in the waters used, but from the infectious germs originating in and arising from fermenting vegetable and animal substances connected with drains. Some high medical authorities in England estimate the number of deaths in that country resulting from miasmatic exhalations from sewage, and from contaminated water, as high as fifteen thousand annually. In this country, very many cases of typhoid fever originate from this cause, and numerous deaths occur, among the wealthy as well as among the poor. There can be no doubt that the recent severe illness of the Prince of Wales resulted from the use of water and air which had been poisoned by sewage matter. Our advice to all housekeepers is, to guard well all sources from whence may arise contaminations in water or air, and by so doing many very serious evils will be prevented.

IODINE.

THIS important agent has greatly advanced in price during the past year, and the prospect is that it will be exorbitantly high for a long time. The manufacture of the substance is largely carried on in the British Islands and in France, but it has never been successfully produced in this country. Several years ago a manufactory was established at Rockport in this State; but the price was so low that it could not be made in competition with the English product. It is manufactured from the common sea-weed found in such large quantities upon our coast, and we are inclined to think that a profitable industry might be established in its manufacture, since the price is so greatly enhanced. It is now used in the fabrication of a popular dye, and this will increase the demand beyond the capacity of supply abroad. Iodide of potassium, so popular as a therapeutic agent, is now so costly as to be almost beyond the reach of physicians, and the photographic artists suffer from the rise.

Although iodine is manufactured from *Fucus*, *Laminaria*, and other varieties of sea-weeds, it must be remembered that the plants get it from the waters of the ocean. That we may show to the reader how sparsely the element is contained in sea water, we will state that although the starch test for iodine is so delicate that one part dissolved in 300,000 parts of water is easily detected, yet if we concentrate sea water to the *one hundredth* of its original bulk, it affords no characteristic reaction. It is evident, therefore, that the proportion of iodine in sea water must be less than *one part in thirty millions of water*. It requires more than thirty million pounds of sea water to furnish the marine algæ with one pound of iodine, and yet one house in Glasgow, Scotland, manufactures *forty tons*, or eighty thousand pounds, of iodine from the weeds every year!

ANALYSIS OF WATER FROM AN ARTESIAN WELL.

WE have recently analyzed water taken from an artesian well in this city, which presents some interesting results. The boring was made to supply water to Messrs. Hallet & Davis's extensive Piano-forte Manufactory on the low ground in the southern section of the city, and was carried to the depth of ninety feet. The well is tubed with iron throughout its whole extent, and the water rises to the top of the tube. In proceeding downwards, the borer, after passing through the mud and drift, came upon a bed of clay ten feet in thickness; underneath this was a bed of metamorphic rock, then another clay bed; and finally the drill, after passing through a stratum of loose sand and gravel, struck upon slate rock, and at this point the boring was suspended.

Analysis of the water as obtained after pumping half an hour, gave the number of grains of solid matter in each gallon as 89.13, composed as follows:—

Silica	.40
Sulphate of lime	7.11
Carbonate of lime	3.15
Chloride of magnesium	9.43
Chloride of sodium	69.04
	89.13

The peculiarity of this water consists in the large amount of chloride of sodium, or common salt, found in it, and indicates that the well has some subterranean connection with the ocean. As the tubing is continuous and perfect, it cannot be at a point higher than the stratum in which the boring terminates. The clay beds would seem to be capable of keeping out any salt water in the vicinity, and therefore it is probable the communication is direct with the waters of the bay at some remote point. The rock which was reached, is undoubtedly the same as is now being perforated by the Boston Gas Co., who in their boring have gone down over 1,400 feet.

FALSE COLORS.

WE are not sure that "the age of adulteration" would not be the most appropriate appellation that could be selected to distinguish the period in which we live. With the progress of scientific discovery new facilities are developed for making things appear what they are not, and no small share of the inventive talent of the time is devoted to this dishonest end. There is scarcely an article in common use that is not liable to be adulterated or sophisticated. Even the medicines upon which we depend for the saving of our lives when attacked by dangerous diseases are often rendered either inert or positively mischievous by some villain who thinks more of a few cents' gain than of the risk of killing an indefinite number of sick people. The diabolical character of these "tricks of the trade," as they are mildly called, is well illustrated by some facts brought out at a late meeting of the Medical Society of London. One of the members stated that, being struck by the repeated failures that followed the use of some vaccine matter which he had purchased in tubes, he had examined it with the microscope, and found what appeared to be "buccal epithelium and starch granules." Independent evidence has been given to show that some venders of vaccine lymph manufacture the article from saliva and tartar emetic or croton oil. The man who would put such a preparation into the market deserves to be vaccinated with it himself, and then sent to board awhile in the nearest small-pox hospital.

This wide-spread adulteration naturally begets an equally wide-spread suspicion in regard to whatever is susceptible — and what is *not* susceptible? — of adulteration. Man, being often "taken in" by false appearances, naturally comes to distrust the evidence of his eyes, and wants to subject everything to some crucial test that shall show its true character beyond a doubt. Especially are we suspicious of what seems to be of extraordinary merit or peculiar excellence. Where the rose and the lily are blended with the most exquisite perfection on the feminine cheek, we are quick to surmise that art has been called in to supplement the work of nature. Even birds and beasts do not escape this scrutiny and criticism. We have our doubts as to the reality of their colors. For aught we know, the horse whose hue takes our eye may have been painted, and his beauty may not outlast the first drive on a rainy day. The bright plumage of a canary may awaken distrust, as in a case which we find reported in a late English paper. A Nottinghamshire man writes to the editor, complaining that three canary birds which he sent to a competitive exhibition at Derby were subjected to various tests, such as acids and alkalies, in consequence of the unnatural brightness and beauty of their color. Feathers were, he alleges, also plucked out of them, and he was requested to leave them for a month to see if the new feathers would be of the same hue as those of which they had been deprived. He declined this offer, and the birds were pronounced to be disqualified for the exhibition on the ground that their color was unnaturally beautiful. The much maligned birds subsequently each took a prize at a competitive canary exhibition held at Nottingham, though even there they were viewed with suspicion, owing to

ie extraordinary beauty of their color, and were gain subjected to certain chemical tests. When e consider the tricks played by ladies, horse-ealers, and bird-fanciers, we cannot be surrised that the drawing-room, the stables, and ie bird-cage all come in for their share of susicion; but how lamentable it is that the world hould be reduced to such a condition of doubt nd distrust that it cannot believe in the existnce of beauty without paint! Perhaps even ie green of the fields may some day be attribted to arsenic and agricultural vanity.

[Communicated to Boston Journal of Chemistry.]

N THE SEPARATION OF TIN, ANTIMONY, AND ARSENIC.

BY S. P. SHARPLES, S. B.

THIS is generally regarded as one of the most ifficult problems the chemist has to deal with. he method by fusion as given by Fresenius is diffiilt to the student, and gives in most cases very unitisfactory results. And the method given by Will no better. I have used the following, which ives rather better results than either of the above, nd is more readily performed by the student.

The metals are brought into the form of sulphides the usual manner. These, while still moist, are oiled with an excess of hydropotassic sulphite, hich dissolves the arsenic and leaves the tin and ntimony unacted upon. Add sulphuric acid to the olution to slight acid reaction, and boil until all the O_2 is driven off; then add bromine water in excess oxidize the arsenic; add ammonia to alkaline retion, and then ammonia magnesia mixture; allow it stand for some hours. Formation of white precipiite indicates arsenic; or the solution, after treatment ith sulphuric acid and boiling, may be tested with itrate of silver, or any of the other ordinary tests r arsenious acid.

The undissolved residue from the hydropotassic ılphite is washed thoroughly with hot water, and ien dissolved in sodic hydrate. If an undissolved sidue is left, this is examined for gold and platinum. romine water is then added in excess, and the sotion is boiled a few minutes; it is then allowed to ol, and mixed with its own volume of alcohol. The rmation of a white granular precipitate indicates itimony. Filter and test the precipitate by any of e ordinary methods for antimony. The filtrate is sted for tin by acidifying with sulphuric acid, and en adding hydrosulphuric acid water. The forration of a yellow precipitate which soon changes a dirty brown, indicates the presence of tin. Filter id test by the blow-pipe.

"FIRESIDE SCIENCE."

THE *Daily Advertiser* of this city thus kindly noes the volume: "*Fireside Science* is the title of beautiful and really useful volume from the press Hurd & Houghton. Many of the essays of which is composed have previously appeared in the OURNAL OF CHEMISTRY, and were there received ith a favor they entirely merit. While they are curate and wise in their presentation of scientific cts and principles, they are exceedingly simple, teresting, and popular in style, a combination of e entertaining and the instructive rarely achieved. me of the titles of essays will give a good idea the scope of the work, and we quote them: Chemistry of a Hen's Egg,' 'Rebreathed Air,' The Human Hair,' 'The Clothing we Wear,' 'The in and Bathing,' 'The Food of Plants,' 'The rigin and Nature of Springs,' 'Farm Experiments Lakeside,' etc. The housewife and the farmer ill each find here some useful information in their ecial departments, and everybody may get from valuable hints concerning the care of the body."

The *Boston Journal* remarks as follows: "*Fireside Science*, by J. R. Nichols, M. D., editor of the JOURNAL OF CHEMISTRY, is a volume of practical, readable, and entertaining essays of every-day life. Such matters as every one inquires about and few know, are written of here in a style clear and accurate. A glance over the table of contents is enough of itself to induce a desire for reading the book clear through. These essays, born of the fireside, commend themselves to it, and will find a congenial home around it."

The *Boston Post* says: "We have received Dr. Nichols's *Fireside Science*, published by Hurd & Houghton. It is a handsome volume, containing a number of popular scientific essays upon subjects connected with every-day life. Its style is charming, and the valuable information which it contains is conveyed in the pleasantest manner."

EDITORIAL NOTES.

THE SEARCH FOR DR. LIVINGSTONE. — At a meeting of the Royal Geographical Society, in December, Sir Henry Rawlinson stated that the council intended to address the Foreign Office, with a view of arranging, either directly from the Foreign Office, or through coöperation between the Foreign Office and the Society, some means of communicating with Dr. Livingstone, either by sending messengers into the interior of Africa, and offering a reward of 100 guineas to any African who will bring back a letter in Dr. Livingstone's handwriting to the sea-coast, or by organizing a direct expedition, headed by some experienced and well-qualified European, who should himself penetrate to the point where Dr. Livingstone is supposed to be. Mr. Rassam said his experience in Abyssinia convinced him that the best plan would be to send native messengers; but Captain Rigby, who for many years officially resided at Zanzibar, said it would be impossible to get a messenger into the interior and back. He thought the only means of communicating with the great traveller was by a small armed expedition under an experienced European. The president said that the council, feeling that the loss of 50 or 100 guineas would be nothing compared with the object to be gained, had thought it desirable that the plan of messengers should be tried first, and, if it failed, then the more serious expedition might be resorted to.

THE PREVENTION OF CONFLAGRATIONS IN CITIES. — The Chicago fire and its lessons are still the subject of much discussion in Europe as well as in this country. The London journals are raising the question whether that city could be devastated by a conflagration more extensive than the famous "Great Fire" of 1666, and it would appear that, in spite of the solid and substantial character of English architecture, the business quarters of the metropolis are exposed to some very serious risks. Immense stocks of inflammable goods are piled up in warehouses, in the basements of which boxes and packing cases are made by gaslight. The walls between the buildings are often cut through in order to make room for the expansion of a heavy business; and every building is crowded to its utmost capacity, on account of the concentration of such an enormous trade in so limited a space. There have been destructive fires in that part of London, and a far worse one is at least a possibility.

In Paris there is less risk of a great fire, and in many Continental cities such a catastrophe could not occur under any conceivable circumstances. With regard to Florence, for instance, Hiram Powers writes as follows: "Although there have been frequent fires in the city during the thirty-four years of my residence in it, not one house has been consumed, except a theatre, and that was not entirely destroyed. Rooms full of goods have been heated like ovens by ignited calicoes, straw hats, etc., but as the floors above and below were all covered by thin brick tiles, the goods burned without ventilation; and as there was no flame, a smell like that of a coal pit soon gave the alarm, and the fire was soon extinguished by no other engine than a squirt holding about a gallon, which discharged a well-directed stream through some aperture. The secret of fire-proof building, then, is this: It must be made impossible for the flames to pass through the floors or up the stairway. If you will have wood floors and stairs, lay a flooring of the thinnest sheet iron over the joists, and your wood upon that; and sheathe the stairs with the same material. A floor will not burn without a supply of air under it."

ARTIFICIAL MILK. — We have elsewhere suggested that it may not pay for the farmer to send milk to market at the present price of the fluid. If the supply should actually be withdrawn, we may be driven to the use of a substitute, as was the case in Paris during the siege. M. Dubrunfaut at that time devised an artificial milk, made by dissolving $1\frac{1}{2}$ ounces of sugar in a quart of water, adding an ounce of dry albumen (from white of eggs) and 15 to 30 grains of soda crystals, and then making an emulsion of it with from $1\frac{1}{2}$ to 2 ounces of olive oil. As the war progressed, gelatine was substituted for the albumen, and then slaughter-house fats, — purified by melting at 150° and then projecting into them small quantities of water, — for the olive-oil. One firm made in this latter way, 132,000 gallons of milk daily for Paris consumption.

ATOMS.

ANOTHER new chemical nomenclature has been proposed in England, by Mr. Metcalfe Johnson, who would fain call nitric acid by the euphonious appellation of *nitrodoxohydroxon* and bisulphate of soda by that of *natrodoxobisulfotroxon*. — A medical journal warns the public against the green kid gloves now much worn, as many of them are dyed with an arsenic color which produces on the hands an eruption very difficult to cure. — In reply to the assertion that "one half the number of professional aeronauts have been killed in the exercise of their vocation," Mr. Coxwell, who is himself a "balloonist," says, that in the thirty-five hundred ascents that have been made in Europe and America there have been but fifteen fatal accidents. — A new alloy of zinc and iron, containing 4.6 per cent. of the latter metal, is said to be remarkable for its whiteness and tenacity; and a new imitation of gold, prepared by a German chemist, consists of 58.86 parts of copper, 40.22 of zinc, and 1.92 of lead. — It is found that the wing of the bat and the ear of the white mouse are abundantly provided with nerves, apparently for the purpose of supplying, by means of a very refined sense of touch, the imperfection of vision; the number of nerve endings on each ear of the white mouse being estimated at six thousand. — An exchange says that "thirty-seven enthusiastic members of the 'Massachusetts Society for the Prevention of Cruelty to Animals,' made one horse draw them last week to a concert in aid of the Society at Salem." — M. Sezille has described, before the Agricultural Society of France, a method of preparing wheat, by which he claims that out of one hundred pounds of wheat twenty pounds more of bread are obtained than by the ordinary method of grinding and bolting, representing an increase of about twenty-five per cent. of the nutritive value. — The Westmoreland Coal Company are about to utilize the immense piles of "slack" or waste coal at their mines by converting it into coke; a new process for desulphurizing it having been devised. — The *Technologist* begins the new year under the name of *The Industrial Monthly*, but it is still furnished at the low price of $1.50 a year.

PSYCHIC FORCE. — The investigations on this subject by Dr. Crookes continue to attract a good deal of attention on both sides of the Atlantic. The general tone of the comments made by the scientific and secular press is, to say the least, very unjust to a gentleman whose scientific attainments are so high, and whose personal character is so irreproachable. The attack upon him in the *Popular Science Review* was particularly vulgar and conceited, and we are surprised that the editors should allow a paper of so abusive a character to appear in their valuable journal. Dr. Crookes has been identified with chemical and physical science for many years, and when he engages in any investigations his statements regarding results should be respectfully considered. The *Scientific Press*, of San Francisco, speaks of him as follows: —

"He braves the storm of ridicule which he has invoked with a boldness and spirit of candor which shows that he is an earnest man, and one determined to persevere in his line of investigation without fear or favor. His position as a scientist, his acknowledged intellectual attainments and power, and the spirit of candor which he manifests under peculiarly trying circumstances, cannot fail to command the respect of all who are following him in his investigations, whether in a spirit of sympathy or with the view of criticism.

"His latest experiments were conducted with more caution than those first published, while their apparent results are even more remarkable. In his last communication he remarks that so far as his other occupations will permit, he proposes to continue his experiments in various forms, and report from time to time their results. In the meanwhile he hopes that others will be induced to pursue similar investigations in a scientific manner.

"The Doctor applies some caustic remarks to the tender skin of Prof. Stokes, who presumes upon a severe criticism of the experiments, while he refuses to witness them in person, when he has ample opportunity and is urged to do so."

FILL LAMPS IN THE MORNING. — Scarcely a week passes, during the winter months, but we read accounts of frightful accidents from kerosene lamps exploding, and killing or scarring for life women and children. A simple knowledge of the inflammable nature of the fluid would probably put a stop to nearly all the accidents. As the oil burns down into the lamp, a highly inflammable gas gathers over its surface, and as the oil decreases, the gas increases. When the oil is nearly consumed, a slight jar will often inflame the gas, and an explosion is sure to follow, dealing with it death and destruction. A bombshell is not more to be dreaded. Now if the lamp is not allowed to burn more than half-way down, such accidents are almost impossible. Always fill your lamps in the morning; then you never need fear an explosion. — *National Family Almanac.*

Remarks. — Here is an Almanac, a "*Family*" Almanac, giving its readers to understand that they can have inflammable or dangerous liquids in their dwellings, and use them in their lamps, only they must "fill them in the morning," and not allow the lamp to burn but "half-way down." This whole paragraph is written in entire ignorance of the nature of burning liquids, and we are sorry to notice that it has been extensively copied by the press. Any fluid so inflammable that it must be poured into lamps in the *day time*, and but half the volume consumed in the vessel before it is refilled, is an *incendiary, perilous* liquid, and not a drop of it should ever be allowed to cross the threshold of any dwelling. *True, legal kerosene* is *not* such a liquid; no *gas* ever "forms upon its surface;" it is not "inflammable" at ordinary temperatures, and it may be poured into lamps at any time. Beware of volatile liquids, such as naphtha, "solar oils," sunlight oils, spirit-gas, etc., which are to be used under the conditions presented in this "*Family*" Almanac.

☞ THE January number of the *American Journal of Science and Arts* contains the following pleasant notice of this journal: —

"This monthly was established in 1866, and has now reached its sixth volume. It is 'devoted to the science of home life, the arts, agriculture, and medicine,' and its contents, presented under these heads, are interesting and instructive to a large class of readers. It numbers among its original contributors some of our first writers, who do good service in addressing, on matters of current interest in science, a larger body of readers than is reached by any other American journal of like character. The papers by Prof. C. A. Young on 'An Explosion in the Sun,' published in our last number, and also that on a preceding page, giving magnetometer indications at the time of the explosion, were copied from this Journal. For the use of the cut on page 70 we are indebted to its editors."

The *Lowell Daily Courier*, January 8, 1872, says: "*The Boston Journal of Chemistry* is full of familiar science, recipes, art information, agriculture, and other information. The name of the periodical may lead some to mistake its character. We think that the farmer or mechanic, or anybody else who takes an interest in the common processes of nature or art, or has a family growing up around him, may get a larger return for a dollar by subscribing for the *Boston Journal of Chemistry* than in any other similar way."

Mr. Theodore Phillips, of Red Bend, Illinois, under date of January 8, 1872, writes as follows: —

"There is no dollar that I spend during the year which pays me so well as that I spend for the *Boston Journal of Chemistry*. I would not be without it for *ten times* that sum."

☞ WE desire to return hearty thanks to our patrons for the very prompt attention to the "bills" sent out in our last number, and also for the many kind words of encouragement which almost every letter contained. No journal *can have* warmer or more enthusiastic friends than this has, and we fully appreciate the fact.

Of the thousands who have corresponded with the office the past month hardly a subscriber has ordered the JOURNAL stopped, and new names have come in upon us "like a flood."

LITERARY NOTES.

THE Harpers have just published Dr. Martyn Paine's *Physiology of the Soul and Instinct as Distinguished from Materialism.* It is founded on an essay published with a similar title more than twenty years ago, which attracted much attention; but in its present greatly enlarged form it is virtually a new work. The author believes in vital force, and in the soul as an entity independent of material organization; and he maintains his faith against all recent attacks upon it as ably and earnestly as when he first took up the sword in its defence.

The same publishers issue a new and enlarged edition of *The Poets of the Nineteenth Century*, which, in the good taste of its selections and the attractive form in which they are presented, has no rival among similar compilations; *Round the World*, a Boy's Record of his Travels, which many older writers might well take as a model in that line of literary work; and *Border Reminiscences*, by R. B. Marcy, U. S. A., the author of "The Prairie Traveller," etc.

Messrs. Scribner & Co. have begun a new series of their well-known "Library of Wonders," in an enlarged and improved form; and, what is even more to be commended, the English translation is carefully revised, and considerable new matter, of especial interest to American readers, is added. Two volumes, *Wonders of Water* and *Wonders of Vegetation*, have already appeared, and others will soon follow. Prof. Schele de Vere and Dr. J. W. Armstrong, President of the State Normal School, Fredonia, N. Y., are two of the editors engaged for the series.

Medicine.

MEDICAL PHILOSOPHY.

HAVE we a Medical Philosophy? Dr. Stearr (in the JOURNAL for November, 1871) says we hav not, and Dr. Briggs (in the number for December says we have. I presume these different opinion result from the *definition* that the writers severall attach to the term *philosophy*.

In the administration of medicine for the cure o disease we perhaps always philosophize to a certai extent; as, for instance, when we know a particula organ to be diseased, we either administer a medi cine which we believe will come in contact with tha organ, and by contact correct the morbid conditio of the organ, or else that will, by contact with som other organ or tissue, cause the elimination of som foreign or irritating substance, and thereby remov the *cause* of the disease. Some such philosophizin as this is perhaps pursued in every case: but suc could hardly be said to be a comprehensive philosophy of medicine.

To my mind nothing short of a definite knowl edge of the essential character of *health* and of *disease* and of the material change that transpires where either of those conditions supervenes upon the other can form the basis of a Comprehensive Medica Philosophy.

The following *hypothesis* will illustrate my idea.

It is a demonstrated fact that the molecules of all substances, whether organized or unorganized, are in a state of rapid undulatory motion. It is equally certain that the *rate* of molecular motion in different substances is different. We may therefore assume that the different organs and tissues that constitute the animal organization have each a particular rate of molecular motion; and I will assume, as an *hypothesis*, that this *normal* rate of molecular motion in all the tissues is *essential* to the state of health, and that any departure from this normal rate, in any one or more tissues, constitutes the state of disease. Let this hypothesis be granted, and it follows that the material change which a medicine should produce upon the organization, will be increased or diminished molecular motion. If such an hypothesis as the foregoing were sufficiently established, and the essential character of disease definitely determined, then the practice of medicine might be strictly philosophical.

For instance, we *know* that an increase of molecular motion is indicated by an increase of temperature. Having determined the temperature corresponding to the normal motions of the several tissues, the thermometer would indicate infallibly, in every case of disease, whether there is an excess or deficiency of molecular motion.

And because material motion can only be increased or diminished by material interference, in selecting a medicine for the cure of our disease we should seek for some substance that may be brought in contact with the diseased tissue, and whose molecular motion will, by interference with the molecular motion of the tissue, tend to reduce that to its normal state. If such a medicine could be found and brought in contact with the diseased tissue, and afterward eliminated without prejudice to other tissues, its administration might be said to be strictly philosophical.

With some such foundation as the above hypothesis for a Medical Philosophy, though the science would perhaps be more difficult than as at present pursued, yet the advance would be more steady and certain.

J. E. HENDRICKS.

DES MOINES, IOWA, *Dec.* 12, 1871.

FRENCH EXPERIMENTS WITH DISINFECTANTS.

A SPECIAL commission appointed by the French Academy of Sciences have been studying the vari-

ous methods employed for disinfecting the localities where contagious diseases prevailed during the late siege of Paris. Their report pronounces hyponitrous acid the most efficacious of all substances tested for this purpose. This agent completely destroys all germs of contagion, but it is itself so dangerous to health that extreme precautions are necessary in using it. The doors, windows, and other openings of the apartment must first be closed and sealed with gummed paper. The following proportions of the materials for generating the gas should be used: water, 2 litres; nitric acid, 1,500 grammes; copper turnings, 300 grammes. This quantity is sufficient for a room of 30 or 40 cubic metres. The materials are placed together in an earthenware vessel of eight or ten litres capacity, when the room is closed and left undisturbed for forty-eight hours. Even on entering the room at the expiration of this time the greatest care is necessary, and the person opening it should be protected by Galibert's apparatus. This treatment literally burns up all contagion, by the powerful oxidizing agency of the hyponitrous acid.

The commission state that carbolic acid is much more easily applied, far less dangerous and expensive, and seems to be equally efficacious. It is advised to mix it with sand or sawdust in the proportion of one part of the acid to three parts of the absorbent. Carbolic acid diluted with twenty-five to thirty parts of water was found very useful in daily sprinkling the floors and bedding of sick chambers. A case is alluded to by the commission, in which chlorine and the hypochlorites entirely failed to deodorize the gases given off by the bodies at the Paris "Morgue" during the heat of summer. These bodies were then sprinkled with an exceedingly dilute solution of carbolic acid, when the putrefaction was at once arrested and the foul odors removed. According to M. Devergie, water containing only the $\frac{1}{1000}$th part by weight of carbolic acid completely disinfected the dead-house in the hottest weather, even when it contained six or seven bodies.

CHLORALIANA.

CHLORAL-HYDRATE IN TETANUS NEONATORUM. — The *Lancet* states that Dr. Widerhoffer, of Vienna, showed lately to his class a child three months old, which was attacked by *tetanus neonatorum* at the end of the first week after birth, and was treated with chloral-hydrate in doses of one and two grains at the time of each onset of convulsions. It was in danger for a fortnight. During the intermissions of the spasms it was fed from the breast by its mother. It is now a fine, healthy-looking child. This is the sixth case (out of ten or twelve) that Dr. Widerhoffer has had recovered under treatment by chloral; under all other methods all his other cases died. Considering that Vogel and other German authorities on children's diseases had until quite recently never seen a case of this affection recover, such a success may be taken to indicate a real advance in therapeutics. Dr. Widerhoffer gives from two to four grain doses of chloral by the rectum, if the infant cannot take it by the mouth.

CHLORAL-HYDRATE AND BROMIDE OF POTASSIUM IN CHRONIC ALCOHOLISM. — Dr. F. Bradnack (*Buffalo Med. and Surg. Journal*) calls the attention of the profession to an original method of treating chronic alcoholism, namely, the combination of unusually large quantities of chloral-hydrate and bromide of potassium. He administered to a patient, suffering from six days' debauch, these remedies in the following proportion: ℞. Chloral-hydrat., ʒij.; Potassii bromid., gr. lxxx.; Syrupi simp., ʒj.; Aquæ, ℥ijss. M. Ft. haust. These enormous doses, 120 grs. chloral-hydrate, and 80 grs. of bromide of potassium, were given to the patient, merely dividing the mixture into parts, and diluting each with a little water, both doses being taken within five minutes. The effects were very gratifying. The patient had a tranquil and unbroken sleep for fourteen hours.

The details of this case appear to him to prove presumptively two points: 1st, That in cases of chronic alcoholism enormous doses of chloral-hydrate are not only tolerated, but are productive of great good; 2d, That a combination of bromide of potassium with chloral-hydrate furnishes a simultaneous sedative and hypnotic so excellent as to seem to indicate its use in diseases of this nature.

MEDICAL MEMORANDA.

REVACCINATION. — Upon the question when and how often people should be revaccinated, Dr. T. Snow Beck, of London, after careful investigation, has reached the following conclusions: —

1. It is necessary to vaccinate the infant in order to protect it during the period of childhood and youth.

2. We do not possess any data upon which reliance can be placed, and by which we can determine the value of any vaccination some time after it has been performed.

3. It appears clear, from the experience of the present epidemic, that the protective influence of vaccination becomes impaired during the period which elapses between infancy and maturity.

4. In order to maintain the protective influence of the cow-pox during life, it is desirable to repeat the vaccination after the individual has arrived at maturity.

STIMULANTS AND NARCOTICS. — The *Nation*, after remarking that little has thus far been accomplished in researches upon these agents, makes the following suggestions with regard to future investigations concerning them: —

"The effort of the future, with respect to stimulants and narcotics, will not be to prevent their abuse by forbidding their use — an effort as unwise and futile, if this judgment be correct, as the attempt to stop railway accidents by discouraging railways — nor yet to urge a vague precept of temperance upon the public mind; but rather to discover the laws of special adaptation in stimulants; in other words, to indicate the temperaments and constitutions to which particular *stimuli* are applicable, and the *stimuli* which are dangerous to particular constitutions and temperaments. Little effort has yet been made in this direction; but this is the path which the scientific investigation of the question of stimulants is hereafter to follow. The law of healthy stimulation is now the philosopher's stone of physiological science. We commend its search to investigators, feeling sure that the quest will be rewarded much more completely than that of the Floridian Fountain of Youth."

TREATMENT OF BOILS. — Mr. James C. Dickinson, in an interesting pamphlet on "Boils, their Varieties and Treatment," recommends in the treatment of the ordinary boil, when the tendency to break out in crops is observed, to give ten grain doses of quinine; when the quinine fails, he applies an ointment composed of extract of belladonna, powdered opium, and rosin, spread on wash-leather about the size of a shilling, to each boil. This unguent, he says, at once allays pain and irritation, and promotes absorption. Internally, he prefers the lactate of iron and change of air. In cases of "recurrent boils," he uses Erasmus Wilson's ferro-arsenical mixture with the best results.

THE CAUSE OF HYDROPHOBIA. — Although no sure remedy for hydrophobia has been found, it appears that some important discoveries respecting the nature of the disease have been made lately in Russia. A Russian official journal publishes a communication on the subject from a paper contributed to the archives of judicial medicine. "Since," it announces, "the Professor of Pathological Anatomy, M. M. Rudnow, undertook in 1869 the lectures on the pathological anatomy of animals for veterinary students, he has given particular attention to the subject of canine madness, so many cases of which come within the scope of judicial veterinary practice, while hitherto so few firm bases for a satisfactory diagnosis of the disease have been obtained by opening the animals. Being convinced that sure results could only be arrived at by means of the microscope, he continued his researches, and with the aid of that instrument made a surprising discovery. The main cause of rabies is the anatomical alteration of the kidneys through their parenchymatous inflammation. This differs from other forms of inflammation in that the whole epithelium of the kidneys is diseased at the same time, and that it easily degenerates, while the lobes of the kidneys fill at the same time with a fatty substance, by which the uniformly fatal issue of hydrophobia is brought about." Supposing the cause of the disease to be thus ascertained, it is to be hoped that as little time as possible will be lost in discovering a cure for it.

HYPODERMIC INJECTIONS. — Dr. E. Borck, in the *Medical Archives*, sums up the advantages of hypodermic injections as follows: —

1. Promptitude of action — not unfrequently a most important object.

2. Greater certainty and exactness of administration. There is no danger of a portion being ejected, commingled with the saliva, or the entire rejection of the medicine, as when given in the ordinary method by the mouth.

3. A saving of the drug; but one third to one half, or even less, of the ordinary dose being required.

4. The facility by which medicines can be administered by this method, when they could not by the mouth, as in tetanus, coma, delirium, etc.

POPULAR REMEDIES. — We find the following in one of our exchanges, where it is given in all soberness: —

"*Cure for Ague.* — A teaspoonful of common salt taken in water, and a teaspoonful deposited inside the stocking next the foot, as the chill is coming on, will cure fever and ague.

"*Cure for Sty on the Eye.* — Rub the sty over with a plain gold ring, and the sty will disappear. There is no superstition about this. Let the afflicted try it.

"*Cramp in the Leg* may be cured, and prevented, by simply wearing around the ankle a cord composed of six or eight strands of raw cotton — candlewick is best."

PREVENTION OF SCARLATINA. — Dr. W. M. Searcy (*Nashville Medical Journal*) thinks, if, when physicians are called to cases of scarlet fever from day to day, they will carefully examine the tonsils of those of the family who have not yet taken the disease, they will generally find the tonsils exhibiting more or less redness and enlargement. In all such cases he at once applies a solution of nitrate of silver — dr. i. to oz. i. distilled water — every day until signs of amendment are visible, and then every other day until the local disease disappears. When the glands are much enlarged and red, he gives a few grains of calomel, followed in a few hours by castor-oil, or a saline. He gives thirty-three instances of individuals who never experienced an attack, although directly exposed, after the employment of the caustic as above recommended.

BROMINE AND KEROSENE APPLICATIONS IN CANCER. — At a recent meeting of the British Medical Association, Dr. Wynn Williams read a paper "On the Treatment of Cancer of the Neck of the Uterus and Allied Structures by the Injection and Application of Bromine." "The author commenced by making some remarks on the spontaneous removal of malignant tumors, from the study of which he was led on to the injection of bromine into can-

cerous tumors of the uterus and other parts. He stated that the eight cases published in the last volume of the 'Obstetrical Transactions' still continued well. He entered into full details as to the manner of injecting these deposits, and the care required in the use of bromine both as an injection and application, and that before its use the surrounding parts should be well protected by a solution of soda. He exhibited the various instruments he had had made for the injection of bromine. He gave the history and successful treatment of a well-selected case of medullary carcinoma of the uterus in the state of disintegration and ulceration by this method. He also gave the particulars of a case of epithelioma of the lower lip which had been previously removed by operation. On the return of the disease the patient was sent to Dr. Wynn Williams, who, by two injections of bromine, caused the entire and, so far, permanent removal of the disease."

Dr. Sedgwick S. Cowper writes that he has found "the vegeto-mineral oil, known in Australia as kerosene, wonderfully curative in the treatment of ulcerated and cancerous wounds."

SELECTED FORMULÆ.

GLYCEROLE OF STARCH. — This preparation is made by rubbing well together one part of starch in eight of glycerine; then heat the mixture gradually to 240° Fahr., constantly stirring until a translucent jelly is formed. The glycerole of starch is a capital substitute for lard in making ointment. Moreover, this preparation of starch seldom becomes spoiled, and keeps for a very long time. As a local remedy in many acute affections of the skin, and to prevent the pitting of small-pox, it deserves a more extensive trial.

SYRUPUS ASSAFŒTIDÆ COMPOSITUS. — A writer in the *Journal of Pharmacy* gives a formula which obviates the great objection felt by most patients to the disagreeable smell and taste of assafœtida, and which has prevented to a great extent the more general use of this valuable drug. At the same time its medical qualities are enhanced by composition with syrup of wild cherry, possessing the valuable therapeutic properties of both.

℞.	Infusi Pruni Virginianæ . . .	Oj.
	Assafœtidæ	ʒj.
	Sacch. Albi	℥xxiv.
	Magnes. Carb	℥ij.

Rub the assafœtida and magnesia, with the infusion gradually added, so as to make a uniform mixture, and filter; to this, transferred to a bottle, add the sugar, and agitate occasionally until it is dissolved. As a result we have a handsome syrup, which does not differ in appearance from the syrup of wild cherry.

The property possessed by the volatile oils of bitter almonds, cherry, laurel leaves, bark of wild cherry, etc., containing hydrocyanic acid, of removing the odor of assafœtida has long been known, and advantage taken of this property by M. Maheir, a French pharmaceutist, to remove the odors from mortars and bottles with which it came in contact; but the fact has never before been applied to its administration as a medical agent.

AN EFFICIENT DIAPHORETIC. — Dr. T. Osborn recommends the following diaphoretic as having been found useful in the region of Alabama in which he has practised physic: —

℞.	Chloroformi . . .	aa. oz. ss.
	Spts. etheris nitrosi . . .	
	Tinc. opii camphoratæ . . .	
	Vini antimonii . . .	
	Aquæ	oz. ij. M.

For adults, one table-spoonful every hour until the fever abates.

FOR CHRONIC DYSENTERY. — Dr. J. S. Warren, Louisville, Ky., (*Richmond and Louisville Medical Journal*) says: In chronic dysentery we have good effects from the following prescription: —

℞.	Vin. ipecac.	
	Tr. nux. vom. . . .	aa. dr. ij. M.

S. — Twenty drops three times daily, either before or after meals, as may best agree with the patient. One patient, he says, who had taken everything that is usually given in dysentery, was completely cured by the above. The effect of the remedy is to produce temporary catharsis — but this is easily controlled.

A MEANS OF ARRESTING THE SPREAD OF SMALL-POX. — John Day, M. D. (*Australian Medical Journal*), in a paper "On a Means of Arresting the Spread of Small-Pox," read at a meeting of the Medical Society of Victoria, explained his *modus operandi* of perfectly destroying the germs by which small-pox is propagated. His belief is, that the virus of small-pox is always associated with pus-cells, and the only way in which it can be destroyed is by oxidation. He proposes the use of peroxide of hydrogen as the agent for rapidly and thoroughly oxidizing and destroying the virus-germs given off from the bodies of small-pox patients. Peroxide of hydrogen, which, according to Schönbein, is composed of antozone and water in a state of chemical combination, undergoes a remarkable change in the presence of blood, and by mere contact with the corpuscles, its antozone is rapidly transformed into ozone — the oxygen of combination.

The particular form in which he would recommend the use of peroxide of hydrogen is that known as ozonic ether — being a compound of absolute ether and peroxide of hydrogen. It is highly volatile, and may be diffused even through very large apartments, such as the wards of hospitals, by means of a spray-apparatus. It quickly destroys sulphuretted hydrogen and other noxious gases, and, when once diffused, it is very persistent in its action.

As collodion, cold cream, and lard are occasionally used as topical applications in the treatment of small-pox, he mentions that ozonic ether can be mixed with any of these substances without undergoing any perceptible change in its chemical properties.

Remarks. — The above item has appeared in several medical journals, and many physicians have sent to us for *peroxide of hydrogen* and ozonic ether. We have to say that peroxide of hydrogen is an agent often prepared in the laboratory in small quantities, but the great expense and trouble involved in its preparation prevent it from becoming an article to be used in medicine, or sold in the market. It is a dangerous agent to handle. The same may be said of ozonic ether. This may be readily prepared by inserting in a mixture of the vapor of ether and air red-hot glass rods, but the process is dangerous, as explosions are apt to result. The use of the agents as described by Dr. Day is impracticable, and we would say further, if practicable, unnecessary. The thorough employment of carbolic acid or carbolate of lime is effective in destroying germs of disease, and they are cheap and safe. Sulphurous acid is also very effective, but it also is unsafe unless used with great care.

DECISION AND QUIETNESS IN THE SICK-ROOM. — Consult your patient's wants, but consult him as little as possible. Your decision need not be very obvious and positive; you will be most decisive if no one suspects that you are so at all. It is the triumph of supremacy to become unconsciously supreme. Nowhere is this decision more blessed than in a sick-room. Where it exists in its genuineness, the sufferer is never contradicted, never coerced; all little victories are assumed. The decisive nurse is never peremptory, never loud. She is distinct, it is true — there is nothing more aggravating to a sick person than a whisper — but she is not loud. Though quiet, however, she never walks tip-toe; she never makes gestures; all is open and above-board. She knows no diplomacy or *finesse*, and of course her shoes never creak. Her touch is steady and encouraging. She does not potter. She never looks at you sideways. You never catch her watching. She never slams the door, of course, but she never shuts it slowly, as if she were cracking a nut in the hinge. She never talks behind it. She never peeps. She pokes the fire skilfully, with firm, judicious penetration. She caresses one kind of patient with genuine sympathy; she talks to another as if he were well. She is never in a hurry. She is worth her weight in gold, and has a healthy prejudice against physic, which, however, she knows at the right time how to conceal. — *Good Health.*

HOW TO LIVE LONG. — Shakespeare says that "our little life is *rounded* with a sleep," and the New York *Tribune* tells of a California man who has found the secret of longevity in sleeping in a circle, like a cat. This philosopher, whose head, like his back, must be a trifle weak, declares that he has prolonged his life by sleeping with his finger-tips touching his toes, and has invented a machine to hold the body in that graceful and pleasant position. He contends that the "vital electric currents" — on the principle, we suppose, of the smoke-consuming stove — "are thus kept in even circumflow, instead of being thrown off at the extremities and wasted." There is no patent upon the great discovery, and any one with a sufficiently supple back is of course free to try the experiment.

THE *Georgia Medical Companion* bestows upon Dr. E. Cutter's recent pamphlet, "Contributions to the Treatment of the Uterus," the following deserved compliment: —

"The pamphlet is certainly the most complete and exhaustive monograph upon the subjects proposed, which we have seen, and justice requires us to say they are most admirably and satisfactorily discussed by the author. The pamphlet should be in the hands of every physician who desires to be well informed upon the subjects of which it treats."

VACCINE VIRUS. — We desire to state that we cannot supply vaccine matter to physicians, and they will please not send to us for it. At great inconvenience we have endeavored to meet their orders until this notice could appear, as we knew the demand was urgent. It was stated two years ago, in the JOURNAL, that we could not longer supply it, and now we repeat the notice.

CINCHO-QUININE. — U. N. Mellette, M. D., of Williamsburgh, Indiana, under date of January 9, 1872, writes as follows of this agent: "I have used about 30 ounces of cincho-quinine in my practice, and I like it very much. It can be made into a syrup for children with facility, and in this form I employ it largely." Dr. C. C. Comstock, of St. Louis, under date of November 28, says: "I am using cincho-quinine in my practice, and am convinced that it is equal if not superior to quinine. Many of my patients who cannot take quinine can bear cincho-quinine, as its taste is not disagreeable, and it does not produce headache. In treating children, where quinine is indicated I have substituted cincho-quinine with satisfactory results."

The manufacturers, J. R. Nichols & Co., chemists, Boston, will send by mail to any physician in the United States, a packet holding $\frac{1}{2}$ oz. of the agent, for trial, upon receiving an order, inclosing a ten-cent postage stamp.

Boston Journal of Chemistry.

VOLUME VI. BOSTON, MARCH, 1872. NUMBER 9.

Familiar Science.

CHEMISTRY OF A DROP OF VINEGAR.

To the popular mind there are many "ways hat are dark" in the ordinary operations of nature, ınd a very deep mystery hangs over the changes ınd movements which occur spontaneously in ome of the most common substances. The fact hat sweet substances like sugar and molasses ıre capable of changing into *sour* vinegar, in a ew weeks, without any special human interfernce, is perhaps as great a mystery as any which s forced upon the attention. Whilst it is observed that there are many solids and liquids in common use, of a sweet or agreeable taste, which apidly become sour, it is also noticed that no sour substances ever become sweet, unless it may be in the case of the juices of some fruits which change during the process of ripening. Vinegar once formed from sugar never goes back again o the saccharine state; all further changes are lownward towards the inorganic condition. If we add sugar to the liquid, it does not impart to t a taste of pure sweetness, and it remains a listinct body, having no affinities for the acid vith which it is incorporated. It is not surprising that sugar should be pleasing to the sense of aste, and be regarded as a luxury among all ations; but that vinegar, having precisely the pposite influence upon the gustatory nerves, hould be freely used in connection with food ubstances, and held to be an almost indispenable condiment, is a matter not a little perlexing. It is clear that the appetite for acid ubstances is a natural one, and that vinegar, ke sugar, is capable not only of gratifying the ense of taste, but of meeting certain wants or onditions of the system which are essential to ealth.

The use of vinegar among the ancients was ery common, and its antiquity is so great that it impossible to learn when it was first employed. rom the writings of Moses we know that the raelites used it freely, and among the Eastern ations vinegar, as a condiment and a cosmetic, as highly esteemed. In the entire absence of hemical knowledge, the formation of the acid om saccharine liquids must have greatly uzzled the old philosophers of Greece and ome, and we have no doubt they often shook eir wise heads, and stroked their beards, as ey watched with intense interest the fermentave changes which resulted in the production of e acid. We must not, however, boast extravgantly of our modern chemical science, since ere are some points in the wonderful process of cetous fermentation which are not yet quite satfactorily cleared up. But the practical details d chemical changes that are connected with e formation of acetic acid are well understood, ith the exception of its production when wood subjected to distillation, and this series of reactions have had much light thrown upon them by recent investigations.

Vinegar must be regarded as the most interesting of all the organic acids, not excepting the malic. Its industrial uses are very numerous, as under the proper name of acetic acid it is employed to form many compounds of the highest importance in the arts. It exists ready formed in the sap of nearly all plants, and probably in some of the liquids dependent on the animal economy, but the quantity is very small. In the artificial production of vinegar it is necessary that alcohol, another very remarkable organic product, be present in the liquid, as it is by the oxidation of this agent that the acid is produced. The series of changes which occur when sweet liquids are transformed over into vinegar are of a complex nature, and somewhat difficult of being made plain to the general reader, but we will endeavor in as brief and comprehensive manner as possible to point out these changes.

In order that the acid may be formed, there are two fermentative processes necessary; first the *vinous*, by which alcohol is produced, and second the *acetic*, from which vinegar results. Sugar in itself is a true chemical compound of three elements, carbon, hydrogen, and oxygen. Hydrogen and oxygen in combination form water, and it is a curious circumstance that the hydrogen and oxygen, as they exist in sugar, are in such proportions that if they were united they would form *water;* hence it might appear that if we could remove the charcoal or the carbon element, simple water would remain from a union of the other two. This would lead us to regard sugar as a compound of *charcoal* and *water*, and indeed, having regard strictly to its chemical constitution this is true, but it really contains no water ready formed, as it is made up of the three elements in direct combination. Now, let us examine this group of atoms, and notice what an extended series of curious products result, when we set them in motion by introducing disturbing agencies. This series of changes by no possibility can result in the production of a higher type of organization, but the new bodies will form a kind of descending scale, gradually decreasing in complexity of composition.

Into a liquid containing sugar, we will introduce some curious germinal matter, called *ferment*, the nature and action of which will soon be described. Upon exposing the solution in a room kept at a temperature of 60° or 70° F., we shall observe after a few hours that it has become somewhat turbid, and that minute bubbles of gas rise from all parts of the liquid, ascend to the surface, and escape into the room. This gas is carbonic acid, the same that results from combustion, and which passes up and out of every chimney connected with coal or wood fires. The evolution of gas is copious, and goes on rapidly increasing for a certain length of time, depending very much upon the warmth of the surrounding air. After a while the action slackens, the liquid once more becomes clear, and if we now draw out from the vessel a portion, it will be found upon examination to have lost in a great measure its sweet taste, and to have acquired another quite distinct. It has become an intoxicating liquid, and by distillation we obtain a colorless, inflammable spirit, easily recognized as *alcohol*. This alcohol is a true ternary substance like sugar itself, but *simpler in constitution*. In the experiment we have broken up the unstable, highly organized substance, sugar, by the disturbing agency of ferment, and from the disarranged atoms have formed another body, totally dissimilar in physical character and influence upon the animal economy. This change is spontaneous, and must inevitably occur in all liquids containing sugar, if they also contain a nitrogenous body capable of putrefying or passing into decay, and if they are allowed to remain in a warm atmosphere. Cider, the expressed juice of apples, is a liquid which contains much sugar, no matter how sour the apples may be from which it is made. It also contains albuminous or nitrogenized substances; so if the liquid is allowed to remain in a warm room, the particles of sugar become disturbed, a kind of family quarrel is engendered by the mischievous ferment, the whole household of sugar atoms is broken up, and they are forced to aid in building up a new substance, which is the cause of more misery than all the physical maladies that afflict mankind.

It will be understood that although vinegar is produced from cider, it cannot be formed from it direct; that is, it is impossible to change cider directly into vinegar. The sugar must first be changed into alcohol, and then the alcohol is changed into vinegar. It will also be understood from this statement, that when vinegar is made from rum or whiskey, the sugar from which the alcoholic liquids come has passed one stage in its descent towards the acid condition, and hence it can be produced from these liquids direct. Before proceeding to notice the interesting changes involved in the acetous fermentation, let us consider the nature of the agent through which the vinous is set up. This ferment is a kind of vegetation which springs up in liquids containing nitrogenized bodies, and also it exists or is spontaneously developed in the organs of plants. If we take a little of the common household yeast, and diffuse it in a few drops of grape juice or new cider, and then place a drop of this between two thin plates of glass, with a little mastic varnish at the edges to prevent the evaporation of the water, we have a suitable arrangement for studying the ferment plant under the microscope. In watching the changes that occur through several days, we shall observe that the little globule, or plant, no more

than $\frac{1}{100}$ of a millimetre in size, is capable of reproducing itself almost indefinitely. The single atom in the field of the microscope in the course of a couple of hours begins to swell, and in six hours more a new globule has proceeded from its side, perfect in every respect like the first; from this another birth takes place, and this budding and developing process goes on so long as the albuminous matter lasts, and in large masses of fermentable matter millions and billions of the plants are produced every day. The ferment globules are composed of a solid envelope inclosing a liquid; or they may be regarded as cellules, holding a liquid and having their walls covered with a mucilaginous substance. How they act, in the work of breaking up organic compounds like sugar, is not precisely understood. It is difficult to closely investigate the changes under the microscope, as the evolution of bubbles of carbonic acid in the saccharine solution is so copious that observation is in a great measure cut off.

This strange ferment is not only found in sugar solutions, but is always present when animal matters spontaneously decompose. What is called *putrefaction* or decay, in flesh, gelatine, eggs, cheese, blood, etc., is indeed *fermentation*, as the sugar in these substances is transformed into alcohol and carbonic acid. Alcohol is always produced from the carcase of a dead cat, dog, or horse when left to undergo spontaneous decomposition. It is a product consequent upon the changes which result from *death*, and we may say that its habitual use as a beverage tends to disorganize the vital functions, and to rapidly place the human body in a condition from which a portion of itself will be resolved into the agent which caused its destruction.

It has been intimated in this discussion that apples from which cider is produced, and from which vinegar results by the process of fermentation, contain the germs of ferment, and the inquiry may arise, Why do they not act upon the sugar contained in the juices, and destroy the fruit? They do, whenever from any cause abrasions or holes occur in the skin. An apple, so long as the skin is sound, is protected from atmospheric oxygen, and the ferment cannot act without the contact of this element, and so the apple is preserved. If a worm bores a hole through the skin, or an insect ruptures it in any way, oxygen is admitted to the juices, the ferment starts into life, and the apple *rots*. A rotten apple is *sour* because it contains true vinegar. The same process has gone on in the apple that goes on in cider when vinegar is formed from it. First alcohol was produced in the fruit, and from this vinegar, and following the descending scale the vinegar, if collected and subjected to certain processes, might be changed into pyroacetic spirit or acetone.

In using the term *acetous fermentation*, it must be understood that we use it for the sake of convenience, and because it is commonly used in reference to vinegar making. The acetous change is brought about by agencies which are unlike those producing the vinous, and we doubt if the term *fermentation* is a proper one to apply to it. A great variety of opinions prevail among chemists regarding this action, but we do not design to be betrayed into any extended discussion upon the subject. It is enough to say that in order that alcohol may be changed into vinegar, access of air is necessary, and that the air must be brought in direct contact with the liquid. Vinegar making is an oxidizing process, and hence it is important that the oxygen of the air should be brought in contact with saccharine liquids, which are distributed over the greatest extent of surface, for it is only on the surface that vinegar is formed. A barrel of cider exposed to the air out of doors in summer is converted into vinegar very slowly, because the air can only act upon the surface, and if there was no *motion* in the liquid, it would not change in the course of a century. Heat causes convective currents, which tend to displace the liquid, and bring new portions to the surface constantly.

A barrel of cider, which would require six months to change under ordinary conditions, can be acidified in a week, by allowing the liquid to trickle slowly over or through a mass of clean shavings so as to expose it to a great extent of surface. In this country preference is given to cider vinegar made by the slow process, as adopted by our farmers, but very little of this is found in the market, in cities. The vinegars sold by dealers are made in a variety of ways, some of which are in the highest degree objectionable. A vinegar is produced from cheap molasses which costs but two or three cents a gallon, and which is sold at twenty or twenty-five cents. It is easily made by largely diluting molasses with water, adding yeast to promote vinous fermentation, and when the alcohol is formed, oxidizing it by distributing the liquid over a great extent of surface. Vinegar of fair quality can be made in this way in *thirty-six hours* after the vinous fermentation is completed.

Much sour liquid is sold called vinegar, which is made from sulphuric acid, or oil of vitriol. The cheap acid is added to water until its taste is regarded as desirable, and then it is colored with burnt sugar, to make it resemble true cider vinegar. This is a fraud of a serious nature, and hundreds of unsuspecting consumers are greatly injured in health by its use. We have found in vinegar oxalic acid, which is a fatal poison when used to any considerable extent. This acid is now so cheap that its employment in the manufacture of factitious vinegars is quite common. In view of the alarming sophistications and substitutions connected with the vinegar trade, we think the legislative bodies of the several States should pass stringent laws regarding the offence, and appoint inspectors whose duty it shall be to examine all specimens offered for sale.

Vinegar used as a condiment may be understood from the properties of acetic acid. When in a strong or concentrated state, it acts on living tissues as a caustic, producing redness, heat, and rapid inflammation of the skin; when properly diluted, and used in moderation, it promotes digestion. It has the power of dissolving gelatine, and this shows how it assists in the digestion of veal, young meats, and fish. It also aids in the digestion of crude vegetables, as cabbage and salads. It is curious that our instincts call for the condiment, in connection with the use of these kinds of food. Many young girls have an unnatural craving for vinegar, and the vegetable substances preserved in the liquid, limes, cucumbers, onions, etc. The injury to the health resulting from indulgence in such indigestible substances is undoubtedly very great, and parents should promptly interpose their authority ar prohibit their use.

The fact that animal life is so frequent observed in vinegar is not a little perplexir to many. An acid so potent and caustic woul not apparently be a congenial medium in whic animals might live and thrive, and yet the liqui as seen upon our dinner tables is often crowde with a mass of living, active creatures, whic can almost be seen with the naked eye. Tl *Anguillula aceti*, or vinegar eel, is an animalcul possessing wonderful tenacity of life, and it als is one not found alone in vinegar, but in a larg number of substances while in the process o decay. It is almost impossible to destroy then for if we take a mass of the eels mixed up wit the ova and expose them to the scorching su of midsummer, dry them thoroughly, place the in a mortar and grind them to the finest powde we do not destroy life. If we place a little this powder in a few drops of water, we soo discover some chemical change going on, an suddenly the whole is converted into colonies o living eels. Acids and corrosive liquids do n destroy them, and agencies fatal to most othe creatures have no effect upon them. Ho astonishing are these facts!

The eels are never found in the best, or i well manufactured vinegars, as they cann exist without something to feed upon, and in th removal of all mucilaginous or albuminou matters from vinegar, no food remains for then Vinegar eels are not only objects of curiosit and study to naturalists and others, but they ar often turned to account by the vagabond quack that infest cities and towns, and prey upon th ignorant and confiding, who resort to them wit the view of obtaining relief from certain maladies The ingenuity of quacks is in no way mor clearly shown than in their manipulations wit these wiggling animalcules.

Through the *Doctor's (!)* flaming advertise ment, the victim is made acquainted with hi place of business, and he forthwith seeks out th den and submits himself to examination. He i gravely told that his system is *full of worms*, th result of his indiscretions, and that the doom o Herod awaits him. To frighten his victim, an gain perfect control, he obtains a little of som one of the secretions of his body, and placin this upon a glass slide which has been previousl covered with a film of *sour paste*, he adjust it under a microscope, and lo! there are th worms; the dupe can see them for himself The dismay of the poor victim can be better imagined than described; he is ready to part with all his money to be relieved from his dreadful condition, and the quack has him in his power Sour paste always contains millions of the *Anguillula*, and a thin film may be spread upon a glass slide and dried so as not to be observed. As soon as the saliva or other secretion is added to the paste, the dormant energies of the little creatures are aroused by the moisture, and they appear full of life. This is but one of the many forms of deception practised by the quacks of this and other cities.

In this essay upon a drop of vinegar, we have but touched upon some of the most interesting points connected with its chemical history. To present even these few points with much fulness of detail would require more space than we have at command.

THE SOLAR ECLIPSE OF DECEMBER 12, 1871.

BY PROF. C. A. YOUNG.

It is too early as yet for us on this side of the water to attempt anything like a summary of the results of this eclipse, and still perhaps enough of interest has already come to hand to be worthy of record in the pages of the JOURNAL OF CHEMISTRY.

The shadow of the moon struck the earth on the morning of December 12, in the Arabian Sea, near the mouth of the Persian Gulf, and thence travelled to the southeast across the southern point of India, and the northern extremity of Ceylon, passing over the Straits of Sunda, and very near the city of Batavia, touching the northern coast of Australia, and finally disappearing in the Pacific. The duration of the darkness ranged from about two minutes in India, to four in Australia.

In Australia, the parties sent out from Melbourne and Sidney were disappointed by bad weather, but so far as heard from, the observers in India and Ceylon were all favored in this respect.

The different telegrams which have thus far come to our notice, run as follows: —

From Col. Tennant, F. R. S., to Dr. Huggins: —

"DODABETTA, NEAR OOTACAMUND, Dec. 12, 9.15 A. M.

"Thin mist. Spectroscope satisfactory. Reversion of lines entirely confirmed. Six good photographs."

Dodabetta is on one of the peaks of the Neilgherry Hills about 8,600 feet above the sea. It seems to be the most western of the stations occupied. The clause about the reversion of lines refers to an observation of my own, made during the Spanish eclipse of 1870 — an observation which had been somewhat discredited in certain quarters.

From N. R. Pogson, of the Madras Observatory, who was stationed at Avenashy, about forty miles southeast of Dodabetta, but at a much lower elevation, we have the following to the Astronomer Royal: —

"Weather fine; telescopic and camera photographs successful; ditto polarization; good sketches; many bright lines in spectrum."

From Janssen, the French astronomer, to the Secretary of the French Academy of Sciences:

"OOTACAMUND, Dec. 12, 1871.

"Corona spectrum attesting matter beyond sun's atmosphere."

This is decidedly Frenchy. The fact indicated by the telegram was ascertained at the American eclipse of 1869, and fully confirmed by nearly all the observers of the eclipse of 1870. No *Frenchman*, however, had before made the observation, and so it is telegraphed as if it were a new discovery.

Another telegram from the same gentleman, dated December 18, reads thus in English: —

"Great atmosphere of highly rarefied hydrogen above the chromosphere."

So far as the existence of an extensive atmosphere above the chromosphere is concerned, this has been well-known for more than eighteen months. If it however really consists to a large degree of hydrogen, the fact is new and important.

From the English Eclipse Expedition which went out under the charge of Mr. Lockyer, and was divided into several parties stationed at various points in Northern Ceylon and along the neighboring Indian shore, we hear as follows: —

"MANGALORE, *Dec.* 16.

"The eclipse observations have been very successful. The extension of the corona above hydrogen apparently small. Five admirable photographs have been taken."

The address and signature of this telegram are not given; I suppose it to be from Mr. Lockyer himself.

From Mr. Davis, the photographer of this English party, to Lord Lindsay, who equipped the photographic corps at his own expense, besides contributing many valuable instruments for other observations, we have this telegram: —

"MANGALORE, BAIKUL.

"Five totality negatives; extensive corona; persistent rifts; slight external changes."

Finally, Dr. Oudemans of Batavia telegraphs to the Royal Academy of Sciences at Amsterdam: —

"Preliminary results: corona distinctly seen, pure white rays, dark rifts as far as the moon's limb; no outline of chromosphere; radial polarization of corona; no magnetic disturbances; moving shadows positively observed."

Very soon now we shall also begin to get the fuller accounts of the observers in letters to the various scientific journals. The London *Daily News* for January 15, which has just been received from a friend in England, contains the first communication of the kind that I have seen, in the form of a long letter of more than three columns from some gentleman of Mr. Lockyer's own party. The letter is mostly taken up with an account of the voyage, preparations, etc., but I give an extract describing the eclipse.

After picturing the terrifying effect of the advancing eclipse upon the superstitious natives, he continues: —

"It is now time to return to the fort (where was placed the observatory). Capt. Maclean (Maclear?) announces bright lines in abundance. Mr. Lockyer has barely time to observe these, whisper a word or two, and reach the large spectroscope, before he exclaims 'Steady,' the signal agreed on for commencing the counting of time. Instantly everybody in the fort heard Capt. Bailey's clear voice ringing out 'You have 120 seconds,' and there in the leaden-colored, utterly cloudless sky shone out the eclipsed sun! a worthy sight for gods and men.

"There, rigid in the heaven, was what struck everybody as a decoration, one that an Emperor might fight for, a thousand times more beautiful than the Star of India even where we are now, a picture of surprising loveliness, and giving one the idea of serenity among all the activity that was going on below, shining with a sheen as of silver essence, built up of rays almost symmetrically arranged around a bright ring above and below, with a marked absence of them right and left, the rays being composed of sharp radial lines separated by furrows of markedly less brilliancy."

The writer goes on with an account of the observations, but as continually happens when popular writers describe scientific work in the popular journals, things are pretty badly mixed up, and as it stands the account is tantalizingly unintelligible. One or two points are clear: the 1474 line was seen longer than F; vertical polarization was observed over the whole corona with the Savart polariscope. The description of the other polariscope results is confused. The corona was observed by Mr. Lockyer through a train of several prisms; an observation which I think must be decisive of many important points, although I can make nothing of the result as it stands: "Four circles, 1474, same size and faint."

Mr. Lockyer, also observing the structure of the corona with the telescope, followed it for more than three minutes after the sun returned.

Putting everything together, it would seem that the principal results of this eclipse are simple confirmations of conclusions which had been already attained on previous occasions, but were not entirely acquiesced in by all astronomers.

It will hardly be disputed any longer that the sun's atmosphere extends very high above its luminous surface, and that the dark lines of the ordinary solar spectrum originate in the lower strata of this atmosphere.

No one will longer claim that the corona is mainly an effect of our own atmosphere. I think I may go further, and say it will be universally admitted that the corona, — ring, rays, rifts, streamers, and all, — is a true solar appendage, whose appearance and extent are only slightly modified by our own atmosphere. But perhaps this is premature; at any rate, the comparison of the numerous photographs and other observations can hardly fail to settle the question forever.

As to the polarization of the corona light, there seem to be the same puzzling inconsistencies between different instruments and observers as hitherto, and a very interesting and difficult problem must be solved by physicists, before they can be fully reconciled.

It may easily happen also that the comparison of the various observations may lead to some entirely new discovery; almost certainly some new question will be raised which can be settled only at the next eclipse.

DARTMOUTH COLLEGE, *Feb.* 5, 1872.

NOTES IN FAMILIAR SCIENCE.

EFFECTS OF FROST ON PLANTS. — It has been a disputed question whether plants killed by frost die in freezing or in thawing. That the former is the case, at least in some cases, has been satisfactorily demonstrated by Professor Göppert, of Breslau. The flowers of certain orchids, as, for example, the milk-white blossoms of *Calanthe veratrifolia*, produce indigo, but only by a chemical reaction that takes place upon the death of the parts. When they are crushed, or the vitality of the cells is otherwise destroyed, they turn blue at once. Now this change of color occurs immediately upon freezing, which proves that life then ceases. Certain other species are said to show the same thing.

THE BIG TREES OF AUSTRALIA. — Recent explorations show that the great Australian trees exceed in height, though not in circumference, the giants of California, though some of the Australians must be regarded as very respectable in girth as well as height, the hollow trunk of one of them being large enough to admit three horsemen to enter and turn without dismounting, while they led a fourth horse. A fallen tree in Victoria was measured not long since, and found to be 420 feet long; another measured 480 feet. The highest trees on the Sierra Nevada, California, yet discovered, reach only 450 feet, the average size being from 300 to 400 feet in height, and from 25 to 34 feet in diameter. The wood of these trees closely resembles red cedar, and

the reddish brown bark is sometimes 18 inches thick. The age of some of the oldest has been computed at 2,000 years.

Preparation of Oxygen. — In the preparation of this gas from chlorate of potash and black oxide of manganese, it is recommended to use a thin iron retort, and apply the heat rapidly at first, gradually lowering the temperature as the gas is evolved. If the mixture is very rapidly heated, one part of it will be entirely decomposed without fusing before another part has reached the required temperature, and so the evolution of the gas will be gradual and steady. But if the heat be more gradually applied, the entire mass may be slowly fused, with very slight escape of gas; but when once the temperature for this is reached, the action goes on simultaneously throughout the mass, and is then of a very violent character. The melted material is also liable to froth up and close the outlet; but by applying the heat rapidly all difficulty is avoided. After being used, the retort, if made of thin iron, should be cleaned out by breaking up the residuum with a sharp stick, rather than by washing, as is usually done. By doing this, it lasts much longer than it otherwise would do.

PAPERING ROOMS.

Don't try to paper with a carpet down. Make paste, cut bordering, and the paper, the day before. If the wall has been whitewashed, it must be washed in vinegar to neutralize the alkali in the lime. If papered before and you wish the paper removed, sop with water and it will peel off.

If convenient provide a long board, wide as the paper, though a table or two will do. The paper must be measured, placed right side down on the board; then with a brush proceed to lay on the paste, not too thickly, but over every part, and be careful that the edges receive their share. When completed, double within three inches of the top, the paste sides being together; carry to the wall, mount your chair, and stick your three inches pasted paper on the wall at top. That holds it; now strip down the other, and see that it fits just right; if not, peel down, make right, then press to the wall from the centre right and left. Leave no air under, or when warm it will expand, bursting the paper.

Of course the paper must be matched; it will not do to measure by line unless the walls are perfectly plumb. Small figures make less waste, and make a small room look larger. Stripes make a low room higher, and if there are no figures between, or in the stripe to match, there is no waste, and no trouble in putting on. If a narrow border is the style, let it be bright, if the paper be neutral; but if that be bright, the border had better be dark and neutral.

If the paste be made too thick, the paper will be apt to crack and peel off; if too thin, it will saturate the paper too quickly and make it tender in putting on. A counter-duster (Brussels brush). is nice to brush the paper to the wall. White clean cloths will do, but it will not do to rub the paper with this; being damp, the paint or color rubs off the paper. The tables must be dried each time after pasting, for the same reason. Paste under paper must not freeze, neither dry too quickly. If whitewashing is done after papering, tack double strips of newspaper wider than the border all around the room.

HOUSEHOLD HINTS.

To Clean Paint. — Use but little water at a time; keep it warm and clean by changing often. A flannel cloth is better than cotton. Be careful of soap. Put but a little soap or skim-milk in the water; add soap to the cloth when needed. A sharp piece of soft wood is indispensable for the corners; the point will become like a paint brush. A saucer of sifted ashes, used where paint is badly smoked or fly-specks are thick, is better than soap; wipe last with clean wet towel, and don't spill a drop of water. Never put soap on glass unless it can be well rinsed, which can never be the case with windows; wash off dirt in clean warm water and dry; then with a paste of whiting and water, and with a little cloth, place a little in the centre of each pane. With another cloth rinse over the glass; next rub off with a dry cloth till the window shines like crystal.

A Brilliant Stucco Whitewash. — Take clean lumps of well-burnt lime, slack in hot water in a small tub, and cover it to keep in the steam. It should then be passed through a fine sieve in a fluid form to obtain the flower of lime. Add a quarter of a pound of whitening or burnt alum, two pounds of sugar, three pints of rice flour made into a thin and well-boiled paste, and one pound of glue dissolved over a slow fire. It is said to be more brilliant than plaster of Paris, and will last fifty years. It should be put on warm with a paint-brush.

A Breakfast Dish. — This is from a good foreign authority: "Bruise into a saucepan 4 oz. cheese, 2 oz. butter, a pint of water, with a little salt; boil gently, adding by degrees as much flour as would thicken it; let it dry on a stove until it is like thick new butter; then add either two or three eggs and a little cayenne."

The Arts.

HOW TO USE ANILINE DYES.

The following directions for the solution and application of the aniline dyes that are best suited for amateur or non-professional use have been carefully compiled and condensed from trustworthy authorities for the benefit of the readers of the Journal.

We will premise that *cleanliness*, which is important in the use of all dyes, is specially necessary in the case of the anilines, as a mere trace of foreign matter often makes a material difference in the color. Earthen or enamelled vessels are to be used in preference to iron. Woolen and silk goods before dyeing should be thoroughly washed in soap and water, and then rinsed in clean rain water. Cotton will not take the dye unless the fabric has been mordanted by treatment with sumac, or otherwise.

Red. *Magenta* (also called *roseine, fuchsine*, and *aniline red*) is readily soluble in alcohol, which, for use with these dyes, should be pure. To one pound of the crystals add 2½ gallons of the alcohol. Agitate frequently, and add 2½ gallons of hot water. Filter, if necessary.

For silk or wool, heat to about 170° F. water enough to cover, add a sufficient quantity of the dye, and immerse the goods for about half an hour, moving them about from time to time to prevent streaks. Half an ounce of the crystals will dye about ten pounds of wool.

For cotton, place the goods in a bath of sumac (one pound to ten pounds of cotton) for two hours; wring out, and proceed as with wool.

The dyes known as *cerise* and *safranine* resemble magenta, and are used in the same way; and the same may be said of *vesuvine*.

Crimson. This is best obtained by the use of *aniline yellow* and *magenta*. Apply the former as directed below, and then pass the fabric through a bath of magenta until the desired shade is produced. Or, by mixing the liquid yellow and magenta dyes in a bath of soap-suds almost any shade from magenta to orange may be got.

Scarlet. For amateurs the process given for crimson is the simplest. The yellow should predominate, or the bath may be slightly acidulated with sulphuric acid.

Yellow. Dissolve one pound of *aniline yellow* in two gallons of alcohol. With this liquid dye proceed as with magenta. A trace of sulphuric acid in the bath improves and brightens the color.

Phosphine is dissolved and used in the same way, except that a trace of carbonate of soda is substituted for the sulphuric acid; or a soap bath may be used.

Picric acid is employed for shades of lemon and canary that cannot be obtained with aniline yellow and phosphine. Dissolve one pound of the acid in *one* gallon of alcohol, and use as in the case of magenta.

Green. Picric acid may be used for this color. Pass the fabric through a bath containing sulphuric acid and alum, adding, after thorough immersion, a sufficient quantity of solution of picric acid and indigo extract.

The aniline dye known as *iodine green* or *night green* is not suited to non-professional use.

Blue. To dissolve *bleu de Lyon* and other aniline blues soluble in alcohol, use a stone jar fitted with a cover, through which a hole is made to admit a stick for stirring. Into this put one pound of the dye, five gallons of alcohol, and two ounces of sulphuric acid; apply the heat of a water bath and stir frequently. After allowing the mixture to cool, filter, and treat any undissolved residue with fresh alcohol until complete solution is effected. From five to eight gallons will be required.

In applying, the dye bath for wool should be rendered sour by sulphuric acid. Tin crystals may be used, in quantity about 2½ per cent. of the weight of the wool, to improve the vivacity of the shade. The bath should be brought to the boiling point. For silk, prepare a soap bath, add the color, and put in the goods. When dyed sufficiently, pass through a bath acidulated with sulphuric acid. Cotton is prepared as for magenta, and dyed in an acid bath as for wool.

The *water blue*, so called, is to be used by dissolving one pound in a mixture of one gallon of alcohol and four gallons of water. Apply as directed for *bleu de Lyon*.

In using *alkali blue* and *Nicholson's blue*, dissolve one pound of the dye in ten gallons of boiling water. Add this in small portions to the dye bath, which should be rendered alkaline by borax. The goods should be well worked about between adding the successive portions of color. Keep the temperature below 212° F. If the right proportion of borax is used, the goods will show but little color when taken from the bath. The color is developed by washing with water, and passing through a bath containing sulphuric acid.

Violet and Purple. *Parme, violet de fuchsine, Victoria violet*, and *amaranth* are dissolved as *bleu de Lyon*, omitting the sulphuric acid.

In applying, acidulate the bath with sulphuric acid, or use sulphate of soda: both these substances render the shade bluish. Dye at 212°. The color of the dyed fabric is improved by washing in soap and water, and then passing

through a bath containing sulphuric acid. According to Hirsch, cotton is treated as follows: "Prepare the goods for fuchsine, and turn them over a few times in a tepid solution of $2\frac{1}{4}$ ounces of crystallized perchloride of tin, for every ten pounds of goods. Remove the latter, add as much violet solution as the shade requires, dye for a quarter of an hour, wring well and dry. Washing in a solution of alum and starch will render the color more solid."

BROWN. Dissolve one pound of *aniline brown* in two gallons of alcohol. Add a sufficient quantity to the dye bath and immerse the fabric.

For the *Bismarck* shade, mix one pound of the Bismarck dye, five pounds of water, and twelve ounces of sulphuric acid. This paste dissolves readily in hot water, and may be used directly for dyeing. For wool, acidulate the bath with sulphuric acid, add sulphate of soda, immerse the fabric, and add the color by small portions, keeping the temperature below 212° F. Various shades may be produced by combining the color with indigo paste or picric acid.

Cotton must first be mordanted with sumac and acetate of alumina, and the bath must be below 100° F.

MEMORANDA IN THE ARTS.

ANOTHER SUBSTITUTE FOR WOOD ENGRAVING. — The *Polytechnisches Journal von Dingler* describes a new process called the "planotype." The design to be engraved is transferred to a block of lime-tree wood, which is then placed in a machine having somewhat the appearance of a carving machine (the shape of which varies considerably according to to the nature of the work), the graver being kept red-hot by a gas-jet. By means of this appliance the design is gradually burnt into the wood. Figures, or letters of reference, are impressed by means of punches. When the whole design has been burnt into the wood a cast in type metal is taken direct from the block; without any further preparation the cast may be used for printing from, like an ordinary stereotype plate. It is stated that the wood does not suffer in the slightest degree from the heat of the molten metal, and that even the finest details are faithfully reproduced. The process is carried out on a large scale, and is found to give most satisfactory results.

SOLUBLE GLASS FOR WASHING WOOLEN GOODS. — One part of neutral soluble glass is added to 40 parts of water at 45° R. (133° F.). In this solution the wool is immersed and worked about for a short time with the hand, and then rinsed in cold water. The results are said to be surprising, the wool emerging clean, white, soft, and without odor.

KRUPP'S STEEL WORKS IN PRUSSIA. — The famous establishment of Krupp, at Essen, has become gigantic in extent, as the following statistics will show. There are 514 smelting, roasting, and cement furnaces; 160 forges; 249 welding and heating furnaces; 245 coke furnaces; 120 furnaces of various other sorts; 340 turning lathes; 199 planing machines; 91 grinding machines; 65 grooving benches; 114 boring machines; 120 various other machines; 150 steam-boilers; 256 steam-engines having a total of 8,377 horse-power; 56 steam-hammers having an aggregate weight of 3,091 cwt. The number of work people is 7,100; and the amount of cast steel produced last year was 130,-000,000 lbs. Of the steam-engines, one is driven at 1000 horse-power, three at 800, one at 200, one at 180, three at 150, one at 120, three at 100, with 23 of a smaller power. Of the steam-hammers, one weighs 600 cwt., one 400 cwt., three 300 cwt., one 200 cwt., one 150 cwt., one 140 cwt., two 110 cwt., with forty-six smaller ones.

THE "CARBON PROCESS" OF PHOTOGRAPHIC PRINTING. — This term is applied to several different processes which are often compounded. They all depend on the property (described in the article on "Chromatized Gelatine" in the JOURNAL for October, 1870) which the chromates have of rendering gelatine insoluble when exposed to light. The "autotype" process makes the prints by the direct action of sunlight on a chromated gelatine tissue impregnated with coloring matter. The sunlight penetrating the negative, impresses those portions which represent the shadows, and the print thrown into tepid water permits the lights, which were protected by the dense parts of the negative, to be washed away. The results of this process are in all respects equal to silver prints, and are indestructible.

The "Woodbury type," or "photo-relief," is a mechanical process, in which the gelatine film is, after the action of the light, allowed to lie in cold water, which makes the film swell in those portions corresponding to the lights, producing an intaglio, from which a mould is made, which, being filled evenly with a gelatine ink, is transferred by a press to a paper, on which it dries, preserving all its lines and shades.

In the "Albert-type," the block (of ground glass) is coated with a similar film as in the other processes, which being wetted, swells and gives a printing surface, from which, as from a lithographic stone, many copies can be printed.

PRACTICAL RECIPES.

TO KEEP GUM ARABIC FROM MOULDING. — Solutions of gum arabic soon mould and sour, and finally lose their adhesive property. It is said that sulphate of quinine will prevent this, while it imparts no bad odor of its own. The addition of a solution of a few crystals of this salt to gum arabic will prevent the formation of mould quite as effectually as carbolic acid, and by analogy it is safe to suppose that the same salt could be used in writing ink, mucilage, and possibly glue.

TO RELACQUER BRASS. — The *English Mechanic* gives the following recipe: strong sulphuric acid, two parts; water, one part; red fuming nitrous acid, one part. These must be mixed in the open air, as the gas evolved on mixing the nitrous acid with the vitriol and water is of a suffocating character; this will pass off in the course of an hour or so, during which time the mixture may be occasionally stirred with a glass rod. The bright gilded effect produced on the brass by this mixture is so good that any one trying it will not return to the use of nitric acid. The subsequent washing, drying, and lacquering cannot be done too soon after the dipping, as the articles tarnish rapidly if kept unlacquered.

TO PROTECT WOOLEN FABRICS FROM MOTHS. — Dr. Vorwerk recommends the following mixtures for this purpose: (1) pure carbolic acid, 45.0 grms.; camphor and oil of rosemary each, 30 grms.; oil of cloves and aniline, each, 5 grms.; dissolve these substances in methylated spirit, 2 5 litres. (2) Pure carbolic acid, 20.0 grms.; camphor, oil of cloves, oil of lemon-rind (*Ol. citri cort.*), nitrobenzol, each, 10 grms.; aniline, 2.5 grms.; dissolve in methylated spirit, 1.5 litre. These fluids are applied to the fabrics and furs by the aid of the so-called spray-producers. The operation if properly done will only be required to be repeated twice or, at most, three times a year. Since these mixtures are inflammable, the operation with the spray-producers should be performed only by daylight. Neither goods nor colors are injured by exposure to the spray.

Agriculture.

ANALYSIS OF COMMERCIAL FERTILIZERS.

IN some remarks made at the Farmers' Meeting at Lakeside, in August last, we stated that we were engaged in making complete analysis of the different commercial fertilizers offered for sale in this market, and when the labors were completed the results would be published for the benefit of agriculture. The address given before the Massachusetts State Board of Agriculture at Fall River, in November, contains some of the results of these investigations, but as a large number of our readers do not have the opportunity of seeing the State Report in which the address will be published, we present the analysis of what is known as "Bradley's Superphosphate," and also those of the Upton fertilizers, which are four in number.

Specimens of the fertilizers subjected to analysis were procured of the manufacturers direct, from packages on sale in their warehouse, and therefore they are presumed to represent fairly the products of the makers as found in the market. The following is an accurate

ANALYSIS OF BRADLEY'S SUPERPHOSPHATE.

Water	9.76
Organic matter	41.71
Inorganic "	48.53
	100.00

It contained of

Silica	4.99
Soluble matter exclusive of water	23.95
Soluble phosphoric acid	7.03
Insoluble " "	12.44
Nitrogen	2.12
Potassa	0.00

We learn from the analysis that the superphosphate contains nearly ten per cent. of water, or about 200 lbs. in each ton, and also that it contains five per cent. of sand, or 100 lbs. in the ton; this gives 300 lbs. of worthless substances in each ton. It should be said, however, that it is difficult to thoroughly dry fertilizing substances, and ten per cent. is not a large amount of water; and it is possible that the sand may be an accidental ingredient.

The soluble phosphoric acid is not present in so large quantity as we hoped to find. It should contain at least double the quantity, to be of high standard; still, it holds much more than most of the superphosphates offered for sale. The insoluble phosphoric acid and nitrogen are present in fair quantity.

At present prices of bone char and mineral phosphates, we estimate the value of soluble phosphoric acid at 10 cts. per lb., the insoluble at 4 cts. The nitrogen we will take at Prof. Johnson's value, namely, 30 cts. per lb. The value of a ton of the superphosphate may be stated thus:

Soluble phosphoric acid	14.00
Insoluble " "	10.00
Nitrogen	12.00
	$36.00

This estimation of value varies considerably from that presented in our address, as since that was prepared we have purchased a large quantity of bone char for making our superphosphates for farm use, and we understand better the exact cost of materials. With the compounds called "superphosphates" found in the market this article certainly compares favorably.

The Upton Phosphates we will distinguish by the numbers 1, 2, 3, 4.

ANALYSIS OF UPTON'S PHOSPHATES.

	No. 1.	No. 2.	No. 3.	No. 4.
Water	12.97	8.21	25.86	21.25
Organic matter	37.70	44.96	21.69	37.88
Inorganic do.	49.33	46.83	52.45	40.87
	100.00	100.00	100.00	100.00

No one of these compounds contained any *soluble* phosphoric acid, and therefore they are not in any sense "superphosphates." Of *insoluble*, No. 1 contained 15.89; No. 2, 17.02; No. 3, 11.21; No. 4, 11.80. Of *nitrogen*, No. 1 held 1.59; No. 2, 1.55; the others were not examined for nitrogen. Only one of the specimens, No. 1, contained potash; the amount held was 2.38 per cent.

As regards these fertilizers, we have to say that while the percentage of water in some of them is very large, and while there is wanting soluble phosphoric acid, and in a part of them nitrogenous bodies, it should be remembered that the price asked for them corresponds in some measure with their value. They are sold at about one half the usual cost of superphosphates, and therefore some of the series are not dear at the price asked. It should also be stated that the gentlemen engaged in manufacturing them claim that their products are incidental to their business as glue makers, and that they sell them for what they are worth.

It is however a matter of regret that we cannot have in the market a standard "superphosphate," of high grade, of uniform quality, and one skilfully prepared. If any plan could be devised by which such an article could be easily and readily procured, it would be of great service to agriculture. Whilst it is true that the fertilizers sold in the Boston market are of better quality than those found in other cities, it is also true that some of them at least are considerably below a fair standard of excellence. We gave in our last number the results of two analyses of fish pomace. The quality of the articles analyzed was so excellent that, at the price asked for it by the manufacturer, we decided to purchase ten or twenty tons for our own use; accordingly we sent an agent to the party to examine his products, and make the purchase. The agent reported that he had no fish pomace for sale like the article sent for analysis, and that he also placed a higher price upon his wet, miserable stuff than he stated to us. Now in this we see the difficulties in the way of obtaining fertilizers of reliable character, and also we see the methods adopted to deceive purchasers. Chemists receive a good article for analysis, which in no respect represents that offered for sale. In this way great deceptions are carried on in many departments of trade.

ANALYSIS OF CORN COBS.

Considerable discussion has recently arisen in agricultural journals and at farmers' meetings upon the nutritive value of corn cobs when ground and fed to animals. It is a very common practice among farmers to grind the whole ears of corn, and feed the product to milch cows, working oxen, and often to horses. This plan we have adopted to a considerable extent at our own farm, but we have had some misgivings as to the utility or advisability of the practice. With the view of ascertaining as nearly as practicable the exact nutritive value of the cobs, we selected a nice ear of Lakeside corn from a bundle hanging in our counting-room, and removing the kernels, subjected the cob to analysis. It gave of —

Water	7.48
Crude fibre	30.95
Ash	1.16
Carbohydrates, fat, and albuminoids	60.41
	100.00

The amount of fat was not accurately determined, but it was proved to be more than one per cent. The amount of water is probably smaller than it would have been had the corn been taken directly from the grain house, instead of the warm room in which it had been hanging for some weeks. The results of the analysis prove that there is in corn cobs a considerable amount of fat-producing and flesh-forming constituents. In the sixty per cent. of carbohydrates, albuminoids, fat, etc., are found the elements which have nutritive value, and in order that we may obtain some idea of its comparative worth, let us contrast it with the dry straw of some grains. Wheat straw contains about 30 per cent. of carbohydrates, 2 per cent. of albuminoids, and $1\frac{1}{2}$ per cent. of fat; oat straw, 38 per cent. of the first named substances, $2\frac{1}{2}$ of the second, and 2 of the third; rye straw, 27 of the first, $1\frac{1}{2}$ of the second, and $1\frac{3}{10}$ of the third. It is shown that cobs have a higher value than wheat or rye straw, and they equal in nutritive constituents the best quality of oat straw. These results indicate the utility of feeding them to our animals, provided there are no objections of a strictly physical nature, or objections arising from bulk and difficulty of reducing the cob to a sufficiently fine powder. It is not probable that cob-meal can be perfectly digested unless comminution is carried to an extreme point, and therefore the finer the cobs are ground, the higher the value, and the less the liability of gastric disturbance. It is certain we do not give sufficient attention to the matter of grinding any of the grains fed to our animals. They should be ground *as fine as possible*, in order that they may be easy of digestion, and in order that the nutritive substances may be fully utilized. There is a positive loss in feeding out coarsely ground grains of any kind, and in grinding the cob with the corn, give special attention to the work of comminution. The corn in the ear should be thoroughly dry before it is carried to mill, and there will be less difficulty in reducing it to a fine powder.

GREEN CORN FODDER.

A correspondent of the *Country Gentleman*, evidently a sensible man and good observer, wrote as follows, during the last autumn: —

"Having three cows, and not having the grass for them, I concluded to soil them with sowed corn entirely. I commenced about the first of June, and have fed them bountifully ever since, with the aid of 18 or 20 heads of small loose cabbage apiece. Now for the result: The cow that would have given on grass 20 quarts per day, now gives only 12 quarts; No. 2, instead of 14 quarts per day, now only 8; No. 3, a heifer that did give in the past winter on dried stalks and feed 6 quarts per day, now only 2 quarts. The three cows are perceptibly decreasing in milk every day, and I fear by the time cool weather sets in, there will be more milk taken from the corn than from the cows. They have a shady, cool yard to run in during the day, and are stabled at night. I was always under the impression that sowed corn was a great supplier of milk. But I have come to the conclusion, so far as the cows show, that sowed corn fed alone and conti ually is not as valuable as we think. But gra and sowed corn fed together are all that we ca ask."

These results correspond with those obtaine at Lakeside farm, and which have been publishe in this journal. Green corn fodder raised unde the best possible conditions is not capable of su taining a flow of milk in cows, unless it is mixe with grass or hay; and the fodder raised care lessly from broadcast sowing is of but litt value as a milk-producing agent.

NEW ENGLAND AGRICULTURE.

A leading Philadelphia journal has remarke that "there is no use in denying that the who interior of New England has been pretty muc exhausted for agricultural purposes by its origin population." This is not true. Poor as is ou land, we can produce more bushels of whea corn, and the other cereal grains to the acr than any other section of the country. Ther is no difficulty in raising on fair land, proper cultivated, 75 or even 100 bushels of corn, a 30 or 40 bushels of wheat to the acre. We a now busy in blasting rocks, extracting stump and draining meadows; and soon, if mechanic and trade pursuits do not by the prospect of e traordinary profits entice away from our rugge soils all the young men, we will have Ne England's fields correspond in productivene with those of Old England. We have pluc here, and are not frightened by a granite boulde or a mossy swamp; we can tear in pieces t one, and dry and pulverize the other. New Eng land may yet become the garden of the country.

SEEDS AND CUTTINGS.

Watering Plants with Hot Water. — has lately been shown by careful experiment, th sickly potted plants, even some that have almo died out, can be greatly benefited, and sometime indeed, entirely restored to vigor, by applying war water to them instead of cold. In certain case oleanders which had never bloomed, or did so onl imperfectly, after being treated with luke-war water, increasing the temperature gradually fro 140° up to 170° F., produced the most magnifice luxuriance of bloom. Similar results occurred wit other plants, some of which had nearly withere away. In all these cases the application of wate heated to about 140° F., without any other precau tion, caused a new and flourishing growth.

Quick Raising of Radishes. — One of th Reports of our Department of Agriculture quote from the publications of the Acclimatization Societ of Palermo a statement that radishes may b obtained at any season, and very quickly, in th following manner: They will begin to germinate i about twenty-four hours, and are then to be set i a box filled with well-manured earth, and moistene from time to time with lukewarm water. In fiv or six days the radishes will attain the size of small onion. To grow radishes in winter, the bo is to be placed in a warm cellar, covered with top, and the earth moistened from day to day wit lukewarm water.

An Important Experiment in Sewage Irrigation. — At Leamington, England, sewage ir rigation works have just been constructed at a cos of £16,000 (or $80,000), and the Earl of Warwick has undertaken to dispose of the sewage for a term of thirty years. He devotes a farm of a thousand acres to the purpose, and pays £450 ($2,250) a year

towards the expense of pumping the sewage upon the estate. The town authorities pay the remainder of the expense connected with the pumping. The farm has been prepared according to the most approved plans, and in the most thorough manner. A model cattle-house has been built for the accommodation of several hundred head of stock, milch cows forming an important item in the herds. If not the largest sewage farm in England, it will be in all respects a model one, as the Earl will spare no labor or expense to test the principle of utilizing sewage for agricultural purposes. There is at present no little diversity of opinion as to the economy of this way of disposing of sewage, and also as to its effect upon the health of the stock and the wholesomeness of the vegetables raised, and this experiment will therefore attract much attention.

The Duchesse d'Angoulême Pear. — A French nobleman, observing his tenant about to destroy a fine, thrifty pear-tree, inquired the cause. He was told that it was a chance seedling, and had borne no fruit in twenty years. He had already cut its roots preparatory to the first stroke, but was ordered to let it remain. He did so, and in the following year it was loaded with superb fruit of an entirely unknown variety, which at once became celebrated. The root-pruning the gardener had given it worked like a charm. Not many years afterwards, when the Duchess of Angoulême was passing through Lyons, its inhabitants sent to her their hospitalities. Nine fair maidens presented the duchess with golden salvers, on which lay heaped this precious fruit, and begged her to bestow on it her name; and the pear now recognized as the crowning glory of all fruits was thenceforward known as the Duchesse d'Angoulême.

A Pretty Ornament. — Take a turnip, of convenient size, and scrape out the inside, leaving a thick wall all around. Fill the cavity with earth, and plant in it some clinging vine or morning-glory. Suspend the turnip with cords, and in a little time the vines twine around the strings, and the turnip, sprouting from below, will put forth leaves and stems that will turn upward and gracefully curl around the base.

The Sword turned to the Ploughshare. — The late General Ewell, of the Confederate Army, owned three thousand nine hundred acres of land in Maury County, Tennessee, one thousand two hundred of which were under cultivation. He had one thousand two hundred sheep, Southdowns, Cotswolds, and half-bloods, and four hundred head of cattle. He worked a dairy with fifty cows, averaging each a pound of butter per day.

Cider-Making in California. — We are not disposed to be envious of our friends on the Pacific shore, but it really is a comfort to know that some things are *not* possible in California. A local journal says: "Many experiments have been made to keep cider for winter use, as is done in the East. In one case an experienced cider manufacturer sent to England and procured a cider mill of the same kind as was used by his father, who manufactured cider for London. He set his mill in operation, put his apples through the same process, and produced a beverage, but it wasn't cider. A gentleman who tried it said whiskey was mild compared with that cider. California cider is excellent when new, but it won't keep. We have never known of an instance where it could be used after a month or two."

Superphosphates. — Since the article upon "Analysis of Commercial Fertilizers" was in print, we learn that Messrs. Upton, Shaw & Co. have greatly improved their works at Brighton, and design to enter upon the manufacture of "superphosphates" of a high standard of excellence. This is an improvement in the right direction.

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, MARCH 1, 1872.

PERSONAL ABUSE IN SCIENTIFIC DISCUSSION.

It is indeed a matter of profound regret, that gentlemen engaged in scientific research cannot pursue their noble and most important labors without stopping to indulge in the degrading, vulgar business of personal abuse. Whilst we ought not perhaps to expect perfection of character or temper among students and investigators, yet education and high mental culture ought to influence a man's nature, and lead him to manifest at all times courtesy, generosity, and a kindly feeling towards his associates and co-laborers. But doctors quarrel, and so do lawyers, and even clergymen; we wish it were otherwise among men of science, but alas! it is not. Jealousy, pride of opinion, arrogance, conceit, all these have their influence in engendering strife, and keeping up animosities which ought not to exist.

Just now, scientific investigators in England are "all by the ears" upon the matter of the "pyschic force," or "spiritual manifestations," and Dr. Crookes the distinguished chemist, Mr. Huggins the astronomer, Mr. Varley the electrician, Lord Lindsay, and others, are assailed in the most violent manner in journals and reviews for their investigations of the phenomena. It would be difficult to find in the literature of any science, art, profession, or business, more spiteful, vindictive, personal attacks than are made upon these gentlemen in several of the last numbers of the *London Quarterly* and *Popular Science Review*.

Dr. Crookes in particular is made the target for a volley of abuse which would quite intimidate any man of less ability, or one less secure in his position. The assailant in the *Popular Science Review* is a Mr. J. P. Earwaker, of Merton College, Oxford, a gentleman whom we never heard of before. His name "Earwaker" suggests noise and clamor, and he is true to his patronym. The article in the *London Quarterly* was written we suppose by Dr. Wm. Carpenter, a man who is well known among scientists here, as well as abroad. Dr. Crookes condescends to reply to this reviewer, and has published a pamphlet, a copy of which has been sent to us. If any of our readers wish to see as fine a specimen of caustic criticism as has ever appeared, let them procure this pamphlet. If the reply does not take the arrogance and conceit out of Dr. Carpenter, he has a tougher cuticular covering than most men. There really is no occasion for this abuse of Dr. Crookes and the other gentlemen associated with him. If any one dissents from his conclusions, why not express it in a dignified and courteous manner? The position of these assailants is highly dishonorable, as they undertake to criticise and overthrow experimental results by personal detraction. They act the part of empirics and charlatans by meeting systematic, careful observations and scientific tests with cheap dogmatism and spiteful innuendoes. But Dr. Crookes is fully able to take care of himself, and in his defence he does not find it necessary to imitate the bad temper of his assailants.

We turn from this controversy among scientific men to another which is nearer home, and which we are happy to say is conducted in a better spirit. Prof. Hunt, the eminent chemist and geologist, in his address before the American Association at Indianapolis, last summer, made some observations or statements respecting rock crystals which Prof. Dana of Yale regards as erroneous. Prof. Hunt also, in a mild way, attacked Prof. Dana's views upon some points in crystallography, and when any one attempts to criticise so able and careful an observer as Prof. Dana, he must look well to his weapons of defence, for his antagonist is a giant. We well remember his tilt with Prof. Horsford of Cambridge, a dozen years ago, upon the theory of the formation of coral reefs, and the source of carbonic acid in the waters of the Florida Keys. Although not professing to be a chemist, he proved that he was a formidable antagonist when chemical points were under discussion. Prof. Dana's reply to Hunt appears in the last number of the *American Journal of Science and Arts*, and doubtless it will provoke further controversy. The subject is one which would hardly interest our readers, and therefore we will not bring it before them. The able journal to which we have alluded can be consulted by those who wish to know more of the matter.

ANALYSIS OF SWEET CORN.

We made in our laboratory, last autumn, a careful analysis of sweet corn, the ordinary eight-rowed variety, as found for sale in Faneuil Hall Market. The specimen was fresh, and the ear and kernels were as perfectly developed as any brought in from the country. The analysis gave of—

Water	72.92
Fat	1.60
Sugar and Gum	7.51
Starch	13.54
Nitrogenized substances	2.73

As the object was to ascertain the nutritive value of the corn, we present only those substances. It will be seen that the corn contained of fat, sugar, gum, starch, and nitrogenized bodies, more

than 25 per cent. These principles give to green corn a high value, and whether it is fed to animals, or placed upon our dinner tables, it has good claims to be regarded as among the important food substances. That we may understand what important changes are wrought in the grain by the process of ripening, we present below the analysis of dry corn, as given in one of Prof. Johnson's books: —

Water	12.00
Fat	4.06
Sugar and Gum	2.07
Starch	54.04
Nitrogenized substances	8.08

Here we notice the great increase of fat, starch, and nitrogenous bodies, which give to ripe corn a still higher value, and render it a more concentrated form of food.

With the view of ascertaining the effects upon green corn of the process of cooking, and also the effects of keeping it in hermetically sealed cans, we made analysis of two specimens found in the market, which were alleged to be preserved under different methods. The two brands are known as Winslow's and Durant's, and both corresponded in physical appearance when the cans were opened. The Winslow corn had, however, a stale, unpleasant odor, whilst the Durant specimen was as fresh as if it came direct from the dinner pot to the table. The variation in the methods of treatment is wholly immaterial, as regards good results, and the observed differences in the specimens are due to the age of the corn, and the cleanliness and care exercised in boiling and canning. The analysis of the two specimens gave the following results:

	Winslow's.	Durant's.
Water	65.31	63.88
Fat	2.06	1.87
Sugar and Gum	11.03	15.54
Starch	16.26	13.88
Nitrogenized substances	3.59	3.51

The water in the cooked corn is less than in the uncooked, as a portion of the natural juice is removed, and also the amount of fat, sugar and gum, and nitrogenized bodies is larger. This may be due in part to changes produced in cooking, and in part to differences in the corn existing prior to subjecting the specimens to this process.

We learn from the results of these labors that sweet corn undergoes comparatively few changes when cooked, and kept many months, if air is excluded. If nice, fresh corn is selected, carefully cooked, and placed in clean glass vessels hermetically sealed, it affords a nutritious and palatable dish in the winter months, and every family should secure a supply.

A VETERAN APOTHECARY.

One of the best known and most highly respected of our citizens is Dr. Hollis, the veteran apothecary on Union Street. Dr. Hollis has occupied the store where he now is for *forty-eight years*, and during this long period has not been absent from his post for ten consecutive days. There have been many years when he has not been absent a single day, and notwithstanding his age, which is seventy, he is still to be found behind his counter, displaying the same care and skill in compounding and dispensing medicines which he has manifested during half a century. He is a thoroughly educated apothecary of the old school, and as a chemist has a deserved reputation. We well remember the excitement produced in scientific circles, and among the people generally, when the first intelligence of Schönbein's discovery of gun-cotton reached this country. The method of manufacture was not fully disclosed, and every chemist went to work endeavoring to produce the agent. Dr. Hollis was the first to succeed, and his store was for a time filled with curious people, anxious to see the wonderful explosive.

It is a pleasure to look in upon Dr. Hollis and observe the neatness, care, and skill everywhere displayed. Here are no plate glass windows, marble counters, and flashy bottles and drawers, to dazzle and bewilder. Everything in the way of fixtures and appointments remains about the same as when the young apothecary first took the store in the early part of the present century. There is noticed a wholesome and agreeable odor of medicines, untainted by the flavor of cigars, confectionery, soaps, or colognes. No miniature marble cathedral stands upon his counter, from which to draw "soda," and a host of strange mixtures called mineral waters.

We somehow have a feeling that better medicinal agents are obtainable in such pharmacies, and are inclined to pass by the showy corner "drug-store," and trust to old-fashioned bottles and drawers for holding, and old-fashioned scales for weighing the remedies we require. But few of these establishments remain. Dr. Webb, of Salem, Dr. Gale, of Portland, and others in the cities and towns of New England, held to the "old ways" as long as they lived, but they have gone, and soon not a single example of the old style of keeping and dispensing medicines will be left.

We hope our venerable fellow-citizen will live, not only to fully complete the half century of business in his store, but for many years to enjoy the fruits of his honest industry and professional skill.

EXPERTS AT FAULT.

The fact that "doctors disagree" has passed into a proverb, and the conflicting testimony given in courts of law by scientific experts is a matter of common remark. The Wharton murder trial has recently furnished a striking instance of the kind, and the New York *Evening Post* mentions another connected with a case recently tried in the Superior Court of that city. The matter in dispute was the right to a "trade-mark" for a certain brand of mustard, and Prof. Doremus (whose name often appears on published "certificates" as an analytical chemist) had testified that mustard contains more than eleven per cent. of starch. The *Post* gives the following account of the subsequent proceedings: —

"Two other analytical chemists, one of them Professor Chandler, of Columbia College, alleged that mustard contained no starch. The evidence was in this conflicting condition when both parties rested, and the case was adjourned until the next morning for argument. In the mean time Professor Doremus applied to the counsel of the defendant to move to so far open the case as to allow him to vindicate by actual experiment in open court the correctness of his statement as to the existence of starch in mustard. The motion was made and granted; and at the appointed time the court-room presented the appearance of a chemical laboratory.

"The Professor, with his assistant, prepared mustard for experiment in open court by pounding the seed in a mortar. He placed the crushed seed in distilled water and boiled the mixture over a spirit lamp. He then threw some of the solution on sheets of filtering paper, applied his chemical test, and exhibited to the court on the paper the characteristic blue iodide of starch. The experiment was varied in many ways with the same result, and at the end of the testimony many sheets of paper were thus colored. The demonstration seemed perfect. On Professor Chandler being called to the stand he made experiments which in his view demonstrated that starch did not exist in mustard, and stated that he was not satisfied with the experiments that had been made by the defendant's witness.

"'Why,' said the defendant's counsel, 'are you not satisfied with the reaction for starch exhibited by Dr. Doremus on the dozen or more sheets of filtering paper?'

"'I am not certain, to begin with,' said Professor Chandler, 'that the paper would not have produced that reaction without the mustard.' Whereupon the counsel handed to the witness some of the clean paper and asked him to apply the test to it himself. He did so, and the result was a deep blue, thus showing the illusory nature of the prior tests, and that the experiment was entirely worthless as proof that starch was contained in mustard."

EDITORIAL NOTES.

War Statistics. — The *Elberfeld Gazette* publishes some curious statistics of the comparative deadliness of the different weapons used in the Franco-German war. According to them, of 3,453 Germans wounded before Metz, no fewer than 95.5 per cent. were struck by Chassepôt balls; 2.7 per cent. only were wounded by projectiles from heavy guns, and there were only 0.8 per cent. of wounds from cold steel. As to the French wounded, it is calculated that as high a proportion as 25 per cent. were wounded by artillery projectiles, and about 70 per cent. by the fire of the needle-gun. No fewer than 25,000 Frenchmen in all were struck by the projectiles of the German artillery. This gives an average of one effective shot in every three fired from the German batteries, a result which appears hardly credible. The losses in the different branches of the German army are estimated as follows by the *Gazette:* Of every 100 men put *hors du combat*, 90 per cent. were in the infantry, 5 per cent. were in the cavalry, and only 3 per cent. belonged to the artillery. The total number of cartridges fired by the Germans in the late war is said to have been 25,000,000, or about 30 per man. The war having lasted — for fighting purposes — just six months, this gives only an average of five cartridges per man per month for the whole army. Taking the total number of French killed and wounded at 100,000, this would give an average of 250 cartridges fired to each man struck.

How to Distinguish Linen, Cotton, Silk, etc. — If a thread of linen or cotton yarn be held by an end in each hand, and then slowly drawn out until it breaks, without receiving any sudden jerk, it will be found that the cotton is more unequally broken, its extremities distended, frizzed, branched, and twisted. Linen, on the other hand, breaks off more cleanly, its ends forming short tufts, of which the section is perpendicular to the axis, and whose filaments are straight. The distinction is readily recognized, and once seen cannot be forgotten. Some investigations on the separation of silk from other fibres were made by Mr. John Spiller, in England, not long ago; and in the course of his experiments he found that hydrochloric acid was an energetic solvent of silk, although it left wool and cotton unacted on, at least for a lengthened period. The practical bearing of this discovery was exemplified by the immersion of several so-called pure silk ribbons and other fabrics in the acid, when the

silk was dissolved away, leaving the threads of the adulterating material intact. A lady, previous to purchasing an alleged silk material, may thus be able to satisfy herself that the fabric is really what it is professed to be, by obtaining a small sample of it and immersing it for a few seconds in hydrochloric acid; or better, by dropping a little of the acid on the centre of the sample, when if it be pure silk a hole will be made, but if impure, the threads left will immediately indicate the nature and extent of the adulteration.

Muscular Christianity. — The Archbishop of York has been proving his claim to be considered a muscular Christian. A correspondent of the *Manchester Examiner* says that "a few evenings ago a man, evidently not suffering from the effects of total abstinence, was found on the road between York and Bishopsthorpe in charge of a horse and cart laden with meat, which had become entangled in a heap of stones. His cries brought to his assistance another man who happened to be passing near the spot, but the efforts of both were insufficient to extricate the horse and cart from its unpleasant position; and thus matters might have remained until now but for the timely arrival of the Archbishop of York, who, at this juncture, with a party of clerical friends, drove up in his carriage. His grace, observing the state of affairs, at once ordered his coachmen to stop, and he and his friends descended into the road. The Archbishop then put his shoulder to the wheel, and with a few vigorous pushes succeeded in setting the imprisoned horse and its load once more at liberty. Nor did his good deeds end here, for, heedless of the mud-stains which he had contracted during his exertions, he administered a few words of salutary advice to the erring wagoner, and then, reëntering his carriage, proceeded on his journey, leaving a most pleasant impression behind him."

Scientific Aids to Swimming. — A French inventor has patented an apparatus for swimmers, but we think that any frog might bring an action against the man for infringement of a device secured to the batrachians by endowment of nature. For the hands he has a large membranous fin, which is held in its place by loops passing over the fingers and a strap around the wrist. The surface presented to the water by these fins is so large as to add greatly to the effectiveness of the strokes of the arm, but not so large as to exhaust the muscular power. Their effect is to reduce very much the effort required to swim without them. But the greatest ingenuity is displayed in the form and fitness of the fins for the legs, which are attached to the ankles, and are so formed that they act upon the water, both in the movement of bringing the legs together and throwing them back. They act so finely in "treading water," as swimmers call it, that one can really walk, if not on the water, at least in it. The difference between swimming with this apparatus and without it, is very much like the difference between rowing a boat with the handle and the blade of an oar. The old swimmer has no trouble in using the fins at first trial, and is surprised to find with what strength he can swim without exhaustion. He easily swims twice as fast with the apparatus as without it, and he can sustain himself for hours upon the water, or swim miles with it.

Carrier-Pigeons in Belgium. — An English journal says: "Pigeon-flying is quite as popular in Belgium as horse-racing is in England, with the very great difference, and credit to them, that, at present, their hobby or passion is not made an excuse for betting and debauchery. The Pigeon Societies, or as they are termed in Brussels, 'Sociétés Colombophiles,' and in Courtrai, 'Société Peristeraphile,' are subscribed to, and supported by, every grade of society, from the worthy king and princes downwards." The breeding and training of the birds is carried on in the most systematic manner, and several times during the year matches are instituted for various distances, from one to 900 miles, for birds of different ages, and which have been trained up to certain journeys. At many of the railway stations in Belgium one may see, almost every week, large numbers of these birds, in charge of a single man, who has his instructions for letting off the occupants at certain stations, given distances from home. Sometimes these men may be seen with as many as a hundred baskets, each stamped and labelled by their respective owners, or by the societies of which their owners are members.

ATOMS.

Dr. Calvert has found that alkaline carbonates have the same property as the caustic alkalies, of preventing the oxidation of iron immersed in their solutions; a plate of iron having been thus kept free from oxidation for two years in a solution of carbonate of soda, and also in sea-water to which soda or potash had been added. — A bed of phosphates, somewhat like the deposits near Charleston, S. C., has been discovered in Russia. — The spectroscope has been employed to measure the rotation of the sun, and the results approximate closely to those obtained by observations upon the spots. — The *English Mechanic* says that the degree of Ph. D., which it wickedly translates as "Doctor of Phudge," is easily bought at the cost of a few pounds. — Chloroform often removes grease or paint from clothing when benzine or bisulphide of carbon fails to do it. — Iron vessels of a thousand tons are now built which draw only eighteen inches of water, and a company has been formed in New Orleans to provide such vessels for the transportation of the products of the Mississippi Valley to that city. — "Crito! I owe a cock to Esculapius; will you remember to pay the debt?" were the last words of Socrates; and, as some one remarks, only a great and a truly good man could think of his doctor's bill at such a time. — Thin milk of lime (if warm, it will act more promptly) can be used for cleansing glass vessels in which petroleum has been kept, as it forms an emulsion with that liquid; and the addition of a little chloride of lime to a second washing with the milk of lime removes even the smell completely. — The Viceroy of Egypt has begun to build a railroad, six hundred miles long, between Lower and Upper Egypt; so that Livingstone may yet be able to come home from Central Africa by rail. — In a school where the pupil is required to write a sentence containing the words given out to be spelled, the word "panegyric" drew forth the following: "A few drops of panegyric, given on a large lump of sugar, is often best with an infant with the stomach-ache." — The skeleton of the whale recently on exhibition in Boston has been "mounted" in the rooms of the Society of Natural History, and is considered one of the most remarkable specimens in America. — Professor Agassiz writes home that he has discovered the nest of a fish in the *sargassum* or seaweed of the Gulf Stream, and has hatched out a dozen or more young fishes from the eggs found therein. — Among the ruins of Chicago is a "clinker" resulting from the melting down of about nine thousand stoves mixed up with enormous quantities of brick and stone, and all efforts to break it up have thus far been in vain. — It is proposed to place a painted window in the parish church at Berkeley (Eng.) in honor of Dr. Edward Jenner, the discoverer of vaccination, who was born in that town and was buried in the chancel of the church; the subject of the window, which is to cost £500, being "Christ Healing the Sick." — The two principal companies engaged in beet sugar culture in California, will extend the field of their operations to one thousand acres during the present year. — An electro-magnetic engine, to be used for driving a plugging tool in the operation of filling teeth, was exhibited at a recent meeting of the Franklin Institute in Philadelphia. — There is no end to the jokes on Greeley's agricultural advice that appear in the papers, one of the latest being the statement that he says that "The best way to raise early popcorn is to start it *now;* put the corn (any kind will do) into a corn-popper, and suspend in the sun over a pan of water till the shoots grow out between the wires; then in the spring set it out in pots or beds, and before June the popped corn will be hanging in little paper bags all over the branches." — It has been suggested that printer's ink is a cheap remedy against the ravages of the canker-worm; whereupon some one remarks that the best way to use it is in the shape of good agricultural literature. — "Diamonds" have been discovered in Arizona; but their estimated worth is from forty to sixty cents a bushel. — As an evidence of the progress of civilization in Japan, it is stated that many fires have lately occurred in Yedo, "caused by the careless use of kerosene." — M. Sezille has described, before the Agricultural Society of France, a method of preparing wheat, by which he claims that out of one hundred pounds of wheat twenty pounds more of bread are obtained than by the ordinary method of grinding and bolting representing an increase of about 25 per cent. of the nutritive value. — Dr. Crookes's pamphlet in reply to the *Quarterly Review* and other critics, to which we have referred elsewhere, is published by Longmans, Green, & Co., Paternoster Row, London, and the price is one shilling (twenty-five cents). — The deepest mining shaft in North America is said to be one at the Gould and Curry mine, in Nevada, which has gone down perpendicularly fifteen hundred feet. — A plant known as the *Andromeda Leschenaultii*, growing in India, has been found to yield carbolic acid of a very pure quality, but the cost of its extraction is such that the discovery, though interesting as a botanical and chemical fact, is of no practical or commercial importance. — *Harper's Weekly* uses fifteen tons of paper every week, and the average cost of engraving for each number is $600, or $30,000 a year, with as much more for drawing the pictures on the wood, exclusive of the sums paid to artists for the designs. — In consequence of the numerous frauds committed by forged checks, some of the Vienna bankers have adopted the custom of sending, with their letter of advice, a photograph of the person in whose favor the credit has been issued, and to stop payment when the person who presents himself does not resemble the picture. — The committee appointed to investigate the gun-cotton explosion at Stowmarket, England, have come to the conclusion that the *manufacture* of gun-cotton is perfectly safe, all the operations being conducted while the material is in a damp and consequently non-explosive condition; but that the drying should be carried on at a distance from other buildings, and that the store-houses of the dried product should be similarly isolated. — Prof. Henry, of the Smithsonian Institution, commenting upon the popular belief that the removal of forests tends to diminish the average rain-fall, stated that the observations of the Institution, which extend over a period of twenty years, have as yet failed to establish a theory of this kind, and that it must therefore be regarded as a gratuitous hypothesis, unsubstantiated by fact.

LITERARY NOTES.

The *Commonwealth* (Boston) of February 10th, has the following notice of Mr. Rolfe's edition of Shakespeare's *King Henry the Eighth*, just published by the Harpers: "It is a tasteful 16mo of 210 pages, and is prepared on the same plan as the author's 'Merchant of Venice,' and 'The Tempest.' The text is the result of a careful collation of the folio of 1623 with all the modern editions that have any critical value. A valuable introduction gives us the history of the play, a history

of the sources of the play, and sundry critical comments on it. Then follow the play in delightfully clear type, and the notes. We have been struck with the patience and erudition manifest in this edition of this play, and feel that every lover of Shakespeare who may chance to see the volume will heartily thank the author therefor. As a text-book for schools and reading-clubs, nothing can be more complete and satisfactory. It gives all the incidental information needed by the references of the text, and cites the best critics thereon to establish the true meaning of the great dramatist. These, with its numerous finely drawn illustrations, make it at once a beautiful and comprehensive edition of this great work."

The Harpers have also issued Vol. I. of Tyerman's *Life and Times of the Rev. John Wesley* (to be completed in three volumes); *The Land of Desolation*, a personal narrative of observation and exploration in Greenland, by Dr. Hayes; and Smiles's *Character*, which seems to us a worthy sequel or companion to his "Self-Help."

Messrs. Hurd & Houghton have recently published two little collections of poetry of more than average excellence, — Mrs. Celia Thaxter's *Poems*, mainly lyrics of the New England sea-shore, as characteristic in their way as Whittier's "Ballads" — and *Landmarks and other Poems*, by John James Piatt, whose verses bear as unmistakably the local coloring of the West as hers do of the East.

Dr. Ely Van de Warker, of Syracuse, N. Y., has sent us his valuable monograph on *Criminal Abortion*, published by Mr. James Campbell of this city. It is a very sensible and thorough treatise on this important subject, and should be read by the profession everywhere.

We have also received from Dr. B. F. Dawson, of New York, his paper on *Vascular Nævi*, reprinted from the November number of the "American Journal of Obstetrics." It is an important contribution to the literature of this branch of surgery, and one for which the author deserves the thanks of his professional brethren.

Medicine.

AN ALLEGED NEW DISCOVERY.

Dr. J. R. Chadwick, now at Vienna, in a letter to the editor of the *Boston Medical and Surgical Journal*, describes a new discovery made by Dr. Lostorfer in reference to the blood. He claims to have discovered in the blood of syphilitic patients morbid or germinal growths, which he denominates "syphilitic corpuscles." According to Dr. Chadwick, the whole "medical world" of Vienna is in a state of excitement over this alleged new discovery. Prof. Stricker and the renowned Prof. Hebra have become converts to the new truths revealed by Dr. Lostorfer's microscope, and the doctor has been examining blood drawn from Prof. Stricker's veins. This he pronounces "full of filth," or it "contains more filth than that of any other living man." This statement, which sounds to us very much like that of an empiric, is assented to by Prof. Hebra, and he has commenced tapping his patients in the hospital, endeavoring to find a specimen of blood as "full of filth" as that of Prof. Stricker. He is reported not to have succeeded in this, and therefore Prof. Stricker, so far as investigations have gone, stands at the head for "bad blood." The discovery of "syphilitic corpuscles" in the blood of those affected with this disease may be new in Germany, but it is not in this country. More than two years ago, Dr. Graves, of the Marine Hospital, Chelsea, placed the syphilitic wards of that hospital at the disposal of Dr. Cutter, of Woburn, and numerous microscopical examinations were made, in which the morbid growths were distinctly seen in the blood of the patients. We were present, and with a Tolles $\frac{1}{5}$ objective used in connection with Cutter's clinical microscope, the blood of some of the patients was seen to be charged with the "algoid vegetations," as described by Dr. Salisbury of Cleveland.

To Dr. Salisbury belongs the honor of first pointing out these strange morbid growths in the blood, and his researches with the microscope have not been so highly appreciated as they ought to be in this country. He is a most indefatigable student, and in the course of his investigations some discoveries have been made of the highest importance in medicine. We think this excitement in Vienna, described by Dr. Chadwick, will serve to turn the attention of medical gentlemen towards the researches of Dr. Salisbury, and that due credit and honor will be awarded him.

THE CINCHONA TREE IN INDIA.

It is pretty certain that the attempts of the British Government to cultivate the cinchona tree in India will prove successful; indeed, from recent accounts it would appear that the tree is flourishing in that country, and that it not only yields its normal proportion of alkaloids, but in some species at least, there is a large increase.

At one time it was feared that the length of time needed for the trees to renew their coating of bark, after this had been partially removed, would have constituted a serious obstacle to the remunerative culture of cinchonas in India. This difficulty has been removed by accelerating the production of new bark by the simple application of moss kept continually damp. New bark forms under such circumstances rapidly.

What renders this process of renewal the more important is the fact that the quantity of alkaloid found in the bark of the third time of renewal is not only larger, but is in a state that is more easily purified, and better fitted for the extraction of quinine, than the bark in its normal condition. This circumstance, as well as the comparative analyses of various portions of the trees, seem to point to the bark as the seat of the formation of the alkaloid.

With regard to the mode in which the alkaloid is formed in the bark, the general result of experiments goes to show that there is originally in the plant but a single substance, which assumes different characters according as it is exposed to or excluded from the action of light. There are, as is well known, two opposite modes of respiration in plants: one is carried on in the light and in the exposed parts of plants, and results in the elimination of oxygen and the fixation of carbon; the other manifested chiefly, but not entirely, in the night, and in those portions of the plant not exposed to the light. Experiments have shown that by varying the conditions of growth it is possible to change at discretion the production of chlorophyll into the elaboration of coloring matter similar to that of the roots.

It is surmised, with great probability, that the increased production of alkaloids in bark treated by the above process is due to a similar replacement of one form of respiration by the other; in other words, by making the formative energy of the plant manifest itself in the production of alkaloids rather than in that of chlorophyll.

As to the particular part of the bark which is the chief seat of the formation and deposit of the coveted ingredient, it is supposed that it is in the cellular portion of the bark, not in the wood or bast-cells, that the alkaloid exists chiefly — a conclusion that is so wholly reasonable, and in accordance with analogy, that it seems remarkable that the contrary view could have been held.

MEDICINE AND CHEMISTRY.

Prof. Silliman delivered the introductor lecture to the medical class in Yale College i September, and we have been much interested i reading the published copy he was so kind as t send us. The topic of the lecture, "A Centur of Medicine and Chemistry," is one which it wa found impossible to treat fully in so brief tim and consequently he devotes the hour to the di cussion of anæsthesia and the history and chem istry of anæsthetics. It is decidedly the bes *résumé* of the subject which has appeared, an in its preparation the most thorough research i indicated. We design to make some extract from this lecture at a future time, but at preser have room only for the closing sentences: —

"In reviewing the field of modern chemistry organic and inorganic, in view of its physiologica and therapeutic relations, it is simply impossible t form the slightest rational conjecture of the proba bilities which are in store for the healing art in th near future. The ground gone over in this lectur may appear extensive, but it is only a corner of th vast domain, in every part of which mines of ric ore are waiting only the exploratory work of th physiological chemist to reward humanity with ne blessings, even more fruitful of good, perhaps, tha those the history of which we have so rapidl sketched.

"The time was when chemistry existed only i the hands of the so-called *Iatro-Chemists*, or Doctor Chemists. This name has often been used as term of reproach, but the labors of such doctor chemists as those whose researches we have bee considering, are fast teaching us that great discover ies in therapeutics and physiology are to be mad only by renewing the bond which make the Physi cian and Chemist one; and may we not truly sa that if every chemist is not a doctor, every doctor must be a chemist, if he would march in the van of the great army of those who by searching would find out the truth, and by its skilful and scientific use bless mankind, and crown their lives with happiness and honor."

IODIDE OF CALCIUM.

Dr. Goodman (*Canada Lancet*), at a recent meeting of the Medical Society for Mutual Improvement, spoke in favor of the use of iodide of calcium as a remarkably mild and efficient alterative; it appeared to him to be more easily assimilated in disordered states of the stomach than any other iodide; he had used it lately with marked effect in diseases of the stomach and bowels in the strumous diathesis. — *Georgia Med. Comp.*

Remarks. — The present very high price of iodide of potassium will undoubtedly serve to direct the attention of physicians to *iodide of calcium*, or "*iodide of lime*," as a valuable and cheap alterative resolvent, and tonic. It has been proved capable of taking the place of the other iodine combinations, and it has advantages possessed by no one of them. These advantages may be enumerated as follows: —

1. In the smallness of the dose, and the minute state of its atomic division.
2. In its ready combination with the blood and tissues, manifested by its alterative effects.
3. In not passing off rapidly by the kidneys.
4. In not producing gastro-enteritic and vesical irritation.
5. In being cheaper than the other iodides.
6. In being compatible with most remedies, and admitting of a variety of combinations in extemporaneous prescriptions.

The chemical relations of the iodine are with oxide of calcium, and not wholly with the metallic base. It is probable that the iodine and oxide of calcium exist chemically in a form similar to that which exists between chlorine and lime in the so-called *chloride of lime*, hence we prefer to call it "iodide of lime." The new bodies formed by the combination are iodide of calcium and iodate of lime:

$$6CaO+6I=5CaI+CaO,IO_5.$$

The chemical affinities of the salt are so feeble that it must be kept securely in glass-stoppered vials. It has the disadvantage of requiring to be placed in *solution* before being administered, as the *powder must not be given in dry form.* This disadvantage is, however, of but small account, since the solution is readily made with warm water. The solution is *permanent, colorless,* and almost *tasteless.*

The best and most convenient form for physicians' employment, by prescription and otherwise, is that of the

SYRUPUS CALCIS IODIDI.

This is a concentrated aqueous solution, prepared with sugar, perfectly clear, of very pleasant taste, and it will keep any length of time unaltered. Each fluid ounce holds the active principles of fifteen grains of the iodide of lime, and the dose is a teaspoonful to adults as often as may be required.

Messrs. J. R. Nichols & Co., chemists, of this city, supply the *iodide of lime* in one ounce and one pound packages, and also the *Syrupus Calcis Iodidi,* in one and seven pound packages. The price of the dry salt is 50 cents per ounce; of the syrup, 85 cents per pound.

RICHARD S. SPOFFORD, M. D., died at his residence in this city on Friday morning a little after midnight, in the eighty-fifth year of his age; he having been born on the 24th of May, 1787. When a great statesman or warrior dies the sensation is proportioned to the prominence of his career, but the events of the life of a physician and scholar, like Dr. Spofford, are not such as to bring him prominently before the people. His life was one of study and of beneficence, and his loss will be felt more as that of a personal friend by multitudes in this city and vicinity, than as that of a public man.

Remarks. — The above announcement of the death of a distinguished physician and kind friend appears in the *Newburyport Herald* of January 23d. Dr. Spofford attained the great age of 85 years, and consequently was one of the oldest members of the Massachusetts Medical Society at the time of his death. His father was one of the founders of the society, and Dr. Perkins of Newburyport, his student in medicine in 1825, has recently served as president of the society. Dr. Spofford engaged in the practice of medicine in Newburyport in 1816, and it is quite true, as stated in the *Herald*, that during the half century that Dr. Spofford practised here the people have had an opportunity of learning something of his character. He was generous and unselfish, and where he was called by distress, he went to its relief without asking whence the fee was to come. Indeed, his benevolence leaned to the side of a fault in his character. He was a kind friend, witty and entertaining in conversation, his memory stored with extensive reading of ancient and modern literature and science; he was equally ready with a quotation from Homer or a discussion of Huxley and Tyndall and Darwin; the original text of the Hebrew Scriptures, or a problem in the higher mathematics. The doctor had a wonderful quickness of insight. Those great eyes of his saw everything within the range of their vision, and saw through it at once. Accordingly he was great in the diagnosis of disease; his astonishing quickness of apprehension and perception was of great use to him in this part of his profession, and gave him a reputation in it that would have made him a rich man if he had been of such a disposition as would have led him to gather riches.

This venerable physician was a firm friend of the JOURNAL OF CHEMISTRY, having been one of its patrons from the start. Every number was read as soon as received, and we are indebted to him for many kind words spoken in its behalf. The old landmarks in the field of medicine are passing away, and we must make the most of those that remain.

ON DISINFECTANTS.

DR. A. J. BERNAYS, Lecturer on Chemistry at St. Thomas's Hospital, London, in a letter to the *Times*, writes as follows: —

In employing a disinfectant, it should be borne in mind that we sometimes have to deal with bodies in a state of decomposition, evolving gases more or less known to chemists; at other times with matters not so advanced, in a solid state, but not volatile.

The gases evolved from putrefying animal matter, and those of most injurious quality, are generally hydrogen compounds. Now these should be dealt with by volatile disinfectants; if possible, by gases. Now there is no gas to equal chlorine; there is none so cheap, so thoroughly effective in altering the character for good of noxious gases, and none so easy of application. As long as it is in excess, or, in other words, preponderates over the injurious hydrogen compounds, it can be recognized by its odor. There is only one serious objection to chlorine — its smell; but if it be properly used, and not wasted, this objection is reduced to a minimum. Except in the case of closets, where it is best to dust a small quantity in the pan above the reach of water, a solution of the chloride of lime, in the proportion of one pound to ten pounds of water, is most adapted for disinfecting air. A rag as large as an ordinary handkerchief, steeped in such a solution, wrung out, and suspended in small rooms, will sweeten the air for twenty-four hours. The chlorine, slowly evolved, acts partly in decomposing injurious hydrogen compounds, partly in evolving ozone; chlorine is therefore a grand oxidizing agent.

I will not occupy your space by mentioning other gases, such as sulphurous and nitrous acids, but would only venture to point out that chloralum cannot be substituted for chlorine; a fixed, non-volatile substance cannot take the place as a disinfectant of volatile substances. When we come to disinfect decomposable matter, when it is our task to prevent such matter from decomposing, then we have generally to do with solid bodies. Here is my difficulty. How can I in a few words give an intelligible description? The compounds so capable of mischief are those which contain nitrogen, sulphur, and phosphorus; the best type of them we have in albumen, such as constitutes in a pure state white of egg. These albumen-like compounds form doubtless the germs about which so much is written by medical men. If, then, germs partake of the character of albuminoid bodies, for such there can be no better disinfectant than carbolic acid. Anyhow, as these bodies give rise to the most fetid gases, as they are abundantly present in all decomposing animal matters, and as they are completely coagulated by carbolic acid, it is very difficult to understand why carbolic acid is to be substituted by disinfectants which have no such power. The evil of carbolic acid is not in its poisonous nature; many more have been killed by chloride of zinc, which is nearly equal to chloralum. No, rather is it to be sought in the deceptive character of common carbolic acid. The impurities give the disagreeable and often disgusting smell, and the odors attaching may give quite a false notion of security. Sprinkled against bricks in a sewer, out of reach of water, all the smell supposed to proceed from carbolic acid may continue to be evolved for months, whereas nothing in the way of disinfection is being accomplished. A purer article at a much higher price would be really cheaper, because effective.

In conclusion, carbolic acid is readily diffused through air; chloralum is not. Both are good in their place, but the latter can no more pretend to take the place of carbolic acid than carbolic acid that of chloralum. Carbolic acid may coagulate germs and render them harmless; chloralum could do nothing of the kind.

MEDICAL MEMORANDA.

ROYAL DEATHS FROM SMALL-POX. — By way of impressing the ravages of small-pox in the pre-Jennerian period on people's minds in a manner more picturesque than that of ordinary statistics, says the *British Medical Journal*, Dr. John Gairdner selects the history of a few royal houses. Thus, of the descendants of Charles I., of Great Britain, he finds that of his 42 lineal descendants up to the date of 1712, five were killed outright by small-pox, namely: his son Henry, Duke of Gloucester, and his daughter Mary, wife of the Prince of Orange and mother of William III., and three of the children of James II., namely: Charles, Duke of Cambridge, in 1677; Mary, Queen of England and wife of William III., in 1694; and the Princess Maria Louisa, in April, 1712. This does not include, of course, severe attacks not fatal, such as those from which both Queen Anne and William III. suffered. Of the immediate descendants of his contemporary, Louis XIV., of France (who himself survived a severe attack of small-pox), five also died of it in the interval between 1711 and 1774, namely: his son Louis, the Dauphin of France, in April, 1711; Louis, Duke of Burgundy, son of the preceding, and also Dauphin, and the Dauphiness, his wife, in 1712; their son, the Duc de Bretagne, and Louis XV., the great-grandson of Louis XIV. Among other royal deaths from small-pox in the same period, were those of Joseph I., Emperor of Germany, in 1711; Peter II., Emperor of Russia, in 1730; Henry, Prince of Prussia, 1767; Maximilian Joseph, Elector of Bavaria, Dec. 30, 1777.

AMATEUR PRESCRIPTIONS FOR THE SICK PRINCE. — During the illness of the Prince of Wales many people came from all parts of the country with medicinal remedies for his Royal Highness. The *Pall Mall Gazette* remarks that this is not without precedent. "When Henry, Prince of Wales, was dying in November, 1612, of a fever which commenced with a chill, the only medicine that nearly succeeded in producing perspiration was a 'quint-essence' sent by Sir Walter Raleigh from his prison in the Tower for the use of the Prince, and it even produced a more marked effect than the pigeons which were applied to the head, or the split cock applied to the feet of the royal sufferer. The extreme anxiety shown by strangers to render medical assistance to those who, occupying prominent public positions, are attacked by illness is very remarkable, and speaks well for the general good feel-

ing that prevails in the world in spite of all the harsh judgments that are sometimes passed upon it. It is a well-known fact that when the late Lord Derby had an attack of gout, prescriptions and pill-boxes poured in upon him from all quarters, and were duly acknowledged, to the complete satisfaction of the kindly hands by whom they were forwarded. When Mr. Pitt was at the point of death, a stranger, it is said, appeared at his house at Putney-hill and requested permission to administer a remedy he brought with him, and which he felt convinced would be effectual. The doctors having exhausted all their resources gave the required consent, and a small quantity of what appeared to be a kind of oil was poured down the throat of the dying statesman by the visitor, without producing any other result than increased difficulty of breathing and other symptoms of distress. The effect of the experiment was not, in fact, such as to create confidence in the nostrums of amateurs, who spare the small, but, bottle in hand, hover round the bedsides of the great; still they are often well-intentioned people, and the disappointment they feel at the rejection of their advice is quite sufficient punishment for their offence, if offence it be, without their being made the objects of ridicule."

Women as Nurses. — The London *Saturday Review*, in an article entitled "In Sickness," remarks as follows: "In sickness, too, who but women can nurse? Men make good nurses enough out in the bush, where nothing better can be had; and a Californian 'pardner' is tender enough in his uncouth way to his mate stricken down with fever in the shanty, when he comes in at meal times and administers quinine and brick tea with horny hands begrimed with mud. But this is not nursing in the woman's sense. To be sure the strength of men makes them often of value about an invalid. They can lift and carry as women cannot, and the want of a few nights' sleep does not make them hysterical. Still they are nowhere as nurses, compared with women; and the best of them are not up to the thoughtful cares and pleasant attentions which, as medical men know, are half the battle in recovery. And this is work which suits women. It appeals to their love of power and tenderness combined, and gratifies the maternal instinct of protection and self-sacrifice, while it pleasantly reverses the usual order of things, and gives Samson, blind and bound, into their hands."

Hypodermic Injection of Morphia. — In the London *Practitioner*, Dr. Sleightholme gives his experience in the hypodermic injection of morphia, while house physician to the Manchester Royal Infirmary. He says that he gave at least two thousand injections of morphia to patients suffering with various complaints. From these cases he never saw any immediate ill effect from the injection, and but one instance of ill result from prolonged use. In delirium tremens he found that usually the hypodermic injection of morphia increased the excitement. The delirium from injuries was increased by the same treatment. Neither was acute chorea benefited by injected morphia. In acute rheumatism, valvular disease of the heart, and aneurism, the injection had a most happy effect. In general, he says, when hypodermic injections of morphia are used to relieve pain they invariably succeed, no matter how severe the pain may be; that when sleep was prevented by severe pain, the pain was relieved and sleep followed.

POISONOUS "HAIR RESTORERS."

We have referred more than once to the mischief done by hair dyes, "restorers," etc., containing lead. A medical correspondent of the *Country Gentleman* states that he has under his care two ladies, one of whom "has been paralyzed on the right side for nearly three years, and has been utterly helpless most of that time. Her vision has been very imperfect; her knowledge of past events has utterly departed from her; recently she appears to be recovering her recollection, and can count with tolerable accuracy as high as twenty." He attributes her prostration entirely to the use of a popular hair restorer. "The other case is not so bad, but bad enough. For the past year her eyes have been an occasion of constant torture. The retina has become so sensitive to the light as to make a dark room indispensable. Wheels of burning flame revolve constantly before her eyes, attended by lightning-like flashes, which are terrible to bear. She is another victim to the poisonous lead contained in the same popular hair-restorer."

Since writing the above, we find another case of the kind reported in the *Boston Medical and Surgical Journal* by Dr. J. M. Crocker, of Provincetown, Mass. "R. W., aged 55, laborer, was attacked with what appeared to be muscular rheumatism, affecting mainly the deltoid and other muscles of shoulders, last February. When first visited, he was suffering from pains which he had felt more or less severely for a month or two. Both arms were in this manner crippled. Ordered cotton batting to affected parts, lemon-juice and opiates internally. Made quite a rapid recovery, but when seen in March following, he was suffering from an almost complete paralysis of extensor muscles of fingers and hands, with dropping of wrists. He could readily and forcibly grasp, but found difficulty in letting go. Subsequently, upon inquiry, I discovered that for fifteen years he had used a 'hair renewer,' made by himself of three teaspoonfuls lac sulphur and two teaspoonfuls sugar of lead to a pint of water. With this he had drenched his hair and scalp as often as once a week. Under use of iodide of potassium and galvanism, he has made a good recovery, the hair-dressing having of course been discontinued."

A SIMPLE REMEDY FOR DANDRUFF.

There are doubtless few persons, especially among gentlemen, who do not suffer from the inconvenience of dandruff. Physicians seem to consider it not of sufficient importance to engage their attention, and the poor victims are left either to practise their virtue of endurance, or for a cure, to try some of the many nostrums advertised in the public prints.

The intolerable itching which frequently accompanies the troublesome complaint is not the only unpleasant feature, as, to persons of any pretensions to neatness, the appearance of the white scales on the coat-collar and shoulders is very objectionable.

The writer, during a number of years, tried the different alcoholic solutions of castor-oil, and many other preparations, without permanent benefit, and, as a last resort, was led to adopt the plan of cleaning the scalp with borax and carb. potassa. This proved effectual, but after a persistent treatment of some months the hair became sensibly thinner, and perhaps would have soon disappeared altogether. The belief that dandruff arises from a disease of the skin, although physicians do not seem to agree on this point, and the knowledge that the use of sulphur is frequently attended with very happy results in such diseases, induced me to try it in my own case. A preparation of one ounce of flowers of sulphur and one quart of water was made. The clear liquid was poured off, after the mixture had been repeatedly agitated during intervals of a few hours, and the head was saturated with this every morning. In a few weeks every trace of dandruff had disappeared, the hair became soft and glossy, and now, after a discontinuance of the treatment for eighteen months, there is no indication of the return of the disease. I do not pretend to explain the *modus operandi* of the treatment, for it is well known that sublimed sulphur is almost or wholly insoluble, and the liquid used was destitute of *taste*, *color*, or *smell*. The effect speaks for itself. — *Journal of Pharmacy.*

SELECTED FORMULÆ.

Colors for Druggists' Show Bottles. — *Amber.* — Dragon's blood, in coarse powder, 1 part; oil of vitriol, 4 parts. When thoroughly dissolved dilute with cold distilled water till the required tint is obtained. *Lilac.* — Dissolve oxide of cobalt in hydrochloric acid, adding sesquicarbonate of ammonia in excess, and afterwards sufficient ammonio-sulphate of copper to bring the desired color. *Orange.* — Dissolve bichromate of potash in water and add a little sulphuric acid. *Violet.* — Mix together solutions of nitrate of cobalt and sesquicarbonate of ammonia, adding a sufficiency of ammonio-sulphate of copper to strike the required color. *Blue.* — Take of solution of perchloride of iron 10 drops, yellow prussiate of potash 10 grains, oxalic acid 2 drachms, water 1 gallon. *Red.* — Solution of perchloride of iron 10 drops, sulphocyanide of potassium 10 grains, water 1 gallon. *Crimson.* — Iodine and iodide of potash, of each 30 grains, hydrochloric acid 1 drachm, water 1 gallon. *Green.* — Sulphate of copper 1 drachm, bichromate of potash 30 grains, strong liquor of ammonia 2 ounces, water 1 gallon.

Balsamic Cigarettes for Asthma, etc. — The London *Chemists' and Druggists' Compendium* gives the following recipe: Soak strong unsized paper in a solution of saltpetre; this dry, and treat first with tincture of cascarilla, and afterwards, when nearly dry, with compound tincture of benzoin; cut into squares of a suitable size, and roll into the form of cigarettes.

Transparent Amandine. — The following is from the same authority: Take of fine white honey 4 ounces, fine white soap 2 ounces; mix these well in a mortar, adding one ounce liquor potassa, until the mixture becomes a perfect cream; rub in with caution and slowly 7 pounds of almond oil (sweet), and 1 oz. of essential oil of bitter almonds, adding to taste a sufficiency of oils of bergamot and cloves, and lastly, half a drachm of balsam of Peru.

Lavender Water. — The following is a superior preparation by Dr. Pereira: Oil of lavender (flowers) 3 drachms, oil of bergamot 3 drachms, oil of roses (otto) 6 drops, oil of cloves 6 drops, musk 2 grains, oil of rosemary (best) 1 drachm, honey 1 ounce, benzoic acid 40 grains, rectified spirit 20 ounces, water 3 ounces.

Aromatic Vinegar. — Take of camphor 1 ounce; oil of cloves, 1 drachm; oil of lavender, 40 drops; oil of rosemary, 40 drops; glacial acetic acid, 10 ounces.

Dispensary for Skin Diseases. — A most beneficent charitable institution has been opened in this city at 241 Harrison Avenue. It is a Dispensary for Skin Diseases, a free hospital in which all diseases of the skin are treated on Mondays, Wednesdays, and Saturdays of each week, at 11½ o'clock. Dr. Wigglesworth is the skilful surgeon in charge, and patients in his hands will receive all attention and medical and surgical treatment necessary.

Rush Medical College, Chicago. — We desire to call attention to this medical school, as during the great conflagration in Chicago the college building was utterly destroyed. The college has secured the lecture and clinic rooms of the Cook County Hospital, and the regular session will commence on Wednesday, March 6, and continue until June 26. The college has an able corps of instructors, and students will receive as thorough instruction here as at any institution in the country.

Boston Journal of Chemistry.

Volume VI. BOSTON, APRIL, 1872. Number 10.

Familiar Science.

THE SOLAR ECLIPSE OF DECEMBER 12, 1871.

BY PROF. C. A. YOUNG.

The article upon this eclipse which appeared n the last number of the Journal, though ›urposely delayed as long as possible, was ıardly in type before fuller accounts of the ob- ervations began to be received in the form of etters published in the different popular and cientific periodicals: thus far communications ıave come to hand from Lockyer, Maclear, ?ringle, Respighi, Janssen, and Tennant.

And first, one or two errors in the previous ırticle must be corrected. It seems that Bekul, ›r Baikul, where Mr. Lockyer observed, is not n or near Ceylon, but on the western coast of ndia, about twenty-five miles south of Manga- ›re. Manantoddy, where Abbay was stationed, s also west of Dodabetta, about half-way be- ween it and Bekul. At this station alone the veather was bad and prevented observation. Poodoocottah, Respighi's station, is on the east- rn side of the peninsula, some twenty miles rom the sea; and the only stations in Ceylon vere at Jaffna and Trincomalee.

A more important correction relates to the emark as to the "Frenchiness" of Janssen's elegrams. I am happy to say it does him in- ustice, for in subsequent letters he removes the round of complaint. Taking the telegram by self, however, it naturally suggests the remark › any one who has had occasion to be familiar ith the cool manner in which, ever since the ays of Descartes, French *savants* have too often nored the previous work of other nationalities, ıd claimed foreign discoveries as their own.

I translate a portion of one of Janssen's tters: —

"In my telescope the spectrum of the corona ›pears not continuous but remarkably complex. found in it the bright lines of hydrogen, which rms the principal element of the protuberances and e chromosphere; the brilliant green line already ›served in the eclipses of 1869 and 1870, and some her fainter ones; and finally some of the *dark* ıes of the ordinary solar spectrum, notably D: ese lines are much more difficult to perceive.

"My observations prove that, independently of the ›smical materials which must exist in the neigh- rhood of the sun, there exists around this body an mosphere very extensive and excessively rare, ith hydrogen for its basis (à base d'hydrogène). his atmosphere, which undoubtedly forms the out- le gaseous envelope of the sun, is fed by the aterial of the protuberances projected with such olence from the bowels of the photosphere, but is stinguished from the chromosphere and the pro- berances by a density enormously less, a lower mperature, and perhaps by the presence of cer- in different gases.

"There is then reason to assign a distinctive me to this new solar atmosphere. I propose to call it the *coronal atmosphere*, a designation which indicates that it produces the principal portion of the luminous phenomena which thus far go by the name of the Solar Corona.

"In announcing this result I do not forget for my part, how much we owe to the labors which have prepared the way for it; notably those of the American astronomers in 1869 and 1870."

The only objection to be made to this is that he should speak of his own observations as proving instead of confirming a discovery made in 1869, and fully established in 1870. The name *leucosphere* was proposed for this "coronal atmosphere" by Lieutenant Brown, last year, but has not been generally adopted.

The observations of M. Janssen at Sholoor, however, agree with those at nearly all the other stations, in demonstrating the presence of hydrogen in this upper atmosphere — an exceedingly important addition to our knowledge. Some of the hydrogen lines were indeed seen in 1870 by nearly all the observers, but since they were also seen almost as well on the surface of the moon itself as anywhere else outside of the chromosphere, their presence was generally attributed to simple atmospheric glare — I certainly thought so, wrongly as it seems. What decides the matter, however, is not that the hydrogen lines were seen, but that the D^3 line, so called, which in the spectrum of the chromosphere is brighter than the F and G lines, was *not* seen: this fact, which cannot be accounted for on the supposition of a mere reflection, comes out very strikingly in the observations of Lockyer and Respighi. Janssen also deserves great credit for his success in bringing out for the first time the dark Fraunhofer lines in the corona spectrum. He owes this success to his magnificent instrument, a reflector of 14 inches aperture and only 56 inches focal length, giving an image from 12 to 15 times brighter than common, and fitted with a corresponding spectroscope.

The observation of the eclipsed sun through a train of prisms, by Mr. Lockyer, which was so confusedly described in the letter quoted last month, gave the following result: He saw four exquisitely colored rings, with projections in each directly above the prominences visible on the sun's limb. One of the rings was a brilliant scarlet, answering to the C line of hydrogen; the second was green (1474); the third blue (F); and the fourth violet (2796). Furthermore, the rings were all of about the same height, estimated at 2′, and the green zone was the faintest. What is singular about the result, and contrary to what might have been expected, is not, as Mr. Lockyer seems to think, the faintness of the 1474 ring, but the fact that it was no larger than the others, and only 2′ instead of 8′ or 10′ high.

Respighi's result, however, agrees better with my own expectations. Observing in a manner essentially similar, but with a telescope instead of the naked eye, he saw the same rings except the one in the violet, and describes them thus:

"The green zone surrounding the disc of the moon was the brightest, the most uniform, and the best defined. The red zone was also very distinct and well defined, while the blue zone was faint and indistinct. The green zone was well defined at the summit, though less bright than at the base: its form was sensibly circular, and its height 6′ or 7′. The red zone exhibited the same form and approximately the same height as the green, but its light was weaker and less uniform."

Both observers agree in this, — neither of them saw any yellow zone corresponding to the D^3 line, nor did they see anything of the coronal streamers through the prism. The significance of the first fact has been already indicated. The second goes to show (though considering their faintness it does not quite make it certain) that the streamers differ in their nature and material from the coronal atmosphere; it does not by any means, however, follow that they are not solar in their origin.

The reversal of the Fraunhofer lines seems to have been satisfactorily observed by Captain Maclear at Bekul, Colonel Tennant at Dodabetta, and Captain Fyers at Jaffna. It was partially seen by Pringle at Bekul, and Respighi at Poodoocottah, and probably by Pogson at Avenashi. How it was with Janssen I do not know. His instrument, however, on account of the small size of the sun's image, was not very well adapted for this observation.

Mosely, at Trincomalee, did not see it. Mr. Lockyer missed it by an accidental derangement of the telescope. He says further, "At the last contact Mr. Pringle watched for it and saw no lines." How the mistake occurred I do not understand, but Mr. Pringle's own words are, "At the end of totality a considerable number of lines flashed in; what proportion of the whole I cannot say, perhaps one third."

Captain Maclear writes, "As totality came on the light decreased, and the lines increased exceedingly rapidly in number and brightness, until it seemed as if every line in the solar spectrum was reversed: then they vanished, not instantly, but so rapidly that I could not make out the order of their going."

This description applies exactly to what I saw in 1870, except that the lines then made their appearance more suddenly — they flashed out like the stars from a rocket head; but the discrepancy is easily enough accounted for by supposing that the portion of the sun's limb last covered by the moon was then more quiet than at the time of Captain Maclear's observation.

As to the polariscopic results, Mr. Lockyer and his associate, Dr. Thompson, found strong vertical polarization over everything. At Jaffna Captain Tupman and Mr. Lewis found it as strongly radial: so also Oudemans at Batavia. Mr. Pogson's result is announced as "satisfactory," but whether that means vertical or radial

I am sure I do not know. The old puzzle evidently remains.

There is nothing further as to the comparison of photographs, 5 of which were obtained at Bekul, 6 at Dodabetta, 3 at Avenashi, and 6 at Jaffna, besides a few others by amateurs at different stations. Probably it will be necessary to wait until the parties have all returned to England before we hear the result, which can hardly fail to be interesting and instructive.

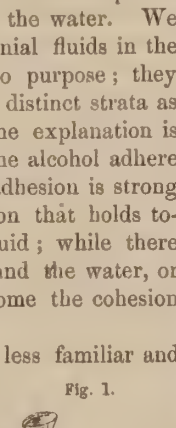
DARTMOUTH COLLEGE, *March* 1, 1872.

THE DIFFUSION OF LIQUIDS.

THE mixing of liquids is a very familiar process, and the fact that certain liquids will not mix is equally well known. If we pour alcohol into water, the two soon become uniformly mingled, but if we try the experiment with oil instead of alcohol, the oil rises to the top and remains entirely separate from the water. We may stir or agitate the uncongenial fluids in the hope of blending them, but to no purpose; they hasten to arrange themselves in distinct strata as soon as we let them alone. The explanation is a simple one: the particles of the alcohol adhere to those of the water, and this adhesion is strong enough to overcome the cohesion that holds together the particles of each liquid; while there is no adhesion between the oil and the water, or none that is sufficient to overcome the cohesion of the liquids.

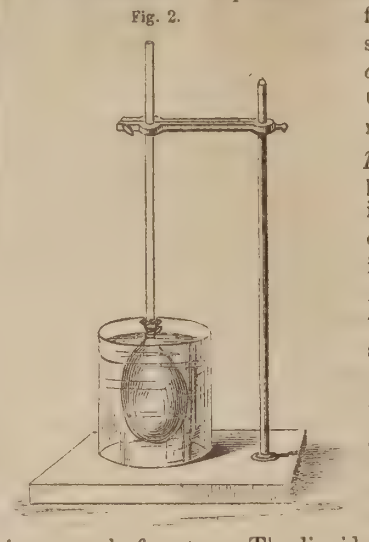
The *diffusion* of liquids is a less familiar and a less simple phenomenon. If we put some colored alcohol into a tall glass jar, and then by means of a long tube, as shown in Figure 1, pour in water very carefully, the latter will remain for some time at the bottom of the vessel, and the line of separation from the alcohol will be sharply defined; but if the liquids are left to themselves for a day or two, the color will show that they have become thoroughly mingled. If sulphuric acid is poured in this way into the bottom of a vessel containing water colored with litmus or red cabbage, the change in the color of the vegetable dye enables us to trace the gradual intermingling of the acid with the water. This mixing of liquids that are merely brought in contact is what is meant by their *diffusion*. The laws of this diffusion have been carefully investigated by Graham and others, but it would take too much space to state them in full. Suffice it here to say that the rapidity of the diffusion varies remarkably with the nature of the liquids, or (in the case of solutions of the same substance) with the strength of the solution, with the temperature, and with certain minor conditions. To illustrate the variation in the rate of diffusion, we may mention that hydrochloric (or muriatic) acid diffuses into pure water seven times as fast as syrup of sugar, and the latter seven times as fast as albumen, or the white of an egg. In some cases, chemical decomposition may be effected by diffusion: thus potassic bisulphate is separated into free sulphuric acid and potassic sulphate.

Fig. 1.



Liquids will mingle even when separated by a thin membrane or porous substance, and this form of diffusion is called *osmose*, from a Greek word meaning *impulse*. A simple experiment in the osmose of liquids is illustrated in Figure 2. Tie the neck of a bladder air-tight about the end of a long glass tube, fill the bladder with alcohol, and immerse it in a vessel of water. The liquid will gradually rise in the tube, showing that water has passed into the bladder. The water in the vessel will also be found to contain alcohol, which has been passing out, but with a slower current, while the water has been passing in. The inward current is sometimes called *endosmose*, and the outward one *exosmose*. The rate of diffusion varies with the liquids used, and with the substance employed to separate them. If we use a small collodion balloon instead of the bladder, the fall of the liquid in the tube shows that the alcohol passes out faster than the water comes in. If the bladder is filled with sugar syrup instead of alcohol, the inward flow of the water is far more rapid than the outward flow of the syrup, as is proved by the rise of liquid in the tube.

Fig. 2.



In cases like this, the phenomena are apparently due to the combined effect of capillary attraction and diffusion. The water is absorbed by the bladder (that is, drawn into its pores by capillary force) more rapidly than the alcohol or syrup. The first effect, then, is to saturate the bladder with water containing a slight admixture of syrup — to confine our attention to that experiment. On the outside of the bladder, this water slightly mixed with syrup is diffusing into pure or nearly pure water, which will necessarily be a slow process; on the inside, water nearly pure is diffusing into strong syrup, and as this will be a quicker process the quantity of water entering will be greater than that of syrup escaping.

But there are other cases of osmose that are by no means so easily explained, and the laws that govern the process are as yet but imperfectly understood. The subject is an interesting and important one, since it embraces such phenomena as the motion of the sap, and of other fluids in plants and animals, with the dependent processes of absorption, secretion, and in short, almost everything that is most intimately connected with organic *growth*.

MAPLE SUGAR.

THE formation of the sugar in the sap of the maple, like many other organic processes, is not perfectly understood by chemists, but the following facts are well ascertained, and afford a partial explanation of the mystery. In the latter part of the summer considerable starch and similar substances are deposited in the cells of the sap wood of trees. These are the stores laid up for the manufacture of the foliage for the next summer. When spring comes the roots of the trees wake up from their winter sleep and imbibe large quantities of water from the soil, long before the buds begin to swell. This water is of course charged with various salts, some of which, like carbonate of lime, are held in solution by the carbonic acid contained in the water, while others are soluble in pure water. This water is gradually carried up the stem of the tree by capillary attraction and by osmose; but as it ascends through the cells it converts some of their contents into sugar, becoming denser and more saccharine as it rises, until finally it reaches the buds. If now the weather is warm enough, the buds expand and soon burst into leaves and flowers. The first energies of the tree are devoted to perfecting these important parts; and when this is accomplished the leaves commence to prepare the material for the growth of another year. This is deposited in the new layer of wood which is formed directly under the bark, ready to be taken up again the next spring for the formation of new twigs and leaves and thus the circulation goes on from year to year. The only part of the trunk that takes any active part in the circulation is the sap or light colored wood. The old dark portion of the wood in the interior has become clogged up with insoluble matter, and is no longer capable either of conducting sap or of performing any other function in the economy of the tree.

If we wish to make sugar from the sap of any tree, it must be tapped at the time of year when it is most abundantly charged with that liquid, and this is usually a month or two before the leaves begin to expand. Nearly all our hardwood trees will yield more or less sugar, but only a very few of them furnish it in large quantities or pure enough for domestic use. The *Acer* or Maple family stands at the head of the list in this respect, and chief among these is the *Acer saccharinum* or sugar maple, the juice of which contains from three to six per cent. of cane sugar. That which comes from the tree when it is first tapped is much richer than that which flows later in the season. The first sap ascending the stem naturally dissolves out the largest proportion of the starch and gum.

After the sap is drawn it is concentrated by boiling until it commences to crystallize, when it is allowed to cool and deposit the sugar. During this concentration of the sap the lime salts which have been held in solution are gradually precipitated as the syrup becomes more dense. This deposit or "nitre," as it is called, consists according to some authorities, of carbonate of lime; others consider it to be malate of lime or saccharate of lime.

The flow of sap varies much with the state of the weather, being most abundant when the nights are cool and the days warm. This has been explained on the supposition that on warm days the air contained in the trunk of the tree expands, thus forcing the sap out; while as the tree cools off at night the air contracts, and the sap rises from the roots to supply the vacuum, to be again forced out the next day. As soon as the leaves commence to expand the flow ceases, because then the leaves are able to evaporate all the water that the roots can supply. But

he continual tapping of the tree and the withrawal of its stores of nourishment soon causes t to languish, and it cannot survive such treatment many years any more than a man could survive the loss of a considerable portion of blood each day.

THINGS WORTH NOTING.

"THERE IS NOTHING NEW UNDER THE SUN." — n "Arthur Young's Travels," published in 1793, here may be found the following suggestion of an lectric telegraph: "In the evening to Mons. Loand's, a very ingenious and inventive mechanic. n electricity he has made a remarkable discovery. You write two or three words on a paper; he takes with him into a room, and turns a machine enlosed in a cylindrical case, on the top of which is n electrometer, a small fine pith ball. A wire onnects with a similar cylinder and electrometer in distant apartment, and his wife, by remarking the orresponding motions of the ball, writes down the ords they indicate, from which it appears he has ormed an alphabet of motions. As the length of he wire makes no difference in the effect, a correpondence might be carried on at any distance; within and without a besieged town, for instance, or or a purpose more worthy and a thousand times nore harmless, between two lovers prevented from ny better connection. Whatever the use may be, he invention is beautiful."

Photography was suggested even earlier. In Dr. Hooper's "Rational Recreation," 1774, is the following method of writing on glass by the rays of the un: "Dissolve chalk in aquafortis to the consistence of milk, and add to that a strong dissolution f silver. Keep this liquor in a glass decanter, well toppered. Then cut from a paper the letters you vould have appear, and paste the paper on the decanter, which you are to place in the sun in such a manner that its rays may pass through the spaces ut out of the paper, and fall on the surface of the iquor. The part of the glass through which the ays pass will turn black, and that under the paper ill remain white."

HOW TO USE THE THERMOMETER. — Signal fficer Singleton, of St. Louis, alluding to some tatements respecting discrepancies between governent reports of the weather, the state of the therometer, etc., and those made by private individuals, ays: "A thermometer should be placed in an open pace, out of the vicinity of high buildings, or any bject that impedes the free circulation of air. It hould face the north, to be always in the shade, hould be twelve inches from every neighboring bject, should be about fifteen inches from the ground, nd should be protected against its own radiation to he sky, and against the light reflected from neighboring objects, or the ground itself. The thermometer should be read as rapidly as possible, as the eat from the body or the breath influences the instruent. I have taken a thermometer belonging to gentleman in this city, that read seven degrees bove the standard instrument in this office, and fter removing the back, which was of metal, painted lack and varnished (with a radiating power of wenty-seven degrees at night), placed it in my nstrument shelter, after ascertaining the error, by y standard (which was three tenths of a degree, he instrument being an imported article and very ne), and I found it to read exactly with the standrd. Out of 470 observations at all hours of the ay and night it varied but once, and then only wo tenths of a degree."

LOW BAROMETER IN POLAR REGIONS AND IN CYCLONES. — Observations show that there is a marked depression of the barometer in the polar egions and in the central part of cyclones; but no ery satisfactory explanation has as yet been given of the cause of this phenomenon. Reliable observations show that there is a depression of *more than one inch* below the average at the equator, in that portion of the Antarctic region which has been visited by observers, and about half as much in the Arctic region. It is also known that during the continuance of a cyclone the barometer stands from *one to two inches lower* in the central portion of the same, than when exposed in the exterior part.

ACCURACY OF TELEGRAPHIC DETERMINATION OF LONGITUDE. — In some work of this kind done for the United States Coast Survey, where the longitudes were estimated by four different circuits, the greatest difference between any two determinations was twenty-eight thousandths of a second, equivalent to about *thirty feet*, the mean error being less than one millionth of the distance between the two objective points, which, in some cases, as in that between Cambridge and San Francisco, was 3,580 miles.

HYGIENIC HINTS.

HARD AND SOFT BOILED EGGS. — It is well known that a soft boiled egg is more easily digested than a hard boiled one; but the difficulty is in the white, not in the yolk. Experiments have shown that the gastric juice will not act readily on the tough tenacious structure of firmly coagulated white of egg, even when cut in pieces as small as peas — or as fine as people usually chew their food — while it acts with facility on the more brittle yolk. To cook eggs so that they will be easily digested, put them into boiling water sufficient to cover them, and let them remain ten or fifteen minutes; keep the water nearly up to the boiling point, but do not let it reach that point. Fresh eggs will cook sooner than old ones, and small ones than large ones. By this process the yolks will be well cooked, while the white does not become tough and hard to digest.

THROAT AND LUNG DISEASES. — Most of the throat and lung diseases, which indirectly lead to consumption, are occasioned by sheer carelessness. A delicate woman often sits for two or three hours in a crowded theatre or church, breathing an atmosphere tainted by the exhalations from the lungs of hundreds of other people, her system is exhausted, her skin is excited by unwonted action, and when she leaves the building and goes out into the cold air her blood is suddenly driven to the interior of the body, and then ensues a more or less permanent congestion or inflammation of some of the internal organs — usually the air tubes in or leading to the lungs. This process being repeated many times, a chronic bronchitis is finally established in persons otherwise healthy, and life is ever after rendered miserable by this periodical overheating and sudden chilling of the body, even if the more dangerous malady, consumption, does not interfere, and put the abused body into the grave.

READING IN RAILWAY CARS. — The *Philadelphia Medical and Surgical Reporter* has the following sensible remarks on this subject, and we commend them to the attention of all who ride much by rail: —

Most, if not all who read on railroads, are sensible of weight and weariness about the eyes. This sensation is accounted for on high medical authority by the fact that the exact distance between the eyes and the paper cannot be maintained. The concussions and oscillations of the train disturb the powers of vision, and any variation, however slight, is met by an effort at accommodation on the part of the eyes. The constant exercise of so delicate an organ of course produces fatigue, and if the practice of railroad reading is persisted in must result in permanent injury. Added to this difficulty is bad or shifting light. The safe and prudent mode is to read little if any. The deliberate finishing of volumes in railway cars is highly detrimental.

IN-DOOR LIFE.

ONE chief respect in which our severe climate and our over-stimulating social condition harass us, is the excessive preponderance of in-door activity which they involve. Now man is not yet an in-door animal, though he seems to be in a fair way to become one ultimately. The intense pleasure and the renewed vigor which we feel in summer picnickings may serve to indicate the extent to which our old barbaric needs still assert themselves in our mental and physical constitution. We cannot, however, again become out-door barbarians; nor is it urged that barbaric life is more conducive to health than civilized life. We may nevertheless learn from the savage one all-important hygienic lesson. In innumerable ways the savage violates the laws of health; but he at least breathes pure air, and his blood is rapidly oxygenated. Now one of the worst features, perhaps the very worst, of our in-door activity is the way in which it interferes with the due aeration of our blood. And this is a feature of in-door life which we can and must obviate. Partly due to imperfect science, but still more to unpardonable carelessness of the plainest rules of hygiene, is the unquestioned fact that our houses, our schoolrooms, our theatres, and our public conveyances are, as far as the atmosphere is concerned, foul dens of corruption. He who will read, for example, the two interesting papers on "Rebreathed Air," and on "Experiments with Air-Furnaces," in Dr. Nichols's just-published "Fireside Science," will not fail to appreciate the justice of our emphatic epithet. In these days of prohibitory liquor laws and anti-tobacco agitation, we may profitably bear in mind that the Indian weed (if practically a poison at all, which may be doubted) is far less poisonous than the carbonic oxide which burning anthracite invariably generates; and that where whiskey has slain its thousands, rebreathed air has slain its tens of thousands. Indeed, it may be seriously questioned whether the latter demon is not a secret but powerful ally of the former, producing as it does that anæmia, or deficiency of red blood disks, which may well be supposed capable of urging the jaded system to solace itself by alcoholic stimulation. From the moral point of view our more just and enlightened posterity will probably regard the Pennsylvania coal monopolists of our time very much as we regard the Rhenish barons of the twelfth century, who used to levy black-mail on every innocent traveller; and from the scientific point of view they will probably look back upon us in our over-heated and foul-aired houses with the same sort of pity with which we look back upon our ancestors in their un-chimneyed, undrained, and plague-producing hovels. However this may be, it is incumbent on us, as our chief hygienic duty, on the one hand, to devise some efficient method of carrying rebreathed air out of our houses, and, on the other hand, either to cease using anthracite for domestic purposes, or to invent (if it be possible) some kind of stove or furnace which will not cause our faces to flush and our temples to throb under the influence of Stygian blasts of carbonic oxide.

In passing, we may observe that Dr. Nichols's little book above mentioned, under the title of "Fireside Science," contains a number of short essays, all of which are well worth reading, and many of which are of considerable practical value. — *Atlantic Monthly.*

THE UNWEARIED ACTION OF THE HEART.

THE effect of everything that touches the heart is multiplied by the intensity of the heart's own changes. Hence it is that it is so sensitive, so true and quick an index of the body's state. Hence, also, it is that it never wearies. Let me remind you of the work done by our hearts in a day. A man's total outward work, his whole effect upon the

world in twenty-four hours, has been reckoned about 350 foot-tons. That may be taken as a good "hard day's work." During the same time the heart has been working at the rate of 120 foot-tons. That is to say, if all the pulses of a day and night could be concentrated and welded into one great throb, that throb would be enough to throw a ton of iron 120 feet into the air. And yet the heart is never weary. Many of us are tired after but feeble labors; few of us can hold a poker out at arm's length without, after a few minutes, dropping it. But a healthy heart, and many an unsound heart, too — though sometimes you can tell in the evening, by its stroke, that it has been thrown off its balance by the turmoils and worries of life — goes on beating through the night when we are asleep, and when we wake in the morning we find it at work, fresh as if it had only just begun to beat. It does this because upon each stroke of work there follows a period, a brief but a real period of rest; because the next stroke which comes is but the natural sequence of that rest, and made to match it; because, in fact, each beat is, in force, in scope, in character, in everything, the simple expression of the heart's own energy and state. — *Appletons' Journal.*

CULINARY RECIPES.

Boiling Potatoes. — To boil a potato well requires more attention than is usually given. They should be well washed and left standing in cold water an hour or two, to remove the black liquor with which they are impregnated, and a brackish taste they would otherwise have. They should not be pared before boiling; they lose much of the starch by so doing and are made insipid. Put them into a kettle of clear cold water, with a little salt, cover closely and boil rapidly, using no more water than will just cover them, as they produce a considerable quantity of fluid themselves while boiling, and too much water will make them heavy. As soon as *just* done, pour off the water instantly, set them back of the range, and leave the cover off the saucepan till the steam has evaporated. They will then, if a good kind, be dry and mealy. This is an Irish recipe, and a good one.

Potato Salad. — Any one who has eaten potato salad at a Parisian hotel will be glad to try it after he gets home. The following is a good formula for the simple but delicious preparation. Cut ten or twelve cold boiled potatoes into slices from a quarter to half an inch thick; put into a salad bowl with four tablespoonfuls of tarragon or plain vinegar, six tablespoonfuls of best salad oil, one teaspoonful of minced parsley, and pepper and salt to taste; stir well, that all be thoroughly mixed. It should be made two or three hours before needed on the table. Anchovies, olives, or any pickles may be added to this salad, as also bits of cold beef, chicken, or turkey if desired; but it is excellent without these.

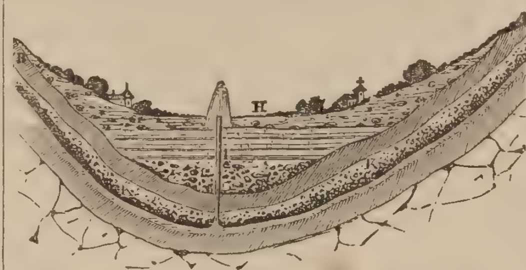
Sweet Potato Balls. — First boil the potatoes, then carefully mash the farinaceous part. Boil in the mean time a pint of milk, put in some lemon peel, a couple of small lumps of sugar, and a little salt. When the milk boils, take it off the fire and add the potatoes, so as to form a paste, or rather a tolerably thick mush. When cool, make it into balls; cover these with crumbs of bread and yolk of egg. Fry to a nice brown color, and serve up with sugar strewed over them.

A Relish for Breakfast or Lunch. — Take a quarter of a pound of good, fresh cheese; cut it up in thin slices and put in a spider, turning over it a large cupful of sweet milk; add a quarter of a teaspoonful of dry mustard, a dash of pepper, a little salt, and a piece of butter as large as a butternut; stir the mixture all the time. Have at hand three Boston crackers finely powdered or rolled, and sprinkle them in gradually; as soon as they are stirred in, turn the contents into a warm dish and serve.

The Arts.

ARTESIAN WELLS.

A correspondent wishes us to explain why the water in artesian wells often rises to the top of the well or even higher, like a fountain supplied by a reservoir situated above the outlet. It is simply because the well *is* virtually such a fountain. The water rises in the effort to regain its level, as the accompanying figure may serve to show. Suppose B and D to be two strata of clay, or some formation impermeable to water, and K to be a stratum of sand or gravel between them. The rain that falls on the hills at



either side will filter down through this sand or gravel, and collect in the hollow between the clay strata where it cannot escape. If now we bore down to K, the water thus confined will rise to the surface at H, or considerably above it. The height will depend upon the pressure of water which has accumulated in the sloping space between the impervious beds.

It will be readily understood that it is only where the nature and arrangement of the geological strata are such as we have described, that artesian wells can be expected to furnish water without the necessity of pumping. The province of Artois in France, from which these wells take their name, is a locality of this character; and the great cities of Paris and London are both favorably situated in this respect. The well at Grenelle in Paris is 1,798 feet deep, and the water rises at the rate of 516 gallons a minute, and with force enough to throw it 32 feet above the surface. In the London basin, as it is called, the porous cretaceous (or chalk) beds rest on the impervious "gault," and are covered with the equally impervious London clay; while on the higher grounds about the city the edges of the chalk bed are exposed and receive the rain-fall. Many wells have been sunk in this basin; among them those which supply the ornamental fountains in Trafalgar Square, and which penetrate to the depth of 393 feet.

Many of the waste places of the earth may yet be made fertile and habitable by means of artesian wells. Borings in the Great Sahara have been successful, and that immense desert may eventually be converted into fruitful fields. Extensive arid districts beyond the Mississippi are likely to be reclaimed in a similar way when the more favored portions of that region have been filled up.

MEMORANDA IN THE ARTS.

Railways in War. — A military committee has just been sitting at Berlin to inquire into the results of the employment of railways during the late war in the conveyance of troops, ammunition, provisions, etc. It is found that when the distance is short, and a considerable force has to be conveyed, it will proceed more rapidly on foot than by railway. An army corps of 36,000 men will go a distance of eighteen German miles in less time than if it were conveyed by a double line of railway, and a distance of twenty-seven miles in less time than if it were conveyed by a single line. A saving of time is only to be obtained in forwarding large bodies of troops by railway when the proportion of troops to German miles is as 2,000 to 1 on a double line, and as 1,333 to 1 on a single line. The French frequently suffered great losses from not observing this rule, while, on the other hand, they surpassed the Germans in employing railways for the conveyance of provisions. For this purpose so-called "magasins mobiles" were formed, each of which contained ten days' provision for an army corps, and was always kept ready on the line to be despatched wherever it might be wanted.

New Instrument for Measuring Speed at Sea. — The difficulties hitherto experienced in measuring the speed of ships, by any of the devices thus far produced, are said to be overcome by an ingenious instrument called the *rhysimeter*, lately invented in England. The indicator, which resembles a barometer in size and appearance, is located in the captain's cabin, a column of mercury showing constantly by its variations the speed which the vessel is making. Its accuracy is said to be perfect, there being no appreciable interference by friction or otherwise; and as the machine is self-registering, it may be made to keep a complete record of the speed of the ship throughout the voyage. The log and all substitutes for it heretofore employed have been found unreliable, especially in changeable weather, or under a heavy sea in either direction.

The rhysimeter is also designed for indicating the velocity of flowing liquids, which is in fact one of its most valuable uses, as it will greatly assist in the solution of many problems in practical hydraulics.

To Deodorize Kerosene Oil. — The odor of a substance is in most cases adherent, like color or any other physical property, and not accidental or extraneous. Where, as in the case of kerosene oil or the lighter petroleum naphthas, the substance is a mixture of many constituents, it is difficult to decide which of them is the objectionable one, and so long as this has not been determined, we can devise no rules for getting rid of it, or for destroying it in any other way. Practically, therefore, we are unable to deodorize the products, and especially the lighter ones, of the distillation of petroleum; but we may conceal them in the same way as formerly the disagreeable odors incidental to sick rooms and even to ordinary apartments were hidden by the liberal use of strong smelling liquids or the fumes of incense. The *Druggists' Circular* suggests that the best fluid for this purpose is the artificial oil of bitter almonds, or mirbane oil; a little of it will go a great way in disguising the odor of petroleum effectually, and as it has a very high boiling point, it will accomplish its purpose most durably.

Sodium for Blasting. — The application of sodium for the purpose of blasting is made as follows: Two glass bulbs 50 cubic centimeters capacity are blown with a neck of glass between them; one bulb is filled with sodium and the other with water, and between the two is fused a soluble salt. The length of time required to dissolve the salt can be ascertained by experiment, and the connecting tube be made so as not to have the charge fired prematurely. The bulbs, with the sodium below, are let down into the drill hole, the water gradually dissolves the salt, and thus comes into contact with the metal, and the explosion follows.

A New Thing for Photographers. — The *Scientific Press*, of San Francisco, describes a little contrivance invented by a photographer of that city, which will, we think, be found especially useful in

taking the pictures of children, as it dispenses with the great black cloth with which the tube of the camera is covered, and the removal and replacement of which, while the picture is being taken, tend to impair the result, by distracting the attention of the sitter. Instead of the cloth or brass cap which covers the tube of the camera, there is a disk of brass or other metal, consisting of two semi-lunar portions, which open and close like the blades of a pair of scissors. They are worked noiselessly and instantaneously by the slight pressure of a little knob on the top of the instrument, and the plate is exposed and closed again without any manipulations that can be seen by the sitter. The operator waits until the child assumes a favorable expression, when he presses the spring, exposes the plate, and takes the picture without making any motion that attracts the attention or causes a motion of his sitter. Like all useful inventions, this is exceedingly simple, and may be attached to any photographic camera.

PRACTICAL RECIPES.

Fine Green Bronze. — First boil the work in a strong solution of potash to get off all the old lacquer and grease; next wash in clear water; after that let the work stand a day or two in a weak solution of nitric acid, then take out, wash, and dry; then coat the article with some good black lead. Polish until you have a good black, glossy surface; then put on yellow lacquer, which, upon a black surface, gives a green bronze.

Useful Cement. — The following cement is found to be excellent for use in cases where it is desirable to join or close vessels for containing the vapor of acids, or highly corrosive substances. Beat and sift finely dry pipe clay; add painters' drying oil, and mix, in a mortar, to a moulding consistency. Use this lute in cylinders, flattened, and applied to the joinings. The points to which it is applied must be perfectly clean and dry.

Joining Rubber. — Rubber is easily joined and made as strong as an original fabric, by softening before a fire and laying the edges carefully together, without dust, dirt, or moisture between. The edges so joined must be freshly cut in the beginning. Tubing can be united by joining the edges around a glass cylinder, which has previously been rolled with paper. After the glass is withdrawn the paper is easily removed. Sift flour or ashes through the tube to prevent the sides from adhering from accidental contact.

Liquid Black-Lead Polish. — A recent English invention consists of black lead, such as is used for polishing stoves and for other uses, combined with turpentine, water, and sugar or saccharine matter, and the proportions which have been found to answer well are, to each pound by weight of black lead, one gill of turpentine, one gill of water, and one ounce of sugar; but these proportions may be varied, and in some cases all the ingredients are not necessary.

Elastic Varnish for Leather. — Take two parts by weight of resin, and one of india rubber, and heat them in an earthenware vessel till they are fused together; after which they should be stirred till they are quite cold; a little boiled linseed oil may be added while the materials are hot.

To Improve Gilding. — Mix a gill of water with two ounces of purified nitre, one ounce of alum, one ounce of common salt; lay this over gilt articles with a brush, and the color will be much improved.

A perfume for note paper, said to be that used by the Queen of England, is made of powdered starch, one half ounce; ottar of roses, ten drops. Put this in bags and keep in the desk with paper.

Agriculture.

FARM PENCILLINGS AT LAKESIDE.

MUCK.

The term *muck*, as used by farmers and agricultural writers, has a somewhat ambiguous meaning. It is often applied to cow-dung and stable manure, but usually the term is employed to designate the black, unctuous deposits found in meadows and low basins, and upon the margins of ponds. As these deposits differ most essentially in composition, the significancy of the word is not well defined. To obviate the confusion or perplexity which exists, we think there should be a distinction made between *peat* and other low land deposits, and they should have different names. Peat is the proper term to apply to the vegetable matter found in meadows in different stages of decay, and which is unlike the heavy, dark deposits, consisting of sand, clay, and vegetable *débris*, found in slough holes, ponds, etc. The difference between peat and this wash is very great, and the advantage in maintaining a distinction is obvious, as farmers will be better able to understand what deposits have some value and what have none. Peat, or pure vegetable deposits, may under some circumstances be worthy of attention, but wash or *mud* seldom is.

During the present winter we have observed, in our rides and walks in the country, farmers busily engaged in removing the heavy deposits from ponds left dry from the absence of rains. This labor, from the worthless character of the substance sought, was wholly unremunerative. An examination of one of these deposits in process of removal showed that sand and clay formed nearly fifty per cent. of the bulk of the material, water and a small amount of partially decomposed leaves and rushes made up the remainder. The black fragments of vegetable material gave to the mass a *dark* appearance, and hence it was supposed to have manurial value. Most fields would be positively injured by applying to them this heavy silt or mud, and the loss of time and labor to the farmer in removing it was a serious one. Before carting away such deposits, he should have taken a handful of the mixture and thoroughly diffused it in a quart of clear water. The sand and clay fall to the bottom of the vessel, and the lighter particles of vegetable material settle above, and by decanting or turning off the water after standing a few hours, a clear idea of the nature of the muck could have been obtained.

We are certain that the value of peat or muck, as a source of plant food, has been greatly exaggerated, and we hesitate not to say, that one of the most absurd books ever written is a "Muck Manual," compiled and published a dozen or more years ago; it has led farmers into quagmires and shaky bogs after materials which they were induced to suppose possessed a fertilizing value closely approximating that of animal excrement. This is a delusion which still exists to a very considerable extent, and occasions considerable disappointment and loss. What is the actual manurial worth of peat or the decomposed vegetable matter found in our meadows? Let us look into its nature carefully; let us dry it, weigh it, analyze it, and thus learn something positive concerning it. From a considerable number of analyses of peat, taken from different localities in New England, we will select two made the present winter as fairly representing both extremes, one a very good, the other a very poor article. The first and best was sent to us by J. S. Potter, Esq., of Newton, Mass., and it gave of —

Water	84.95
Ash	4.83
Organic matter	10.22
	100.00

The second came from Swampscott, Mass., and gave of —

Water	63.73
Ash	28.56
Organic matter	7.71
	100.00

A ton of the first specimen held *seventeen hundred pounds* of water, the second, *twelve hundred pounds*. The best contained about two hundred pounds of vegetable matter, the worst one hundred and sixty. What fertilizing value the specimens possessed is to be found in the ash and organic matter. The ash of the first was composed of sand, sulphate and carbonate of lime, oxide of iron, with traces of magnesia and soda; the second was largely made up of clay and sand with small quantities of lime. These mineral constituents are insignificant in value, although in one of the specimens large in amount. It may be said that the ash constituents of the last specimen are, practically, of little account, and the first holds but traces of the costly materials of plant food.

As regards the organic portion of peat it may possibly furnish food for plants both directly and indirectly, but our experiments with it in the field — and these experiments extend over a period of nearly ten years — have not afforded encouraging results. It is asserted by some writers that it furnishes carbon to plants, but this is doubtful. The leaves of plants elaborate carbon from the carbonic acid of the atmosphere; if the roots absorb it at all, it is in very limited quantities. There is no doubt whatever that peat, in its decay in the soil, furnishes carbonic acid in large quantities, but whether this is of any advantage to plants is not a settled point. Peats do contain nitrogen, but the amount is small; those found in the bogs of Massachusetts seldom rising above *one per cent.* of the dry mass. Assuming that dry peats of good quality supply on an average one per cent. of nitrogen, and the whole amount is utilized by plants, then one ton of raw peat yields three pounds, which at thirty cents gives the nitrogen value of the ton ninety cents. This nitrogen does not exist in the form of ammonia, as we have invariably failed to find ready formed ammonia in peats, and they do not contain nitric acid; therefore the nitrogen must occur in some inert or insoluble form, not perhaps largely available as plant food. It is impossible to state what the actual value of the nitrogen of peats may be, but we have good reason to believe that under the influence of moisture and air in soils, a portion of the gas at least is converted into ammonia or nitric acid, and therefore becomes available as a fertilizing agent. So far then as nitrogen goes, we have reason to believe that peat furnishes *some* valuable plant nourishment. If peat has the power of absorbing free nitrogen from the air, and if it is oxidized to nitric acid in the soil, then its *indirect* value should be regarded. We have a most ex-

cellent deposit of peat upon our farm, and have applied it to various kinds of soils, and, as before intimated, have studied its effects. Several of the years, or seasons, have been unfavorable for trial, from the extreme droughts; much of the dry, light vegetable matter lying upon the surface of our fields has been taken up by the winds and carried away. When perfectly dry it is as light as chaff, and is therefore easily moved by winds. Thus far, when treated with and without lime, we have failed to observe the least beneficial influence upon our crops. As an absorbent in cattle pens and barn cellars, it serves a good purpose, and if farmers can afford to draw and handle it, it should be collected. It also supplies a good adjunct to the compost heap, and seems to absorb ammoniacal and other gases; and its presence promotes changes in animal matter and in other fertilizing substances. We have not space fully to discuss this important subject in this number of the JOURNAL, and therefore it will be taken up again at a future time.

LOBSTER-SHELL MANURE.

Upon the coast of New England in the summer months, immense quantities of lobsters are taken, and after cooking are placed in hermetically sealed cans, and sold as food in all parts of the country. Some canning establishments in Maine consume in this industry thousands of tons each season; and consequently little mountains of shells accumulate, which are a source of annoyance to the owners of the factories. To utilize this product, the shells have been ground up and sold to farmers as manure. In order to ascertain the value of this substance, we have been employed to make analysis of it as sold in the market. It was found to contain of —

Water	15.90
Organic substances	42.13
Inorganic "	41.97
	100.00

In 100 parts it contains of —

Ammonia, actual and potential	3.50
Insoluble phosphoric acid	4.00

The insoluble phosphoric acid corresponds to 8.73 per cent. of bone phosphate, and the remainder of the inorganic portion consisted of carbonate and sulphate of lime. We learn from this determination that the lobster-shell manure has not a high value, — is not worth as much as a good quality of fish pomace. We presume the article as prepared at different factories would vary considerably in value, but the analysis will afford a very fair idea of its actual worth.

BONE CHARCOAL.

One of the important uses to which bones are applied is the production of a charcoal, which is largely used in decolorizing syrups in sugar refineries. If bones are burned in the open air, the animal portion is destroyed, and they crumble to a white powder; if they are placed in iron retorts and subjected to the influence of heat, a portion of the animal constituent is carbonized, and bone charcoal results. By either process, the earthy phosphates are not in the least disturbed, and the very best superphosphate of lime can be made from the substances by treating them with acids. We are this year using bone charcoal for making superphosphates for farm use, and we find no difficulty in producing an article which yields, upon analysis, *fifteen per cent. of soluble phosphoric acid.* This article we predict will "make the corn jump," as the phrase is, when the growing season fairly comes round. We have great confidence in well prepared phosphates, and fully believe that if we supply phosphoric acid in assimilable condition to soils, great benefits will result to our crops. The phosphates we *must* supply to exhausted lands, as not a plant can grow without them, and from no incidental sources can they proceed. Nitrogen, which has so great value in our manurial substances, may be furnished in abundance from the atmosphere or from rain water. It is certain that organic matter in soils has the power, to a greater or less extent, of changing atmospheric nitrogen into the two compounds from which alone it is made available as plant food. We are led from year to year to adopt more confidently Liebig's views upon this important point, inasmuch as we have observed that the nitrogenous element, when not directly supplied, was not wanting in any variety of plants if the phosphates were furnished generously.

HOME-MADE FERTILIZERS.

In preparing superphosphates upon the farm it is perhaps better to employ bones that have been calcined or charred, as a dry powder results from a proper admixture of acid with such materials, and the trouble of drying and a second grinding is avoided. Raw bone dust, when acted upon by acid and water, forms a pasty mass which requires time and labor to dry properly. It is undoubtedly better for the farmer who has collected a quantity of raw bones which he desires to convert into superphosphate, to make a pile, allowing them to rest upon rough stones, surrounded with a low wall. This constitutes an extempore furnace, in which, with the aid of wood to kindle, the bones can be burned to whiteness, thereby becoming very brittle, so as to be easily ground to a powder. The loss in organic matter will be a little more than 25 per cent., but this does not detract from the value of the superphosphate which can be made from the bones. If bone charcoal is employed, such as has been used in refineries or laboratories, it is all ready to be acted upon by the acid. Calcined bones can be ground in a common plaster or grist mill. We are using in our laboratory what is known as the Bogardus Mill, which grinds bones, coal, and burnt bones with great facility and rapidity. It is a small mill, made of iron, and requires what is equivalent to a three or four horse power to move it. In preparing superphosphate, use of sulphuric acid or oil of vitriol 50 lbs. to each 150 lbs. of the fine bone. The equivalent of acid, or enough to fully decompose the bone, requires rather more than one pound to two; but there is danger, in imperfect manipulation, that some free or unchanged acid may remain, a result not desirable. It is better to dilute the acid with water by turning into the vessel 3½ gallons, and then adding the 50 lbs. of acid. Into this shovel the 150 lbs. of bone, stirring it constantly with a hoe. If bone charcoal is employed, it will be dry enough and sufficiently fine to apply to the fields as soon as cool. There is much said among manufacturers about superphosphate "going back" after it is made. This means that the soluble phosphate changes by standing into the insoluble condition. We incline to think that this only takes place in the presence of organic substances, and that it is only those mixtures of fish pomace or dried animal matter with superphosphate of lime, that undergo spontaneous change. We are engaged in a series of investigations in our laboratory upon this point, which we trust will throw light upon it. For some purposes for which we use our home-made fertilizers, we add to each 1,500 lbs. of the dissolved bone, 300 lbs. of chloride of potassium, and 200 lbs. of nitrate of soda, thus supplying the potash and nitrogenous elements. We modify the combinations to meet the wants of different crops. But to explain all this fully would require a book, and we pass to other topics.

KAINIT.

We have before referred to this potash salt which comes from the Stassfurth salt mines in Prussia. It is very largely used in England, France, and Germany, in agriculture, and from a careful examination of the statements made respecting it we incline to regard it favorably. Mr. C. D. Hunter, chemist at Mr. Lawson's experimental farm, Blennerhasset, England, has used it with success upon potatoes and other crops, and many others have used it with satisfactory results. Our experiments at the farm with kainit have not been long enough continued to justify confident opinions. Kainit is composed of about 25 per cent. of sulphate of potash, 20 per cent. of sulphate of magnesia, 40 per cent. of chloride of soda or common salt, and 15 per cent. of gypsum and chloride of magnesium. The potash is the most valuable ingredient, and if we estimate the value of that in each ton, we reach the following result: sulphate of potash contains 54.08 per cent. pure potash, 45.92 per cent. sulphuric acid; and therefore 2,000 lbs. of kainit averaging 25 per cent. of sulphate of potash would give 270.4 lbs. of pure potash. Commercial potash contains but 75 per cent. of pure alkali, and hence its cost at present prices is fully 10 cents a pound. The pure alkali therefore in one ton of kainit would be worth about $27.00. The salt, gypsum, and magnesia have considerable value as manurial agents. The salt is largely in excess of the other ingredients, and we fear it may be too large for some soils. Kainit is manifestly a substance worth trying, and since through the efforts of Wm. Grange, Esq., of Baltimore, it is placed within reach of farmers, we hope it will receive extended trial in this country. Mr. Grange offers to supply it at $13.00 the ton, currency, which is a very low price compared with that of some dealers, who have been asking $40.00 the ton. The integrity of the article as furnished by Mr. Grange is guaranteed, each cargo being accompanied by the sworn certificate of Dr. G. L. Ulex, chemist, at Hamburg. We presume farmers can obtain quantities as small as a single ton by addressing Mr. Grange at Baltimore, but of this we are not certain. All desired information may be obtained by addressing him.

ANALYSIS OF SOILS.

MUCH interest is manifested by agriculturists regarding the value of soil analysis, and we are often solicited to express views upon this point. Careful experiment and observation have led us to conclude that less practical or positive knowledge is gained by analysis of soils than many suppose. We entered upon the work ten years

ago with much enthusiasm, and expected to be unerringly guided in our farm operations, by the results attained. It was found that while we had no difficulty in learning the exact ingredients of our soils, we could not ascertain in what states of combination they existed. Many soils examined were found to be quite similar in chemical composition, but they differed widely in their productive powers; and also, soils which were found to contain in rich abundance all the elements of plant nutrition did not grow crops as we had reason to expect. Soil analysis fails to throw light upon the mechanical or physical conditions which have a most important bearing upon crops, and the growth of every kind of plants.

Simple analysis of top-coverings, without taking into account the nature of subsoils, location, mechanical conditions, etc., is not to be relied upon as a certain guide in the management of lands. Nevertheless chemistry, directly and indirectly, affords great aid in soil cultivation, and in some cases soil analysis may be valuable. For instance, if lime or potash be wanting in soils it will inform us of the fact, and we can supply these important substances with great benefit. A single analysis of the soil of a wheat or potato field may show the absence of some one of the elements of food upon which the plant depends, and if it were not supplied the crop would be a failure. Soils come from the rocks, and their character depends upon the nature of the rocks from which they have resulted. Some are rich in potash, others in lime; and a soil rich in one or the other of these ingredients is not benefited by their application. Thus, analysis teaches us how to prevent loss in two ways: loss of crops, by supplying needed plant-food; and loss in using unnecessary manure upon lands where it exists in abundance. It also teaches us that certain lands are naturally barren, and cannot be reclaimed with profit, and that others have soluble salts in such large proportions that they cannot grow crops.

There are a large number of enigmas in soil cultivation which chemistry has thus far failed to explain. It is known, for instance, that superphosphate greatly benefits a turnip field, and yet analysis of the plant reveals the fact that but little phosphoric acid enters the plant; and also, it is probable that potash and other salts may exist in such peculiar combinations in soils as not to be readily detected by chemical tests, as we find that potatoes, which require much potash, will sometimes grow upon soils in which we fail to detect this agent.

This subject is an important and interesting one, but it would require an extended treatise to give it proper consideration.

A VERY GOOD COMPOST.

A gentleman residing at La Grange, Ga., wrote to us some time since, that the following mixture had been used upon the cotton fields of that section with excellent results:—

Nitrate of Soda	40 lbs.
Sulphate of Ammonia	60 "
Muriate of Potash	20 "
Bone Dust	200 "
Gypsum	200 "
Salt	50 "
Soil or Muck	1,430 "
	2,000 lbs.

This mixture embraces quite all the great essentials of plant food, but we think it is too much attenuated. The proportions might be doubled (leaving out half the soil) with advantage, as it would not be so heavy to handle. We would however suggest an improvement in the proportions employed: instead of 60 lbs. of sulphate of ammonia it had better be, for cotton, 100 lbs.; and good, true superphosphate might take the place of the bone dust with advantage. The cotton plant needs the active influence of phosphoric acid to push it forward vigorously. If the planters will combine together and purchase these commercial articles, good and true, at the lowest wholesale rates, and make this compost, they will save the tens of thousands of dollars thrown away upon the factitious mixtures sold so freely in the South.

To Dissolve Ground Bone.—"S. C. S.," Aiken, S. C., asks, What proportion of sulphuric acid is required to dissolve ground bone? 22 lbs. of acid will dissolve 100 lbs. of bone. But the Charleston phosphate is not bone, and contains no animal matter; and a larger proportion of acid is necessary to dissolve it; we do not know the exact quantity, but it can be easily determined on trial; probably 50 lbs.—*American Agriculturist.*

Remarks.—A journal of so high character as the *Agriculturist* ought not to publish an item like the above. It must mislead, and therefore do injury. No amount of acid will *dissolve* ground bone. To liberate the phosphoric acid and form the new combinations which as a whole are called "superphosphate," much more acid is required. How is a farmer to "determine by trial" the amount of acid necessary to "dissolve" the Charleston phosphates? Is he to continue to pour on acid until the phosphates are *dissolved* or placed in solution? Before this is effected he will require more acid than any manufacturer can supply. It would have been much better to have answered the correspondent's inquiry by saying that the writer did not know anything about dissolving bones.

Wild Plants for Hanging Baskets.—Those who have tried to grow the *trailing arbutus* in the parlor have usually failed, but a lady correspondent of the *Horticulturist* has succeeded in doing it for several consecutive seasons. "Early in April," she says, "as soon as the snow was gone, we gathered trailing arbutus, partridge-berry (*Mitchella repens*), winter-green (*Gaultheria procumbens*), ferns and moss, with sometimes a plant of the yellow-blossomed wild strawberry (*Fragaria vesca*). The basket was first lined with soft moss, and then filled with light forest mould. A strong root of fern was planted in the centre, the other plants filled in, and the whole kept well watered. For many weeks the basket was kept gay and fragrant with the successive blooms of the arbutus, and as they disappeared the delicate bells and bright scarlet berries of the *Mitchella*, nestling amid the rich foliage and soft moss, made a thing of beauty the entire season.

The conditions observed were: 1st. To renew the materials of the basket every spring. 2d. To select plants with good roots, growing in light leaf mould, and, in case of the arbutus, to obtain plants plentifully filled with buds. This plant will not form buds in a hanging basket; and, indeed, so far as my observation goes, it will only do so when growing over a rock. 3d. And quite as important as all the other items, the basket was kept well watered and in the shade. No sunshine was ever allowed to strike it, a cool situation near a north window being found the most favorable place for it."

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, APRIL 1, 1872.

HOUSEHOLD ELECTRICITY.

During the extraordinary clear cold weather which prevailed in February and March the electrical phenomena observed in some houses excited much interest. In our own dwelling, for many days, no member of the family could walk across a room and come in contact with a metallic substance without receiving an electrical shock, accompanied with a spark and report. The door knobs, stop-cocks connected with steam radiators, gas-cocks, registers, etc., were so electrically spiteful that they were handled with caution. Our children amused themselves in the evening by lighting the gas with their fingers, and altogether the electrical condition of the atmosphere was quite unusual. In order that this exhibition of household electricity may be witnessed in perfection, it is necessary that the weather be clear and cold, and that the rooms be carpeted with heavy carpets, and these should be insulated by paper mattings beneath. Under these favorable conditions, a person scuffling or even walking across a room becomes so charged with electricity that he can ignite a gas-jet readily, by applying to it the tip of his finger.

Observing this play of one of the mysterious forces of nature, we could not help reflecting upon the fact, that with all our knowledge we to-day know no more of what electricity *is*, than the ancient Romans, Grecians, or Egyptians. It is an agency or force which has never been *seen*, *measured*, or *weighed*, and in *itself* is as illusory, intangible, incomprehensible, as the "stuff that dreams are made of." All we know of it relates to its *effects*, and it is not probable that human knowledge will ever reach beyond this boundary.

It is a force that we have been able to put in harness, and by complying with the conditions under which it acts, we can compel it to serve important ends in benefitting the race. It is probable that at present we understand most of the laws or conditions which govern it, and that we have utilized the agency so far as it is capable of being utilized. Its relations to matter, and to the phenomena of life, are also quite well understood. This being conceded, it is evident that *as yet we are utterly unacquainted with a sufficient number of forces to do the work of the universe.* Every day the student and experimenter is brought face to face with phenomena which he is wholly incompetent to explain, and although electricity is a convenient agency to which to refer everything inexplicable, yet it is a very unsatisfactory pack-horse upon which to crowd our difficulties.

There are many things yet to be learned, and proud as we are and have reason to be of our philosophy, as the ages roll on, what we know to-day will stand comparatively as the science and knowledge of the ancient Romans stand to the great light of the present age.

THE TEA HOUR.

The tea hour, in thousands of happy homes, is the hour of the day looked forward to with most intense delight, as it calls around the table

the members of the household after the various cares and labors of the day are completed, and a season of rest and social intercourse is anticipated. The dining hour is with most people the time when the appetite is craving, and the sense of hunger is apt to beget a considerable amount of impatience or perhaps fretfulness. If there is any hour in the day when the man of business is unamiable or testy under his own roof, it is just before dinner, when he is waiting for the signal which is to summon the family to the dining-room. Children, guided by their quick instincts, seldom ask for favors at such unpropitious moments; and often family pets, the dogs and cats, learn to skulk away into some quiet corner, and wait until the meal has fairly begun, before they venture to intrude themselves into chairs, or come within reach of the paternal boots. Dinner may be called the *business* meal; it is the one which requires the most labor and expense to provide, and it is too apt to be partaken of when the mind is loaded with the business perplexities of the day. In the nature of things it cannot be the season when the family shut themselves in from the outside world, and turn the current of the thoughts upon pleasant themes.

At breakfast there is more or less hurry. The mind, refreshed with sleep, is elastic, confident, eager to encounter the labors and duties which have come with the morning sunlight, and there is little inclination to talk or think of other matters than those which are connected with the work of the day. It must be conceded, that in this country the tea hour is the time, and the tea table the place, for the introduction of topics of conversation which require a forgetfulness of everything that is personal or selfish. It is peculiarly the time and place for social converse upon the wonderful and beautiful things in nature which modern research has so clearly unfolded, and which when understood are so well calculated to make us not only wiser but better.

It is the duty of every parent to introduce at the table topics of conversation such as will interest and improve the minds of the younger members of the family. Every number of the Journal of Chemistry contains essays and items bearing upon the welfare of individuals and communities, and they furnish appropriate subjects for conversation and discipline. There are but few families that will not be made wiser, happier, better, by turning the thoughts upon the interesting facts of science and art as presented from month to month in the pages of this journal.

WONDERS IN THE SUN.

The solar "explosion" or eruption of September 7th, 1871, observed by Professor C. A. Young, and described by him in the Journal of last November, has excited great interest in scientific circles, both in this country and in Europe. The London *Spectator* makes it the theme of an extended article, and says that "it must be regarded as absolutely the most striking phenomenon yet witnessed by observers of the sun." Mr. R. A. Proctor, in the *Popular Science Review*, speaks of it as a "solar outburst the most wonderful by far that has yet been witnessed, and affording highly significant evidence respecting the mighty forces at work in the sun's globe." The *Cornhill Magazine*, in an article on "Meteors," and several other leading English periodicals, refer in language equally emphatic to its imposing character, and its important bearings upon the problems in solar physics that are now engrossing the attention of scientific men throughout the world.

It is clear that this wonderful phenomenon furnishes evidence in favor of the theory that the *corona* of the sun (and we may now consider it settled that it *does* belong exclusively to *the sun*, and is nowise due to an effect of our own atmosphere) is partially caused by solar eruptions. It had been a question whether the range of the forces that produce these eruptions could extend through distances so vast as the coronal rays are seen to reach. Astronomers become familiar with the most stupendous energies exerted on a scale so grand and through spaces so immense that the imagination is wearied in the effort to conceive of them; but here it was necessary to suppose volcanic forces that even an astronomer dared not assume to be possible until he should have some positive proof of their existence. And such proof is furnished by this unprecedented eruption, in which glowing hydrogen was *seen* to rise from a height 100,000 miles above the solar surface to double that height in ten minutes, or with the velocity of 167 miles a second!

And it must be borne in mind that it was *hydrogen*, the lightest of all substances known to us, that was hurled to this inconceivable height with this inconceivable velocity, and *against the resistance of the solar atmosphere*. From its velocity between the limits observed, we can prove by mathematical calculation that its motion was greatly retarded by this resistance. But it is not likely that the erupted matter consisted solely of hydrogen. It was probably accompanied by heavier matter — perhaps the metallic vapors that have been recognized in the "eruption prominences" of the sun — and these would be retarded much less and consequently thrown much farther. "Compared with the heavier erupted matter," as the *Spectator* remarks, "the filmy wisps of hydrogen were but as the smoke from a cannon's mouth compared with the cannon-ball." Knowing the actual velocity of the hydrogen in the upper part of its ascent, we can show that the velocity of heavier matter would probably be so great that portions of it would be hurled away from the sun, never to return.

This remarkable eruption therefore tends to support another recent theory, namely, that *meteors* have their origin in such solar outbursts. This theory is discussed at length in the article from the *Cornhill Magazine* to which we have alluded above (reprinted in the *Living Age* for February 3d), but our limits will not allow us to make more than this passing reference to it here. Mr. Proctor's article in the *Popular Science Review* is reprinted in the *Eclectic* for March.

We may remark incidentally that, while in the majority of cases due credit has been given to the Journal by those who have copied or commented upon Professor Young's communication, the English magazines mentioned above have not deigned to make the proper acknowledgment to our little monthly.

☞ For the Publishers' Notice, etc., heretofore put at the head of the editorial department, the reader is referred to the last page of advertisements.

THE ANXIETIES OF AN INVENTOR.

We have on a former occasion alluded to the exacting and exhausting character of experimental and inventive labor. He who is engaged in planning or executing a new industrial enterprise, especially if it be one involving great expenditure of money, and affecting the interests of many beside himself, never lays down his burden of care and solicitude until his task is successfully consummated. No waking hour is free from anxiety, and no sound and refreshing slumber relieves the wearied brain.

Twenty-two years ago to-day (it is the 5th of March when we write) the first locomotive engine passed through the Britannia Tubular Bridge, which was a new experiment on a grand scale. What an anxious day must that have been for Robert Stephenson! It was then that he won his greatest fame as an engineer. It was, indeed, a great triumph to carry a train through a tubular bridge over the Straits of Menai. The largest arched span that had been previously constructed was only 240 feet, and here rigid iron tubes 460 feet long were stretched in mid air where the tallest ships could sail beneath them. So broken had Stephenson's rest been whilst planning this great enterprise, that when he got the first tube floated, and was satisfied that all was safe, he said, "*Now I shall go to bed!*" But although so far successful, the anxieties connected with the enterprise were not at an end, for the Britannia Bridge, which is now the wonder and marvel of the traveller, had only been commenced; and so exhaustive was the gigantic undertaking, that in referring to it after its completion, Stephenson says: "It was a most anxious and harassing time with me. Often at night-time I would lie tossing about, seeking sleep in vain. The tubes filled my head! I went to bed with them, and got up with them. In the gray of the morning when I looked across the square in which I resided (in London), it seemed an immense distance across to the houses on the opposite side. It was nearly the same length as the span of my tubular bridge!" When the first tube had been floated a friend remarked to him, "This great work has made you ten years older;" to which he replied, "I have not slept sound for three weeks!"

BAD WATER.

As an illustration of the bad character of water often used for domestic purposes, we present the analysis of a specimen taken from a well in Woburn, Mass., which has, we understand, supplied several families during the past year.

The water contained, in each United States gallon, of—

Organic matter	10,783 grains.
Inorganic "	62,713 "
Total solid contents	73,496 grains.

This water was largely contaminated with nitrates, and afforded evidence that it was receiving from some source animal and vegetable *débris* in unusual quantities. A well water recently sent to us from Andover, Mass., for analysis, furnished results nearly as unsatisfactory as the above, and almost every day we have occasion to point out to heads of families the fact that the water used is the true source of ailments which for a long time puzzled the medical attendant.

ZINC POISONING.

Having clearly and persistently pointed out the dangerous nature of the galvanized iron pipes when used for water conduction, during the past year, we have not alluded to the subject for some months. The poisoning of individuals and families through this agency still continues in some sections, and we are led to raise another note of warning. We hear of a family of four persons in Portsmouth, N. H., made very ill by using water drawn through the zinc-covered pipes. Dr. Jackson examined some of this water, and found six grains of oxide of zinc in the gallon. Hundreds have suffered to a greater or less extent from zinc-impregnated water, and legislative enactment should forbid the use of the galvanized pipes if there is no other way of reaching this desirable end.

EDITORIAL NOTES.

How Gunpowder is Exploded by an Electric Current. — One of our correspondents is puzzled to understand how a current of electricity conducted by a wire can be made to explode gunpowder at a distance, when a telegraphic wire is not perceptibly heated by the passage of the fluid, and will not ignite gunpowder placed in contact with it. We may receive the *spark* from an electrical machine or a Leyden jar in the midst of gunpowder without igniting it. In fact, experimenters sometimes find it no easy thing to get up an explosion in that way. In using galvanic electricity for the purpose, advantage is taken of the fact that if the current is sent through a *fine* wire of *poorly* conducting metal, the resistance it meets causes it to ignite the wire. Good conducting wires are therefore used for conveying the current to the gunpowder, and fine wire is used for connecting these within the cartridge, a common form of which is shown in the figure. It consists of a tin tube filled with gunpowder, and tightly closed at both ends. Two copper wires, properly insulated, pass into it, and are connected within by a fine steel wire soldered to each of them. When the current is sent through the wires this fine wire is burnt up, and thus the powder is ignited. The copper wires can be refitted with a fresh piece of steel wire, and used again and again.

Following the Sun Round the World. — The journey round the world is scarcely more of an undertaking at the present time than a trip to Europe was a few years ago. "The actual travelling time," as Rev. Dr. Prime states in the preface to his "Around the World," just published by the Harpers, "has been reduced to seventy-five days, distributed as follows: From New York to San Francisco, by rail, six days; from San Francisco to Yokohama and Hong Kong, by steamship, twenty-seven days; from Hong Kong to Calcutta, by steamship, twelve days; from Calcutta to Bombay, *via* Allahabad, by continuous rail, a journey of 1,450 miles through the heart of India, three days; from Bombay to Suez, by steamship, eleven days; from Suez to Paris or London, by steamship and rail, six days; from London to New York, ten days." One would not like to spend less than six months on the tour, which if his plans were carefully laid out in advance would enable him to glance at the chief points of interest *en route.* What he can accomplish if he takes a year for the journey, Dr. Prime's book will show; and there are advantages in devoting just that period to the tour. By starting at the right time (about the first of August), and going westward with the sun, "the traveller will be in each country, and on every sea, at the most favorable season; whereas a longer period would inevitably bring him into some oriental region in midsummer, when the heat is almost intolerable even for residents, or among the typhoons and cyclones of the tropical seas." In this way the circuit of the earth may be made as safely and comfortably as an ordinary summer excursion to Europe. California, Japan, China, India, Egypt, and Palestine, may thus be visited in turn, and time enough will remain for a run through Italy, Switzerland, Germany, France, and the British Isles, before the year has elapsed.

Anæsthetics in the Slaughter-House. — Now that so much is being done to prevent man's inhumanity to the brute subjects of the realm which he rules as "lord of creation," it is not to be wondered at that measures are proposed to reform the long established barbarous methods of slaughtering them for purposes of food. There can be no doubt that the suffering inflicted upon animals in killing them is not only great, but wholly unnecessary. An interesting paper on this subject was lately read by Dr. Richardson before the Medical Society of London, and the matter will probably be taken up by the Society for the Prevention of Cruelty to Animals. Although some animals appear to witness the death of others without emotion, yet this is not universally the case, and the pig especially has a great fear of impending death. Dr. Richardson has discovered an anæsthetic composed of coal gas combined with bichloride of methylene, which he recommends for general use in slaughter-houses. It is simple, easy, and safe in application; it does not interfere with the flow of blood or in any way affect the quality of the meat. He has also invented an apparatus consisting of a tin reservoir made to hang on a nail in the wall of the slaughter-house, and intended to contain the bichloride of methylene. To this reservoir two india-rubber tubes are attached, one to be connected with a common gas jet, the other terminating in a tin funnel large enough to receive the nose of a sheep and capable of being fastened like a muzzle on the head. The muzzle being placed, the tap of the gas is turned, and the gas bubbling through the bichloride is breathed by the animal. In a minute perfect insensibility to pain is produced, and animals breathe the gas quietly without struggling or apparent dread. For large slaughter-houses Dr. Richardson has designed a sort of passage divided into chambers, the central chamber being filled with the mixed vapor; mere passage through it will render the animal insensitive to the knife.

A Royal Clothing Factory. — A report by Mr. Redgrave, the Inspector of Factories, recently issued, gives an interesting account of the Royal clothing factory at Pimlico, at which clothing is made for the army. The separate pieces of the garments are chalked out in the usual manner upon the surface of the cloth, and the piece of cloth with the pattern so chalked upon it is placed above seventy-nine similar pieces of cloth, when the whole are cut out at one operation by a band knife resembling a band saw, but without teeth. The sewing of the parts together, to make garments, is performed partly by sewing-machines and partly by hand. The seams, after having been sewn, are ironed in the usual manner; but the irons are heated by jets of gas, and the iron is pressed down upon the ironing board by a pedal, to reduce the labor of the operator. The work is paid for by the piece. The price paid for making a tunic is 3*s.* 4*d.*, and for making a pair of trowsers is 1*s.* A woman can make about one tunic per day, or four pairs of trowsers.

ATOMS.

The corn raised by the Iowa Agricultural College costs only twice its market value; which is quite creditable for one of those institutions, and better than their average achievement. — A wire rope, six thousand yards long (about three miles and a half) and capable of bearing a strain of fifty tons, has been made for drawing trains through a tunnel on the North British Railway, in Scotland. — The *American Practitioner* says that "Fireside Science" is a book that "ought to be found in every family circle where there are young minds to be interested in the study of physical science;" and the *Philadelphia Medical and Surgical Reporter* remarks that "it is particularly adapted to the instruction and entertainment of the younger members of the family, though it is by no means too simple and commonplace to instruct older and well-read persons." — We see by advertisements in English papers that "the Great Northern Telegraph Company now forward messages to Hong Kong, Shanghai, and Nagasaki, by way of Russia, at the uniform rate of £4 8*s.* per message of twenty words;" so that a message may now be sent from San Francisco across this continent and the Atlantic, and then by the above route to China, as promptly as a few years ago it could have been transmitted from Boston to Chicago. — It has been rather chilly out in Montana, where the thermometer at Fort Benton is reported to have gone down to 59° below zero. — In six coal counties in Pennsylvania, last year, 822 persons were killed and injured; leaving 220 widows and more than 400 orphans. — The Supreme Court of Maine has decided that an oyster is a fish; a zoölogical "ruling" to which exceptions are likely to be taken in scientific if not in legal circles. — Those who have travelled in foreign lands come home and lecture on what they have seen; and now a man who has been in the Wisconsin State Prison is going to give a course of three lectures on "Our Prisons, their Uses and Abuses." — Bone-dust is occasionally adulterated with the turnings and raspings of vegetable ivory (*Phytelephas macrocarpa*); a fraud readily detected, as the spurious matter leaves a much smaller amount of ash than bone-dust, and lacks phosphate of lime. — Some of the agricultural papers are wondering at the fact that "a plant may be raised from a seed in a flower-pot, receiving no nourishment but pure water, and yet far exceed in weight all the soil in which it grew;" as if there were anything strange in that, when the merest smattering of botany suffices to show that plants draw their nutriment largely from the air. — Iron filings are sometimes mixed with the pulp in making wrapping-paper; a fraud on the purchaser, which is made up to *him* when the paper is weighed along with the articles he puts up in it. — The *Literary World*, advertised in our last number, is invaluable to those who would keep track of what is going on in "the literary world," and everybody that reads a specimen number is pretty certain to become a permanent subscriber. — The man that originated the Cardiff giant has retired from business with a snug fortune; which illustrates the advantages of having a natural turn for geological pursuits. — A stationary engine of three thousand horse-power, said to be the largest in the world, has just been started up in the Lehigh zinc works, Friedensville, Pa. — The metric system has been legalized by act of Congress, but it has not been introduced into New Jersey, where an editor, who read in the cable dispatches that "Bazaine has moved twenty kilometers out of Metz," sat down and wrote an editorial, in which he said he was delighted to hear that all the kilometers had been removed, and that the innocent people of Metz were no longer endangered by the presence of those horrible engines of war; and then he went on to describe some experiments made with kilometers in the Crimea, in which one of them exploded and blew a frigate out of water. — The Massachusetts *Teacher*, which a critic not long ago unfeelingly called "a seedy magazine," has greatly improved this year, both outwardly and inwardly, and is now one of the best educational journals in

the country. — The *Connecticut Common School Journal*, which has passed into the hands of those enterprising publishers, Chatfield & Co. of New Haven, begins the volume for 1872 in new and enlarged form, and is every way better than of old. — Forty barrels of "pop-corn" have been shipped from Illinois to England, where the article is a novel luxury. — An English druggist received the following: "please sur if you wold hif you would send me up some stofe for a child aboit to years old she is verrey bad and had to cunvelesons fits and she is cutting her duble teeth it tis whate you call the dum fever."

POISONOUS PAPER COLLARS. — A clergyman residing in Sussex County, Delaware, having been greatly troubled with numbness in his limbs, and other symptoms which led his physician to suspect lead poisoning, sent to us the ash resulting from the combustion of one of the paper collars worn by him, and we found upon analysis that it contained carbonate of lead in considerable quantity. This dangerous substance is used in the glazing of some cuffs and collars made of paper, and when the hands and neck perspire or any abrasion of the skin occurs, the lead is absorbed and poisoning results. The brand of collars containing the lead was represented to be what is known as the "Dickens" collars.

A DISTINGUISHED gentleman in Massachusetts writes us as follows regarding the JOURNAL: —

"Your publication is so universally pronounced excellent, that words of commendation may seem stale to you. But you must allow us readers the pleasure of saying that few papers or magazines of any kind convey so much desirable and practicable knowledge as the JOURNAL OF CHEMISTRY."

LITERARY NOTES.

MESSRS. SCRIBNER, ARMSTRONG, & CO., successors to the well known house of Chas. Scribner & Co., have begun another popular series of books entitled "The Illustrated Library of Travel and Adventure." It opens well with Bayard Taylor's *Japan*, an admirable description of a land in which everybody is interested just now, on account of the visit of the Japanese embassy to this country. If the succeeding volumes are not inferior to this, the success of the new series is assured.

The same publishers have issued Vol. II. of *Curtius's History of Greece*, which we have before commended. The revision of the translation by Prof. Packard, of Princeton, makes this edition as much better than the English as it is cheaper. Vol. III., completing the Peloponnesian War, will soon be ready, and will contain a full Index to the three volumes, — another good feature of this edition.

The Harpers have just published *Around the World*, by E. D. G. Prime, D. D., the record of travels through many lands and over many seas — a book to which we have alluded elsewhere; *Paul's First Epistle to the Corinthians*, by Rev. Dr. Barnes, another volume of the revised edition of his "Biblical Commentaries;" and *Twenty Years Ago*, from the Journal of a Girl in her teens, edited by the author of "John Halifax," and much the best thing that has yet appeared in her series of "Books for Girls." Mr. Rolfe's edition of Shakespeare's *Julius Cæsar* will be ready by the first of April; and in reply to many inquiries from teachers and others, we would say that this play, with the three previously published, will then be bound in one volume for those who prefer them in that form. This book, as well as the others mentioned above, may be found at Noyes, Holmes, & Co.'s.

Under the title of *Half-hour Recreations in Popular Science*, Messrs. Lee & Shepard, of Boston, propose a monthly series of papers selected from the works of eminent scientific writers of the day; and they have issued a sample number containing Mr. R. A. Proctor's "Strange Discoveries respecting the Aurora," and "Recent Solar Researches." Single numbers are to be furnished at 25 cents; twelve monthly numbers, postpaid, for $2.50. The plan is a good one, and we hope it may be carried out.

☞ WE have received subscriptions from the following persons; but as they do not give their post-office address, we are unable to send the paper until we hear from them again: —

JOHN GILMORE,
DR. DA CAMARA,
J. W. MCCLEARY,
P. MOULTON,
GEO. C. WILSON.

Medicine.

DOCTORS IN COUNCIL.

THE peculiar duties of physicians would not seem to be favorable for the development of oratorical powers, or for acquiring skill in debate; but we have observed in the meetings of the Councillors of the Massachusetts Medical Society, during the past three years, that these accomplishments were by no means wanting. We do not believe that any class of men can be brought together in deliberative assembly, who transact business with more directness, accuracy, and despatch, than this body of intelligent medical gentlemen. And in debate, we have been surprised at the clearness, force, and eloquence which these watchers at the bedside of the sick and suffering are capable of exhibiting. Parliamentary rules are better observed and enforced, nice points more quickly seen and understood, and personalities more completely avoided in their meetings, than in assemblies of lawyers, politicians, schoolmasters, or legislators. We believe this is generally true of all meetings and assemblages of educated physicians in this country and Europe. We must not be understood as intimating that doctors never disagree, or indulge in sharp controversies when met together, for such intimations would certainly excite a smile upon the countenance of every reader; but we do say that physicians manage and conduct public meetings with unusual tact and propriety, and show in debate a quiet, unostentatious force and directness, worthy of imitation in all classes of public speakers.

The school in which physicians are educated is eminently a practical one, and is as unlike that in which lawyers and politicians are reared, as anything can well be. They are able to study human beings under circumstances not possible to others, and to obtain an insight into motives and character, when all masks are thrown aside. They are compelled to meet exigencies, and give succor in hours of anguish, and in times of peril. Hence, they learn to act promptly, decidedly; the judgment is quickened, the moral force strengthened, the sensibilities aroused.

This kind of education when brought into deliberative bodies has its influence upon the proceedings, and gives to them the practical directness and business-like air to which we have alluded. We never heard a physician make a *long* speech, and doubt if it is possible for one who has been long in active medical practice to "talk against time," upon any occasion. The essays read at medical meetings are sometimes long and heavy, but they are oftener brief and interesting. Altogether, we have a high opinion of the educated, cultivated medical man, not only when his talents are displayed in the sick-room, but when met for deliberation, and the discussion of professional and public affairs.

A REMEDY FOR SMALL-POX.

FOREIGN medical circles appear to be somewhat excited over the alleged discovery of a specific for small-pox, which is said to have been tried in a Berlin hospital by Dr. Zuelzer with remarkable success. This new remedy is *xylol*, also known under the euphonious synonyms of xylyl-hydrogen, xylen, xylenyl-hydrogen, and dimethylbenzol, among which the reader is free to choose the appellation that is most acceptable to his own ear or tongue. It is one of the products of the distillation of coal-tar oil, is homologous with benzol and toluol, and possesses a specific gravity of 0.8309. It was first found by Cahours, in 1850, among the distillation products of wood. By the addition of water to crude pyroxylic spirit xylol is separated; then it is agitated with sulphuric acid. After several hours' standing, a mixture consisting of xylol and other hydrocarbons is found floating over a brown liquid. This is first washed with a solution of hydrate of potash, afterwards with water, then dried over chloride of calcium and anhydrous phosphoric acid, and afterwards subjected to distillation. Xylol is then found in the liquid running over at 120° to 130° C. It is best administered in form of oil emulsion with cinnamon syrup, or in gelatine capsules. The dose for an adult is ten to fifteen drops, for children three to five drops, hourly or every three hours. Dr. Zuelzer expressly remarks, that the good effects of xylol are only apparent when it is perfectly pure and entirely free from toluol and benzol.

Pure xylol can be obtained of Messrs. J. R. Nichols & Co., chemists, of this city.

OVERTAXING THE MINDS OF CHILDREN.

THE *New York Medical Journal*, for March, gives some extracts from a lecture on "Physical Disease from Mental Strain," by Dr. Richardson, of London. After treating of the ailments caused by excessive mental labor in various classes of adult brain-workers, he considers the injury done to the young by overtaxing their minds in school. The extent of this injury, as he remarks, varies according to the kind and character of the work. In the very young it gives rise to direct disease of the brain, to deposit of tubercle, if there be any predisposition to that disease, to convulsive attacks, or even to epilepsy. In less extreme cases, it causes simple weakness and exhaustion of the mind, with irregularity of power. The child may grow up with a memory overburdened with technicalities, and rendered almost incapable of the acquisition of other knowledge; and often the brain, owing to the labor put upon it, becomes too soon mature, so that in manhood it is merely a large child's brain, very wonderful in a child, and equally ridiculous in a man or woman. The development in an excessive degree of one particular faculty is also a common cause of feebleness.

As an illustration of the danger of constantly forcing a single faculty, he tells the story of a boy whose originally good memory was cultivated to such a degree that he could learn fifty lines of "Paradise Lost" at a single reading. On going from school to the University he was beaten by every fellow-student in the learning of detailed and detached facts. For a long time he made mistakes that were most annoying; he was unable, for instance, to cast up accurately any column of figures, he forgot dates, he ran over or under important appointments, misnamed authors in speaking of works of art or letters, and, in reasoning, his want of analytical power was painfully felt. It took him full ten long years to unlearn his wonderful technical art.

"For the reasons given," says Dr. Richardson, "I have always persistently opposed the special prize system in schools. A teacher, with some experience of results of teaching, I can recall no single instance in which noted prize-men *in early youth* bore away more than other men the prizes, that is to say, the successes, of after-life. I have, however, many, many times known the successful prize-man in the class the least successful afterward, and as often have known the most ordinary youths, in class, come out as the best men in life. Overwork in the child and in the student defeats its own object; it does not develop the powerful brain so necessary for the man: for life is ever a new and great lesson, and some young brain must be left free for the reception of lesson on lesson. Of this there need be no doubt, and there we may leave the first and leading fact. But the danger of overwork is, unfortunately, not confined to the brain; it extends to the body as a whole. When the brain is overworked in the growing child, however well the child may be fed, and clothed, and cared for, there will be overwaste of substance in proportion to the overwork. There will be stunted growth, and the formation of a bad physical body."

POISONOUS PAPER HANGINGS.

We long ago warned our readers against arsenical wall-papers, but we have recently seen it stated in the journals of the day, that, except in the case of a certain bright green, arsenic is rarely, if ever, used in coloring these papers. It appears, however, that the English "Social Science Association" takes the contrary ground, and in their "Transactions" for 1871, a paper on the subject is printed, from which we make the following extract:—

The fact that nearly all the green coloring now in use is arsenical has been indisputably proved by eminent analysts. Specimens can be produced of pale green papers containing six, nine, and even fourteen grains of arsenic to the square foot, and papers containing only a leaf or line of green in the pattern are arsenical and injurious. Yet such papers are to be seen everywhere; in royal palaces, in the mansions of our nobles and gentry, in lodging-houses, and the homes of the middle and industrial classes in town and country. Medical men have these poisonous papers on their walls, and suffer from them unawares. Arsenic was first employed in the manufacture of wall-papers about the beginning of this century, and its use has been on the increase year after year up to the present time. If we cover our walls with a poison which is not only deadly but volatile, can we wonder at deterioration of health? My own experience of the danger of arsenical wall-papers extends over a period of fourteen years, during which my entire household, numbering fourteen persons, suffered severely. But now follows an important point, proving that arsenic is not confined to green coloring, as supposed, but is used in papers of all colors, and even in white. Our papers containing green were replaced with others totally devoid of green, but in a few months' time many alarming symptoms reappeared. Suspecting arsenic again, I had all these papers analyzed, and arsenic was found in the paper of every bedroom in the house, though not one contained even a speck of green. On removing these papers, and coloring the walls with whiting and size, tinted with safe colors, relief soon followed, and health has since steadily improved. It often happens that dangerous arsenic papers are concealed underneath harmless ones, owing to the pernicious custom of putting one paper over another. A very severe case of poisoning by this means has recently come under my notice. Many of the pigments now in use appear to contain arsenic; therefore, in substituting paint or wash for paper, it is important to know of what the colors are composed. There is, I am told, a "new blue" used for coloring walls, which contains arsenic, and the green distemper wash so often used instead of paint is almost invariably arsenical; being totally unglazed, it is all the more rapidly injurious. But the gaseous exhalations of arsenic have been found dangerous, both from glazed papers and oil paint, as was proved at Munich in 1860. The Prussian Government, recognizing the danger, "forbid the use of arsenic in any colors, whether distemper or oil, for indoor work." Yet in this country arsenic paint is freely used on the walls of our rooms, and on Venetian blinds; the green paint used for these latter articles containing about seventy-five per cent. of arsenic.

[The above article was in type before we had seen the new Report of the State Board of Health, which devotes considerable space to this subject. We also see by recent foreign journals that arsenic is largely used in the coloring of *carpets*, both in greens and in *reds;* which is especially dangerous to health, since the wear to which carpets, are exposed promotes the diffusion of the poison in the air.]

PHOSPHORUS FOR SLEEPLESSNESS.

Major A. B., aged about 40 years, served three years in the late war. Being very energetic and trustworthy, his labors were arduous and exhaustive. On his return home he resumed the duties of his trade — that of a carpenter. Engaging in building a hot-house, he was exposed to the sun's heat under glass in the summer time. This exposure was followed by symptoms of disturbance of the nervous system, evincing a loss of nerve force. Naturally of a cool temper, he became excitable. The mathematics of his business became very troublesome, and he found it very difficult to cast accounts or make calculations. His steps were rapid and his manner nervous. There was but little excitement of the pulse; appetite fair; bowels regular. Sleeplessness was the most prominent and perplexing symptom.

Chloral hydrate, bromide of potassium, opium, sulphate of morphia, and valerianate of morphia, were successively tried without avail.

Finally, reasoning that here was a case in which there was a loss of nerve force, and knowing that phosphorus was a most important nerve food, I concluded to put him on its use. He took one fiftieth of a grain thrice daily in pill form. In a few days he slept as well as ever, and discontinuing the pills has since enjoyed his natural sleep.

Post hoc propter hoc is not always a reliable guide. Still, as I have witnessed the calmant and hypnotic effects of phosphorus in other cases, I am disposed to attribute the result in this case to the agent employed. As phosphorus is an irritant poison, great caution should be observed in its employment. None but the right preparation should ever be used, and then only under the direction and advice of a competent and regularly educated physician.

E. Cutter, M. D.

Woburn, Mass.

DISSECTING ANEURISM OF THE AORTA.

Mrs. N. P., aged sixty-eight years. Previous health apparently good, with the exception of slight rheumatic pains and lameness. Was heard to fall from her bed about five o'clock on the morning of February 18. Placed back in bed at once. I was immediately summoned, arriving between six and seven o'clock. Found her tossing about in bed, skin cold, with clammy sweat, pulse feeble, pupils natural; no paralysis, no clutching at any part of body or bedclothes; constantly repeating, "O Lord, O Lord." Could not be made to answer questions, although apparently conscious, as she resisted the introduction of anything into her mouth, with "I beg, I beg" — indistinctly uttered. I was unable to make a diagnosis, and told the family I did not know what was the matter with her, and asked counsel — expressing the opinion, however, that it was of no use, as I considered her dying. Tossing became less and less, coldness continued, all articulate expression ceased, and she died about eleven o'clock same morning, about six hours after being found in the "fit."

In studying her case before death, I had excluded cerebral and pulmonary apoplexy and congestion, aneurism, embolus, cardiac lesions, etc., etc. The question then was: "What was the cause of death?" Permission to examine the body was obtained, and I found a large aneurismal sac ruptured just at origin of aorta, *within cavity of pericardium*, which was, of course, full of blood; no escape of blood into mediastinum. But what renders this case doubly interesting is the fact that the aneurism was what is known as the *dissecting* aneurism — the rupture of the middle two coats being *transverse* and near the origin of the innominata — *dissecting backwards towards the heart.* There was extensive atheromatous and calcareous degeneration of the arch of aorta.

W. W. Munson, M. D.

Otisco, N. Y., *March 1st*, 1872.

THERAPEUTICS A HUNDRED YEARS AGO.

The following extract is from Prof. Silliman's "Century of Medicine and Chemistry," noticed in the last number of the Journal: —

"If any one yet desires to ask what the century of chemistry now closing has done for therapeutic medicine, let him take up any formulary of a century old, and look for almost any of the more familiar articles which form the staple of medical practice to-day. He will find set forth in the pharmacopœias of a century agone, with the greatest prominence, such simples and carminatives as balsam of tolu, syrup of marsh mallow, camphor, red coral, Castile soap, ginger, wormwood, James's powder, musk, mace, mummy, album græcum, powdered spiders, viper, millipedes, stomachic tincture, and aqua pura. Of the more potent medicines then known but little use seems to have been made. Iron and its salts, opium, mercury, jalap, and rhubarb were comparatively rare medicines. Peruvian bark finds its place among astringents, in which category fall also calomel and rhubarb. Burnt sponge is used as an alterative, in all innocence of iodine, which was as yet unknown for more than a generation. Alcohol seems to have been used chiefly for tinctures, and there is no class known as tonics. If we examine the prescriptions, it is difficult to say whether a feeling of amusement or disgust at the utter empiricism evinced is uppermost. Viper broth and spermaceti for consumption; oak-bark and gall-nuts for diabetes; musk, decoction of intestines of fowl, red coral, burnt rhubarb, chalk, etc., for diarrhea; tartar-emetic for hooping-cough; calomel and sulphur ointment for itch; are a few examples of the therapeutics of the leading physicians of London a century since. Not to do these worthy men the injustice to suppose that they dealt only in such extreme simples, it must be remembered that there was one form of iron which was an unfailing *vade mecum* and cure-all with them, and that was the *lancet*, with which they made their practice truly heroic."

MEDICAL MEMORANDA.

Glycerine in Putrid Sore Throat. — Dr. J D. Palmer, in the *Journal of Pharmacy*, says: "I have found this an invaluable remedy in putrid sore throat, as well as in many other affections. Not long since a case occurred in which its healing properties were fully tested. The patient, a little girl, seven years of age, had been suffering several days before I saw her, and the various remedies employed

had made no impression on the disease. As it was with great difficulty and pain she swallowed, and her pulse being very weak and quick, it was important that the remedy adopted should possess healing, nourishing, and antiseptic properties; and glycerine possessing these properties, was administered in teaspoonful doses every six hours. The first dose caused some smarting, the second less, and before giving the third there was obvious improvement. The case was dismissed in three days."

CUNDURANGO IN THE ENGLISH MARKET. — The London *Chemist and Druggist* says: "Cundurango, which was lately described by an enthusiastic American writer, as 'the brightest jewel in the crown of Ecuador,' is decidedly losing its lustre here. This much-vaunted remedy for cancer cannot now command a bid of five shillings a pound, although but a short time since forty shillings was paid for a parcel at public auction, and it has been disposed of in America at the extravagant price of twenty-five dollars per pound. Three bales were offered at the London sales on the 7th inst., and were bought in, amid derisive remarks, at five shillings per pound. How have the mighty fallen!"

COLLODION IN CHILBLAINS. — Dr. C. Green, in the *Buffalo Medical Journal*, states that he has used collodion in chilblains with the most decided success. In one case the patient had her feet for a time exposed to severe cold, which produced erythematous inflammation of several of the small toes. They were swollen, red, tender, and itching. He completely enveloped them in a thick coating of collodion, and the contraction which took place on its drying produced so much compression of the vessels that the toes were as pallid as frozen ones. The pain and itching were relieved, and in twenty-four hours these members were nearly well. He has cured pernio of the heel also with this article.

FROZEN BEEF ESSENCE. — Dr. H. B. Hare (*Philadelphia Medical Journal*) writes that, in a case of scarlet fever in a child, the patient could not be induced to swallow the beef-tea which his condition required. As he took ice with avidity, the father suggested that if the beef-tea were frozen he might then be induced to take it in that form. The suggestion was carried out, and the child took the frozen beef tea readily. This expedient may in many cases be advantageously adopted.

GLYCERIZED COTTON FOR DRESSING WOUNDS. — The *Journal de Pharmacie* states that Professor Gubler, at a recent meeting of the Academy of Medicine, exhibited specimens of wadding prepared by saturating it with a certain quantity of glycerine, which he had found to render it permeable to all medicinal liquids, without causing it to lose any of its suppleness and lightness. He suggested that in this state it might prove a useful substitute for charpie, in the event of a scarcity of that article. Dr. Delaborde has already employed it with advantage. In order to prepare this dressing, it is only necessary to pour a small quantity of glycerine over the square sheet of wadding, and afterwards express it as strongly as possible.

NEW METHOD TO DETERMINE THE ALKALOIDS IN PERUVIAN BARKS.

IN testing Peruvian barks, it is not of so much value to the manufacturer to know how much alkaloid they contain as to know how much of sulphate of quinia they will yield.

On trying the different methods recommended, not one of them was found to meet all requirements, whereas the one used by Carles leaves nothing to wish. 20 grm. of the bark, in fine powder, are weighed off, rubbed in a mortar with 8 grm. hydrate of lime, previously mixed with 35 grm. of water, the whole allowed to dry upon a plate by a gentle heat, then rubbed fine, transferred into a glass tube, closed below with lint, and exhausted by means of chloroform; of the latter about 150 grm. suffice. The end of this operation is known when the drops evaporated upon a saucer leave no residue; or one which, when mixed with dilute sulphuric acid, chlorine-water, and liquor ammoniæ in succession, will not assume a green color. If no chloroform shall be lost it may be displaced by water. When the last traces of chloroform have been driven off from the remaining powder, it is kneaded several times with small portions of a ten per cent. solution of dilute sulphuric acid — 10 to 12 cc. of acid are sufficient. The united liquors, put upon a dampened filter, pass through colorless, leaving resinous particles behind. The filtrate is raised to boiling, and so much of ammonia added that a slight acidity prevails. Soon after the quinine crystallizes; collected upon a double filter, the adhering mother-liquor removed by a few drops of water, pressed, dried between paper and weighed. (It is preferable to dry at 100°, but then the twelve per cent. of water which is lost by this operation has to be added when weighing. The salt then contains 75 per cent. of quinine.) The other alkaloids remain in the mother-liquor, and may be obtained by precipitation.

This method always gives satisfactory results. It requires but a few hours' time; is simple, for all the quinine is obtained at once as white sulphate, and the other alkaloids perfectly colorless. Lastly, it is also very effective, for the same bark gave a larger quantity by this process than by that of Rabourdin and that of Maitre, as follows:

From 20 grm. of a cortex chinæ regius were obtained, —

According to Rabourdin	23.00 sulphate.
" Maitre	22.30. "
" Carles	26.55 "

From 20 grm. of another bark were obtained, —

According to Rabourdin	29.50 sulphate.
" Maitre	26.75 "
" Carles	31.25 "

As strychnia and brucia are soluble in chloroform, this method might, perhaps, also be used to determine the alkaloids of the strychnæ. — *Wittstein's Vierteljahrschrift.*

TANNIN AND GLYCERINE.

TANNIC acid is frequently prescribed in concentrated solution with glycerine; but tannin, commercially obtained, possesses various impurities, which either remain as insoluble turbidity or discolor the solution. Firstly, a green resinous coloring matter, insoluble in water but soluble in strong alcohol and glycerine, invariably occurs. This contamination results from the solvent action of the ether in the original process of extracting the tannin. Secondly, metallic chips of copper, iron, etc., from the vessels in which the tannin was dried, are never absent.

A concentrated solution of tannin is nearly indispensable among the requisites of the prescription department. An aqueous solution, however concentrated it may be, will spoil. An alcoholic solution is often objectionable, but an aqueous solution, containing glycerine, can be utilized on most occasions.

This solution is best adjusted by weight; it is perfectly stable, clear, and transparent, and contains one troy ounce of tannic acid in two troy ounces of the solution, that is, half tannin by weight. The solvent is the other half, or $\frac{1}{4}$ each by weight of glycerine and water. More than this proportion of glycerine cannot be used to advantage, as the liquid becomes too thick to pour conveniently. This solution cannot be prepared, however, by directly combining the three ingredients, as the impurities must first be removed; and the only preliminary solvent for this purpose, which the writer has found to answer perfectly, is a mixture of equal measures of strong alcohol and water. A very concentrated solution, in the proportion of two parts of liquid to one of tannin, can be formed with the aid of heat, which filters with the greatest facility, leaving the resinous coloring matter and the metals untouched.

Alcohol alone, in the proportion of four to one of tannin, would not filter well. Water, in the proportion of at least four to one of tannin, would not filter even as rapidly as the solution with alcohol; and whilst the alcoholic solution becomes turbid with water, the aqueous solution never became clear from the first, and moreover was always much darkened by the metallic impurities forming colored soluble tannates. The preliminary solvent and permanent solvent above proposed are therefore the only available ones. These form a light green, thin syrupy solution, miscible with glycerine and water in all proportions without losing their brightness, and forming in a more dilute condition colorless solutions.

From these observations the following formula is deduced. Take of —

Tannin	8 troy ounces.
Glycerine	4 " "
Strong Alcohol	8 fluid "
Water	8 " "

Mix the alcohol and water; add the tannin and apply heat until the tannin has dissolved. Filter hot, then add the glycerine, and evaporate by a careful heat until the solution weighs 16 troy ounces. — *The Pharmacist.*

SELECTED FORMULÆ.

FOR WHOOPING COUGH. — The *Georgia Medical Companion* commends the following as "safe, pleasant, and effective": —

℞	Argenti Ioduret	gr. x.
	Sacch. Alb.	gr. lxx.
	Pulv. G. Tragacanth	gr. viii or x. — M.

Rub well together, moisten with a few drops of water, make pill mass, and divide into 80 pills. Each pill will contain one eighth of a grain of the salt.

S. — To a child 2 or 3 years old, one pill 3 to 5 times a day. To children 6 to 10 years old, 2 pills at a dose.

IODIDE OF STARCH POULTICE. — The following is from the same authority: Take two ounces of starch and mix with six ounces of boiling water to form a jelly, then add, before cold, half an ounce of tincture of iodine. The poultice is now ready for use. It is recommended for sloughing sores, etc.

STIMULATING EXPECTORANT — Recommended by Tanner as useful in pulmonary affections of children, when it is desired to give tartar emetic without producing depression:

℞	Vini Antimon.	f. dr. i.
	Spts. Ammo. Aromat.	f. dr. iss.
	Syr. Tolutani,	f. dr. i.
	Tr. Camph. Comp.	f. dr. ij.
	Aq. Camph.	f. oz. iss. — M.

S. — One or two teaspoonfuls every third or fourth hour.

CARBOLIZED GARGLE FOR DIPHTHERIA. — Carbolic acid, 20 minims; acetic acid, ʒss.; honey, tincture of myrrh, each f.ʒij.; water, to f.℥vj. The acids to be shaken together well before the other ingredients are added.

CHLORIDE OF POTASSIUM. — Dr. Lander has substituted the chloride for the bromide of potassium in the treatment of epileptics with a success which he declares to be identical. He begins with smaller doses; but doses of 75 to 105 grains daily have been borne without inconvenience for months in succession. He states that it is more active, one sixth of the price, and without the inconvenient secondary effects of bromide of potassium. He believes that, in the stomach, bromide is converted into chloride of potassium; and that, for many reasons, it is desirable to administer it at once in that form. — *Philadelphia Med. and Surg. Reporter.*

Boston Journal of Chemistry.

Volume VI. BOSTON, MAY, 1872. Number 11.

Familiar Science.

ZINC MINING AND MANUFACTURES.

Not many years ago Mr. C. W. Roepper, of Bethlehem, Pa., in his rambles over the mountains in that locality, chanced to discover some zinc ores at the little village of Friedensville, about four miles from Bethlehem. As a result of this discovery large zinc works have arisen within the last twenty years at that town, and the working of zinc mines, and the manufacture of the oxide of zinc and other products, has become an immense industry. A visit to these mines and works, not long ago, afforded opportunity to learn much that was of interest to ourselves, and doubtless will be to our readers.

The mines at Bethlehem were long worked as open quarries, the supply of ore being abundant and near the surface. In this way a huge opening was excavated, but as the depth increased and the ore was not so rich, they abandoned the open quarries, and now the mines are carried on under ground, like copper or coal mines. The ores here are chiefly silicates and blende, the latter being a sulphide. When they are first brought to the surface they are carefully sorted, the silicates and sulphides being kept separate. After all the large pieces have been picked out by hand, the mud and small pieces are washed in the same manner as copper ore. By this means nearly all of the mud and lime is removed, and nothing is left but good ore. It is then thrown on wagons and hauled across the South Mountain to the works.

The richer ores are used for making spelter, while the poorer are sent to the oxide works. The company keep a chemist in their employ, whose business it is to determine the value of the ores and slugs. The sulphides are first roasted to drive off the sulphur and convert the zinc into an oxide, and the silicates are calcined to drive off the water. The subsequent treatment of the ores is the same. They are ground in a mill with a certain proportion of stone coal, which mixes them thoroughly with the coal, and at the same time reduces them to a coarse powder. If they are intended for making oxide, they are taken at once to the furnace house. This consists of a long range of furnaces resembling those of a brick kiln. Into these the mixed ore and fuel is fed; the ash pit is then banked up tight with ore, and the fire door is also almost closed. The operation then goes on for eight hours without much attention from the workmen. The zinc, being intensely heated in contact with the fuel is reduced to the metallic state. As the metal is volatile, it at once rises in the form of vapor; but a stream of air being allowed to flow over the surface of the burning mass, the zinc at once takes fire in this and is converted into oxide. This is carried forward mechanically by the strong current of air that is continually drawn through the furnace by a powerful fan. By this means it is drawn through a falling sheet of water, which removes any unburnt particles of zinc or carbon, and the oxide issues from the tower perfectly pure, but still of a yellow color. It then passes through the fan and is blown into a large settling chamber, where the coarser particles of the oxide are deposited, and whence they are removed from time to time and returned to the furnaces to be worked over again. The finer particles by this time having become cold and snow-white pass on into the bag room. This is a large room hung with rows of long cotton bags, reaching from ceiling to floor and doubled up at the lower end, which lies for a yard or more on the floor. This room presents a singular sight when the fan is running and all the bags are fully inflated. These bags serve to filter the oxide from the air with which it is mixed. This, however, they only partly do, for the oxide, when shaken from them and collected in other short bags, is still a very light, bulky powder, full of air. In order to render it more dense it is passed beneath a roller several times on a table so arranged that it rises toward the roller at each passage. The bag which goes into the machine fat and portly comes out shorn of its fair dimensions.

The oxide is then packed in barrels lined with paper, and is ready for market. It is very extensively used for inside paint work, and in situations which are exposed to sulphuretted hydrogen is far superior to lead, as it maintains its white color where lead is quickly defaced. It is not, however, equal to the lead paint in brilliancy or in covering power.

The portion of zinc ore destined to be converted into spelter, which contains, we believe, all the roasted sulphide as well as the richer portions of the silicates, is then taken to the spelter furnace. This consists of four separate furnaces built into one block, the two pairs facing opposite ways, with two furnace doors at each end. These furnaces each contain forty-eight clay retorts. These retorts are about seven inches in external diameter, and three feet long. They are made of very refractory clay, so that they can stand prolonged heating. The company manufactures its own retorts in another part of the works. The men will remove one retort from the furnace and insert another without cooling off the rest. These retorts are all closed at the end that rests upon the back wall of the furnace; the outer end, which is placed lower than the inner, is open. The workmen fill these retorts with a semi cylindrical shovel, and then pass an iron rod into each so as to make an open passage at the top. They then place an earthenware adapter on the mouth of the retort, cementing it with clay. This is of a conical form, about a foot or so in length, and serves as a condenser, and being inclined upwards while the retort is inclined in the opposite direction, it forms a sort of cup or basin at its union with the body of the retort. In this basin the melted zinc collects. To the end of this adapter is fixed a *prolonge* of sheet-iron which serves to catch any zinc that may have escaped the adapter. In this prolonge are often found most beautiful crystals of zinc resembling moss in their delicacy. The furnace being charged, the work of reduction soon commences. The zinc, oxide, and coal react on each other, and the zinc is reduced to the metallic state while the coal escapes as carbonic acid and carbonic oxide. The metallic zinc, being volatile, is sublimed and carried along with the current of carbonic oxide, and is deposited mostly in the adapters, which become hot enough to keep it melted. Some little, however, escapes to the prolonges, and a little is carried still further and burns along with the carbonic oxide at the end of the prolonge. These burning vapors and the red glare of the furnace give the place a rather uncanny look after dark.

The furnaces are kept going day and night until they wear out. The melted zinc is withdrawn from time to time by a small scraper (the prolonges having first been removed) into large iron ladles, from which it is poured into the ingot moulds. These are of iron, and have the name of the company cast upon them in raised letters so that every ingot is marked. If it is intended for the market it is now ready, and we may say in passing that the spelter manufactured here is superior to any foreign product in the market, being free from all impurities except a trace of iron and carbon. Arsenic is never found in it, while that of foreign makes is rarely free from this impurity. If the spelter is to be rolled into sheets, it is taken to the rolling mill and placed in a reverberatory furnace, where it is again melted; from here it is dipped out in iron ladles and cast in broad, flat ingots; these are not marked, but are perfectly smooth. These ingots are heated up to the proper temperature to make them tough (which is from 212° to 280° F.), and then passed through rollers, one at a time at first, then two or three together, and finally a number of them at once, the workmen taking care to keep them at the proper temperature by returning them to the annealing furnace as often as they get cool. They also in the process of rolling continually shift them so as to bring fresh sheets next the rollers. When the sheets are finished they are trimmed at the edges and then weighed and marked, and packed in barrels for shipment. Many of the workmen employed here are Belgians, who were brought to this country by the company. There are also some Irish and a few Germans among the workmen. As a result of this the local dialect of South Bethlehem is an exceedingly curious one. We have often been amazed at hearing a boy, evidently of Irish extraction, talking a mixture of English, French, and German.

LUNAR LANDSCAPES.

Our readers do not need to be told that the moon is our nearest neighbor among the heavenly bodies, but possibly they may have a somewhat vague idea of *how much* nearer she actually is than any other of these celestial "outsiders." All the planetary distances are on so vast a scale compared with those to which we are accustomed on the earth, that we have no clear conception of them. We know that some are much greater than others, but the least and the largest really seem quite alike to us. It is only when we manage to bring them into direct comparison with our every-day measures that we can approximate to an appreciation of either their absolute or their relative magnitude. Before we make our imaginary visit to the moon, let us try by some such comparison to estimate the extent of the journey that lies before us.

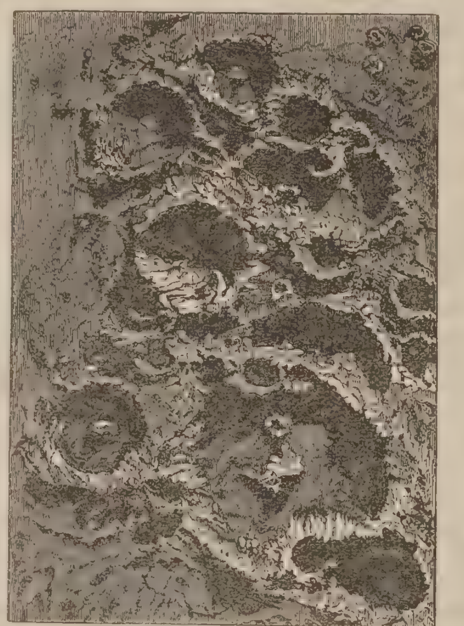
The mean distance of the moon, — no mean distance in itself, though insignificant when compared with the planetary intervals, — is about 240,000 miles. This is some nine times the circuit of the earth, or eighty times the distance from Boston to Liverpool, or across the Continent to California. A railway train, running day and night at the rate of thirty miles an hour, would get there in about *eleven months.* That would be a sufficiently tedious trip, but if we were going to the *next station,* in other words, to the planet Venus, which is about *twenty-five millions* of miles distant when nearest the earth, it would be more than a hundred-fold further, and some *ninety years* would elapse before we arrived at "the star of love." If we were bound for the sun (about sixty-seven million miles further in the same direction) it would take nearly two and a half centuries more to accomplish the distance.

It is evident that railway travelling is too slow for even the shortest of these little extra-terrestrial excursions. Let us take "the wings of the morning," and fly with the speed of the dawning sunbeams over the spaces that separate us from other worlds. A ray of *light* will reach the moon in a little more than a single *second;* while it will take more than *two minutes* to flash across the interval that divides us from Venus, and about *eight minutes* to travel back from the earth to the solar orb whence it emanated. A comparison of these periods of time will serve to show how much nearer to us the moon is than either Venus or the sun.

Of course, our satellite is proportionally near as seen through the telescope. Viewed with the highest magnifying powers, her surface is virtually not farther from our eyes than the outer portions of the terrestrial landscape visible from the summit of a lofty mountain. Objects three or four hundred feet in length can be distinguished, and if the "lunarians," or lunatics (or whatever the men in the moon are to be called), should erect buildings as large as some of ours, we could doubtless recognize them. Thus far, nothing of the kind has been detected, nor have we indisputable evidence of any change whatever in the lunar topography. Such changes have often been suspected, but more careful observations have failed to confirm them. Many keen eyes are now systematically watching the lunar surface, in hope to detect minute changes in its configuration, and we may expect that if volcanic or other forces are even moderately active there, the fact will soon be established beyond a doubt.

But what are the main features of the lunar topography? With the naked eye we see that the surface of the moon is diversified with light and dark regions, which at once suggest the idea of continents and seas like those on our own globe. And the early astronomers believed that the darker portions were seas, and they are called *maria* (Latin for *seas*) on lunar maps to this day, though it is doubtful whether there is any water at all on the moon.

An examination with more powerful telescopes has shown that these so-called *seas,* like every other portion of the lunar surface, are more or less uneven and rocky. There can be no doubt that they are simply vast plains, rough and rugged in many parts, but lying at a lower average level than the more luminous or mountainous regions. The moon is really far rougher and wilder in its mountain scenery than the earth. The loftiest lunar mountains are 23,800 feet high, or nearly as high as the Himalayas, while the diameter of the moon, (about 2,160 miles) is little more than one fourth that of the earth. They are, therefore, relatively as lofty as mountains sixteen or eighteen miles high would be on our planet.



On every part of the lunar surface, so far as we see it (it must be borne in mind that we see but one side of the orb), we perceive *ring-like* mountains, some very small, others from fifty to a hundred miles in diameter. These are doubtless of volcanic origin, though the largest far exceed the dimensions of any terrestrial craters. One of our illustrations shows a group of these craters or ring-mountains; the other is a view of *Copernicus,* one of the most remarkable of these annular formations. This huge crater is about fifty-five miles in diameter, and the greatest elevation of the mountain wall is 11,250 feet (more than two miles) above the surrounding plains. The wild and jagged outlines of the western wall are reproduced in the black shadow thrown on the interior level. The opposite peaks are seen in the full glare of the sunlight, broken only by the dark clefts and ravines into which its rays do not penetrate. It is these shadows that enable us to measure the heights of the mountains, and this can be done with great accuracy.

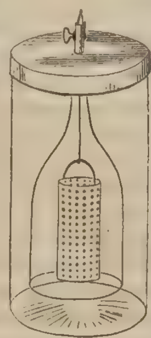
We have said that there is probably no water in the moon; and it is also certain that there is no atmosphere, unless it be one with very little depth or density. *Twilight* is the result of the refraction and reflection of light in its passage through the air, and there is no perceptible twilight on the moon. The same absence of refraction is noticed when a star is *occulted* by the

moon; that is, when the star is hidden by the moon's passing in front of it. If there is a lunar atmosphere, it cannot be a thousandth part as dense as ours; in other words, it is of greater tenuity than the best *vacuum* we can obtain by an ordinary air-pump.

Over the dreary and desolate landscape of the moon, therefore, no twilight ever softens the transition from day to night. The setting sun blazes with noontide splendor until it sinks below the horizon, and the blackness of midnight instantly supervenes; and no auroral crimson in the East gives prophecy of his rising, when, after a night that has lasted through fourteen of our days and nights, he bursts forth with dazzling brilliancy to begin a day of equal length. No clouds ever veil his steady glare, or add the varied beauty of their forms and colors to the unchanging sky. No breeze ever blows across those barren plains, or through those wild valleys. No rain, or dew, or snow ever falls there; nor can there be any other of the phenomena, either in the heavens above or on the moon beneath, that depend on the presence of water or of air. No sound is possible, — at least, none that is transmitted by atmospheric vibrations; but silence as of death reigns far and wide over a world destitute of all vegetable and animal life. If any form of life *does* exist there, it must be wholly unlike any with which we are acquainted, or of which we can conceive. We will not set limits to Divine power, nor deny that beings may have been created capable of living and enjoying life in such a sphere as the moon appears to be; but it would be no less presumptuous, on the other hand, to assume the existence of such beings before we have any evidence of the fact, direct or indirect. So far as the present condition of the moon is known to us, it seems to be, as some one has aptly called it, "a world in ruins."

A SIMPLE HYDROGEN GENERATOR.

The ordinary form of hydrogen generator, lustrated in the accompanying figure, is doubt-ss familiar to most of our readers that are iterested in chemical experiments. It consists f a glass vessel with a metallic over, through which, by an air-ght joint, a tube passes into the lass bell within. The latter is pen at the bottom, and a perfo-ated copper bucket is hung inside. he bucket is filled with granu-ated zinc or zinc cuttings; and ie outer vessel with sulphuric cid diluted with about ten parts f water. When the stopcock is pened, the air is driven out from ie bell, and the dilute acid com-



ig in contact with the zinc causes a brisk evolu-ion of hydrogen. If we close the stopcock, the ccumulation of the gas forces the liquid out of the ell, and the chemical action ceases until the cock ; opened again and the hydrogen allowed to es-ape. The *automatic* character of the apparatus nakes it extremely convenient, but it costs more han some amateur experimenters may be able to fford. If so, they can make a cheap and sim-le substitute by using instead of the outer vessel large wide-mouthed bottle, closed with a cork, nd for the bell a smaller bottle, with one or more oles drilled through the bottom of it, into which ie zinc is put without any bucket. Let the neck f the smaller bottle pass through the cork of the arger one, and close the smaller one with a cork tted with a stopcock or something that will nswer the same purpose. A glass tube with a mall cork will do, but the stopcock is worth the lditional cost. The cork or cover of the larger ottle must *not* be air-tight, but that of the naller one must be absolutely so; and of course are must be taken to drive out all the air before sing the hydrogen, especially in *burning* it, as ie mixture of hydrogen and atmospheric air is ighly explosive.

WINE-MAKING IN BURGUNDY.

An interesting work on "The Origin, Nature, id Varieties of Wine," by Drs. Thudichum id Dupré, has recently appeared in London. he description of some of the processes of ianufacture must be peculiarly appetizing to ie lovers of certain "brands" of wine. An nglish reviewer quotes the following from the iapter upon Burgundy, and we remember read-ig a humorous account of the same operation Flagg's "European Vineyards" (published a ear or two ago by the Harpers), in which it is iggested that it is intended to "give a *body* to ie wine:" —

"Now comes a phase in the production of Bur-indy, which is unparalleled by any proceeding in iy wine-producing country. The fermentation is implete, and the wine has to be drawn; but it is esired to impart to the wine all the color that can e extracted from the husks. For this purpose the usks which are collected in the *chapeau* [crust] ave to be thoroughly mixed with the alcoholic uid. The top of the *chapeau*, which is mostly a ttle rotten and sour, is therefore taken off, and vo or three men, having laid aside their clothes, ount to the top of the *chapeau*. The *chapeau* is dense that the men can stand upon it for some me. Each of the men works a hole with one foot rough the crust; he then gets his other foot through, and gradually succeeds with much trouble in causing his body to sink down through the crust into the wine below. While thus engaged, the whole *chapeau* is broken to pieces and worked together with the wine. These men now work the whole of the murk, and mix it thoroughly in all directions with the wine for about half an hour. They then emerge from the liquid covered with a dark red dye, and after wiping their bodies with the shirt they pulled off, they put on a fresh shirt and re-dress. After the lapse of several hours, the *chapeau* has again risen as before. The men then again descend into the fluid, and mix it with the *chapeau* as before. During this operation the men perspire profusely, not only from the intense labor which they perform, but also from the poisonous effect of the carbonic acid gas exhaled by the fermenting mass. They are mostly deadly pale or blue, and pant and hang their heads over the edges of the *cuves*, gasping for fresh air."

THE VELOCITY OF VISION.

We say "quick as sight," and the popular notion doubtless is that the phrase is synonymous with *instantaneous*. It is certain, however, that it does take time for the impression made upon the eye by a visible object to pass to the brain by the telegraphic line of the optic nerve and thus to reach the mind; but the time is so brief that we might suppose it impossible to measure it. But scientific men, after tracking the speed of light and electricity, were not to be baffled by a problem like this. Some time ago, Helmholtz and Exner demonstrated, by a series of experiments, that if a number of letters printed on white paper be presented to the eye, sometimes one, sometimes two or more of them, are distinguished from the rest, according to the duration of the impression and that of the image formed by it. More recently M. Baxt, of St. Petersburg, has been experimenting with an apparatus similar to that employed by Helmholtz, consisting of two discs, which could be made to rotate at known speed, the posterior one with twelve times the velocity of the anterior. The results at which he has arrived are summed up in a paper communicated to Pflüger's *Archiv für Physiologie*, of which the *Academy* gives the following abstract: —

"From the numerous experiments given, it appears: 1. That the consciousness of a given excitation is only realized or perfected by degrees; and 2. That, under the particular circumstances of his experiments, a period of one twentieth of a second must elapse between the occurrence of a relatively simple excitation of six or seven letters suddenly placed before and withdrawn from the eyes, and its reception or formation in the consciousness. In other experiments he found that the time required for the comprehension of a complex figure was much greater than that for a simple figure, the proportion between an ellipse and a pentagon, for instance, being as 1 to 5. Researches on the time requisite for the production of consciousness with various strengths of illumination gave the result that this time was proportionate, within rather wide limits, to the degree of illumination; but if illumination was excessively strong or weak, it increased."

HYGIENIC AND CULINARY HINTS.

Lemon Syrup. — When lemons are abundant and cheap, as they are now, it is a good plan to purchase several dozen at once, and prepare them for use in the warm, weak days of spring and summer, when acids, especially citric and malic, or the acids of lemons and ripe fruits, are so grateful and so useful.

Press your hand on the lemon and roll it back and forth briskly on the table to make it squeeze more easily, then press the juice into a bowl or tumbler, never into tin; strain out all the seeds, as they give a bad taste. Remove all the pulp from the peels and boil in water, a pint for a dozen pulps, to extract the acid. A few minutes' boiling is enough, then strain the water with the juice of the lemons, put a pound of white sugar to a pint of the juice; boil ten minutes, bottle it, and your lemonade is ready. Put a tablespoonful or two of this lemon syrup in a glass of water, and you have a cooling, healthful drink.

Lemon Butter. — One pound of white sugar, one quarter pound fresh butter, six eggs, juice and grated rind of three lemons, taking out all the seeds. Boil all together a few minutes, till thick as honey, stirring constantly; put in small jars, or tumblers, covered with paper dipped in white of egg. One teaspoonful is enough for a tart or cheese-cake. This will keep a long time in a cool, dry place.

How to Mix Mustard. — Mustard should be mixed with water that has been boiled and allowed to cool; hot water destroys its essential properties, and raw cold water might cause it to ferment. Put the mustard in a cup, with a small pinch of salt, and mix with it very gradually sufficient boiled water to make it drop from the spoon without being watery. Stir and mix well, and rub the lumps well down with the back of a spoon, as mustard properly mixed should be perfectly free from these. The mustard-pot should not be more than half full, or rather less, if it will not be used for a day or two, as the mustard is so much better when fresh made.

Cooking Raisins. — It is well to cook raisins before putting them into pies, cakes, or puddings. Soaking them is not sufficient. Steaming them by pouring a small quantity of boiling water amongst them in a tightly closing dish, and allowing them plenty of time to cook before opening, is a good plan. When raisins are rightly cooked before using, they are plumper, and more palatable, and can be eaten without injury by most dyspeptics.

Chicken Cheese. — Boil two chickens till tender, take out all the bones and chop the meat fine, season to your taste with salt, pepper, and butter, pour in enough of the liquor they were boiled in to make it moist, put into whatever mould you wish, and when cold turn out and cut into slices.

HOUSEHOLD RECIPES.

A Good Cement. — The following has been tested for cementing wood, iron, leather, glass, paper, and almost all kinds of household materials: Best isinglass, half an ounce; rub it between the hands until it breaks down into a powder, put in a bottle, and put as much common acetic acid to it as will just wet the mass through, stand the bottle in some boiling water, and the paste will dissolve and be fit to use at once; it will be solid when cold, but is easily warmed up the same as before. Leave the cork out when warming, or there is danger of bursting the bottle.

Zinc White for Polishing Silver, Britannia, etc. — Those who have tested it say that the very best article for cleaning silver, and other metallic ware is the zinc white (No. 1 quality) used by painters. Rub it fine with a knife, sprinkle it on a soft flannel cloth, with which rub the ware; then brush off with tissue paper or any clean soft cloth.

To Preserve Pegged Boots and Shoes. — If pegged boots are occasionally dressed with petroleum between the soles and upper leather, they will not rip. If the soles of boots and shoes are dressed with petroleum they will resist wet and wear well. The pegs, it is said, are not affected by dryness after being well saturated with the liquid.

The Arts.

FIRE-PROOF FLOORS.

A valuable paper on this subject was lately read by Professor Lewis, before the General Conference of Architects in London, an abstract of which we believe will interest many of our readers.

In dwelling-houses, the floor timbers usually bear at each end on a wall or partition; and even if the latter is of wood, it can be made almost fire-proof by filling in between the timbers either with plaster or with brick and plaster. The filling, however, must be carried up the whole extent of the partition, without vacancies between the floors.

The wall-plate should not be supported by stone or iron corbels, for these are liable to be shivered under the action of fire. A safe bearing may be obtained by forming "oversailing" courses of brickwork, which are proof against the fiercest fire.

In a dwelling-house, wrought iron joists, filled in with plaster "pugging," are a good protection, provided the under side of the joists is well protected by plaster; but *wooden* joists answer as well, filled in with a thick layer of pugging, if the latter is combined with the plastering of the ceiling, so as to form the two into one mass. The constructional difficulties in this case are greater than with iron joists, but by no means insurmountable. It may be noted incidentally that the slight joists used nowadays are a poor defense against fire, compared with the heavy timbers that we see in old houses. On this point Professor Lewis says: —

"As architect to one of the chief insurance offices, and also to the London Fire Brigade, I have seen several thousand cases of fire, and it has been very rare indeed in the case of a dwelling-house, that a solid piece of lumber has been burnt in more than an inch or so. A girder would be safe; but such an injury to one of our light joists would be fatal."

But the real difficulties of fire-proof construction begin where there is a great mass of combustible matter, as in warehouses. In a conflagration these become glowing furnaces, hot enough to melt brass and iron. Here the usual dependence is on iron; but the iron may melt, and long before it is heated to that point it will soften and lose its strength; and even before it begins to soften it may be snapped asunder when suddenly cooled by water thrown upon it. This last risk is the most serious, and it is mainly owing to the "exposure of the iron to the direct action of the flames," a radical defect in nearly all the so-called "fire-proof flooring."

There is another objection to iron girders. They are expanded by the heat, and strain the walls; while the burning of wooden ones would leave the walls intact. In fact, it is safer to use thick wooden girders and brick arches, than to depend upon iron. In the case of a large warehouse in London, all the iron girders snapped in two under the action of fire, while wooden girders in the same building were burned an inch deep, but were otherwise uninjured.

The writer speaks of the plan of having the iron girders and columns hollow, and keeping them filled with water, as a "favorite" one in England; but, aside from the danger of leakage, a fire will soon convert the water into steam and blow it off, if the hollow work is open to the air; while if it is closed, "the whole of the iron work will soon assume the conditions of a steam-boiler with its safety valves screwed down."

The conclusion to which Professor Lewis comes (and which, by the way, we know to be indorsed by good architects in this country) we will give in his own words: —

"In fact, the result really seems to me to be that the only secure protection from fire is a structure of brick arches on brick supports. Nothing else that I can call to mind will stand the effects of great heat and the action of flames; stone and granite fly to pieces, but good brick-work never does. Perhaps the strongest case of endurance against fire known of late years was that at Tooley Street, where an immense range of cellars were filled with oil, which ignited. For weeks this oil was burning, a rolling sea of fire. The cellars were vaulted with brick. They had this glowing mass below, and the heated *debris* above; and yet, after a careful scrutiny, when the oil was got out, I could detect scarcely a trace of injury. If this mode of construction cannot be used, I would trust strong wooden timbers thickly pugged and supported on strong wooden posts, in preference to iron girders on iron columns. But I cannot repeat too strongly, that, with a large mass of fire, no construction under any circumstances could be really fire-proof, except solid arches on brick supports."

MEMORANDA IN THE ARTS.

Danger in the Use of Copper Gas-Pipes. — The French *Journal de l'Éclairage* states that a workman, who with a triangular file had cut almost half through a gas-pipe of copper, $\frac{3}{8}$ inch interior diameter, which supplied the Liège station, was removing the tool, when an explosion took place, with a noise like the report of a rifle, and the man was much burnt. A similar explosion, but less violent, happened subsequently, and the workman, who was not injured, did not report the circumstance. Some gas-pipes having been taken down, they were found covered with a blackish coating, and they showed evident signs of corrosion from ammoniacal condensation. The black matter was analyzed, and was found to consist of acetylide of copper, which explodes between 203° and 248°.

Moving a Chimney. — The Cabot Company, of Brunswick, Maine, in order to enlarge their cotton mill, moved their large smoke-stack chimney — 78 feet high, 7 feet 9 inches square at base, and 5 feet square at top, containing more than 40,000 bricks, and weighing more than 100 tons — twenty feet, without rollers or balls or guys or braces to steady it — one of the greatest feats ever performed in the State. It was planned and carried out by the Company's Superintendent, not one of those engaged having ever witnessed the moving of such a body. It was accomplished by building such ways as are used in launching ships, surfaces planed, greased, chimney wedged up, and moved by two jack-screws in four and a half hours. The flues were disconnected from the boiler at 1 o'clock p. m., and $9\frac{1}{2}$ o'clock the same evening the flues were again connected, fires going, and steam up.

Weights of Wrought Iron and Steel. — Rules: *For Round Iron.* — Multiply the square of the diameter in inches by the length in feet, and by 2.63, and the product will be the weight in pounds avoirdupois, *nearly. For Square Iron.* — Multiply the area of the end of the bar in inches by the length in feet, and by 3.36; the product will be the weight in pounds avoirdupois, *nearly. For Square, Angled, T, Convex, or any Figure of Beam Iron.* — Ascertain the area of the end of each figure of bar in inches, then multiply the area by the length in feet, and that product by 10, and divide by 3; the result will be the weight in pounds avoirdupois *nearly. For Square Cast-Steel.* — Multiply the area of the end of the bar in inches by the length in feet, and that product by 3.4; the product will be the weight in pounds avoirdupois, *nearly. For Round Cast-Steel.* — Multiply the square of the diameter in inches by the length in feet, and that product by 2.67; the product will give the weight in pounds avoirdupois, *nearly*.

New Method of Nickel Plating. — A simple and cheap method of nickel plating, which, not being patented, is open to the use of all, has been invented by Prof. F. Stolba. The process is, in brief, as follows: Into a vessel of porcelain or metal, preferably copper, is poured a concentrated solution of chloride of zinc, made by dissolving commercial zinc in common hydrochloric acid. From once to twice the volume of water is added, the solution heated to boiling, and hydrochloric acid added drop by drop until the precipitate (formed on diluting the chloride of zinc with water) is redissolved. As much zinc powder as will cover the point of a knife is now added, whereby the metal of the vessel becomes zinc plated. Enough nickel salt (the chloride or sulphate or the double sulphate of nickel and potassium) is introduced to color the liquid distinctly green, after which the articles to be plated, with surfaces perfectly free from fat and rust, and with them some small cuttings of zinc, are put in and the liquid again boiled. The work is finished in about 15 minutes. If any part of the articles is not plated, the boiling is continued, fresh pieces of zinc and, if necessary, fresh nickel salt being added. It is important, if the coating of nickel is to be brilliant, the liquid on boiling shall not be cloudy from basic zinc salt, or acid from free hydrochloric acid. The plated articles are well washed with water and cleaned with polishing chalk. The same liquid may be used repeatedly for plating. The nickel salt need not be chemically pure, but must contain no metals precipitated by zinc.

Phosphor-Bronze for Guns. — Experiments upon phosphorized bronze as a material for guns are now engaging the attention of many of the European Powers. For some time past important trials have been going on with guns of this material in Prussia, and, it is said, with the most satisfactory results. The Swiss Government have under trial a breech-loader of phosphorized bronze; the Dutch Government, a muzzle-loader; the Italian Government, having repeated the statical tests which were applied to this material by Messrs. Montefiori-Levi and Künzel, of Liège, have resolved upon proceeding to the trial of guns of the material; and in Vienna some phosphorized bronze guns are about to be tested. Finally, the French Government are about to make some guns with this bronze, supplied from Liège.

Railway through the Alps. — There is a prospect of a fourth railway being made through the Alps before long. The Brenner Pass was the first, the Cenis tunnel was the second, arrangements have been made for constructing the third by the St. Gothard, and now active negotiations are on foot for traversing the Splugen. It is stated that two contractors have offered to make the line for two millions sterling. The cantons of Grisons and St. Gall are willing to furnish one half of the amount. It is proposed to work the line by bogie engines, so as to take the trains round very sharp curves. In this way a tunnel of less than a mile would be sufficient. The St. Gothard line will have a tunnel of eight miles.

PRACTICAL RECIPES.

To Bronze Articles of Plaster of Paris. — To a solution of soda soap in linseed oil, cleared by straining, add a mixed solution of four parts blue vitriol and one part copperas, which precipitates a

mixed cupreous and ferruginous soap; wash with cold water, strain, and dry. The product has a peculiar bronze hue. The dry powders are thus applied. Boil three pounds of linseed-oil with twelve ounces of finely-powdered litharge, strained and allowed to clear by standing. Fifteen ounces of this, twelve of the metallic soap, and five of whole wax, are mixed together by the aid of a water-bath, and the melted product applied with a brush to the plaster cast, which is previously heated to about 200°.

Blue-Black Copying Ink. — Aleppo galls, bruised, $5\frac{1}{2}$ ounces; cloves, bruised, 2 drachms; sulphate of iron, $1\frac{1}{2}$ ounce; sulphate of indigo, $1\frac{1}{2}$ ounce; sulphuric acid, 35 drops; rain water, cold, 40 ounces. Macerate the galls and cloves in 20 ounces of the water for eight days, decant and add to the solid residue 20 ounces of water, macerating for four days; decant. Mix the whole of the liquor, and finally add, in the order named, the sulphate of iron, the sulphuric acid, and the indigo.

To Stain Wood Black. — A correspondent of the *English Mechanic* gives the following directions: Brush the wood over with hot limewash, to remove all grease. Then give it a good dressing two or three times with logwood and nut-galls in decoction, first having removed the lime with a hard brush, and levelled the grain of the wood; afterwards dress with some vinegar, in which some old nails have lain. When black enough, rub well with a piece of black cloth and linseed oil, and, either varnished or polished, it will look equal to ebony, and will stand all weathers for years.

To Draw a Curve. — A plan but little known among draughtsmen, and most efficient for drawing fair curves, is the following: Cut a strip of soft pewter similar to that used for covering bar counters, about one sixteenth of an inch thick, and from one eighteenth to three sixteenths of an inch wide, the length of the longest curve required. Dress it straight, and smooth the edges with a file. By drawing the strip through the closed fingers of the left hand, or over the thumb, a very regular curve may be obtained, which can be altered at will till it matches the line to be drawn or copied. For fine or quick curves a slighter strip should be used.

To Fix Pencil or Crayon Drawings. — This may be done cheaply, simply, and without injury to the drawings, by varnishing them on the back with an alcoholic solution of white gum-lac. This solution quickly penetrates the paper, and enters even into the marks of the crayon on the other side. The alcohol rapidly evaporates, so that in an instant all the light dust from the crayons and chalk, which resembles that on the wings of the butterfly, adheres so firmly to the paper, that the drawing may be rubbed and carried about without the least particle being effaced. The following are the accurate proportions of the solution: 10 grammes of common gum-lac are dissolved in 120 grammes of alcohol; the liquid is afterwards bleached with animal charcoal.

A New Power. — We find the following in an exchange: "A Philadelphia mechanic claims to have invented a hydro-pneumatic engine which by means of one pound of water will produce one thousand pounds of power. The agents employed are air and water, by a new method of application. If this power is one third of what is claimed for it, steam, turbines, etc., have seen their last days." We do not, however, consider that those who are interested in the manufacture of steam-engines, turbines, etc., need have any serious apprehensions that their occupation is gone. Half a dozen of these "new powers" are announced every year, but we never hear anything more of them. That improved substitutes for the old motors will yet be found is not improbable, but even Yankee ingenuity has failed as yet to discover and perfect them.

Agriculture.

CONFUSED FARMERS.

How few husbandmen have any clear or settled convictions regarding the best methods of conducting farm operations! Bring together a hundred men engaged in soil cultivation, and how many of them will perfectly agree upon any one point which comes under discussion? Scarce half a dozen. Let a farmer give his views regarding the best method of growing a cabbage, and he will be confronted with opposing views from a score of his associates, and no two of the disputants will coincide in opinion. There is positively more confusion and doubt among farmers regarding the best and most effective treatment of soils, than there is among medical men regarding the proper treatment of disease; a condition of things quite extraordinary and unnecessary, to say the least.

Whenever a new man (that is, a merchant or manufacturer, retiring to the country) commences with much enthusiasm to till his freshly acquired acres, he feels that he needs information, and forthwith orders a supply of agricultural journals, and hurries to attend farmers' meetings and cattle shows. It is indeed curious to watch the effects of the information he obtains through these channels. The first year he says but little, plants his corn in a meadow according to the advice of Mr. A, and the last journal he read, or he ploughs a field upon a dry hill and drops his seed there, according to the suggestions of Mr. B, or some newspaper writer; he buries his manure a foot or two deep, or spreads it upon the surface, according as he is influenced by the last authority consulted; he uses phosphates and manures lavishly, or he don't believe in anything but cow dung, at ten dollars a cord, because at the last Farmers' Club he attended, on a close vote there was one majority against all kinds of mineral fertilizers. And so he moves on, covered by a cloud of doubt. The first season goes by, and at harvest time he gathers in what crops are worth saving, and still he is silent. The next year he reverses all his operations, feeling certain that success must lie in exactly the opposite direction from whence came failure. The results are still unsatisfactory, and the third year he spends in experimenting according to whatever whim or caprice may govern him. The fourth year the farm is advertised for sale.

This is no exaggerated view to present of the evils and losses which result from the empirical views and statements which find currency through the press and in discussions at agricultural meetings. Unfortunately those that know the least write and talk the most, and it is difficult to suggest a remedy for the affliction. Farming is a pursuit which demands intelligence, common sense, and a capability of discriminating between cause and effect. It is a calling encumbered with much prejudice and many absurd notions handed down from past generations. We must aid in dispelling these evils, and in placing agriculture upon a higher plane; the intelligence and progress of the age demand it.

Now, we believe there are some settled points in agriculture, — some facts, some principles which should be considered as removed from the field of controversy; and if we ever expect to make progress we must endeavor to multiply these settled facts. At another time we will endeavor to point out some of the fixed principles which may be regarded as safe to follow in soil cultivation.

FURTHER REMARKS REGARDING KAINIT.

The observations regarding Kainit, made in the last number of the Journal, have attracted much attention, not only among farmers but among importers and dealers in the agent. It is asserted by some large importers in New York, that kainit cannot be laid down in this country at \$13 the ton, and consequently the proposition of Mr. Grange of Baltimore to supply at that price is not made in good faith. We are unacquainted with any of the parties who offer to furnish the Stassfurth potash salts in this country, but it is due to Mr. Grange to say that he is not a jobber in these articles, but an *importer*, and he only proposes to supply kainit by the *cargo* at the low rate which we have mentioned. If farmers unite and give orders for several hundred tons, to be distributed among themselves upon arrival, they can have it at a low price, according to Mr. Grange's proposals.

One thing is certain: the compound called kainit is not worth to any farmer \$45, \$35, or even \$30 a ton, and if dealers will not furnish it at rates less than that, we advise every soil cultivator to let it alone. We do not advise farmers to purchase in large quantities at present, as we have not sufficient confidence in its fertilizing capabilities to lead us to do that. It contains much common salt (nearly one half), and that we regard as positively pernicious when used upon most soils and for most crops. We have never seen the least benefit from the use of salt; on the contrary, by its employment we have rendered some small patches in our fields almost barren. The most careful observers and experimenters in England have reached similar conclusions, and salt is but little used there at present. The potash element is the most valuable, and indeed we may say the *only* costly ingredient in kainit, and the explanations made in our last number will afford a fair idea of its true value. We incline to regard the Stassfurth *muriate of potash*, at present prices, as the cheapest agent. It can be purchased at about \$60 the ton, and it will give on analysis 90 per cent. pure chloride of potassium. This is a valuable salt, not as valuable as the sulphate of potash, since hydrochloric acid is not so desirable an acid as the sulphuric for soil application, but the agent has a marked influence upon the potato and other crops requiring large amounts of potash. In the use of all new agents proposed as valuable fertilizers, it is best to employ them sparingly until by repeated experiments we are made fully acquainted with their true value. We have much yet to learn regarding the *best forms* in which to employ each of the four great essentials of plant growths. It is not every compound that holds potash, or nitrogen, or phosphoric acid, that promptly and economically nourishes our cereal grains and roots, but much depends upon the *nature* of the combination, and to this department of study we must give earnest attention if we hope to attain satisfactory results.

THE EFFECT OF THE FOOD OF COWS IN THEIR MILK.

The Editor's Scientific Record, in *Harper's Magazine* for July, has the following: "It has lately been announced, as the result of careful and long-continued investigations, that the nature of the food given to cows does not produce the slightest effect upon the character or richness of their milk; the only difference being a greater or less percentage of water. The experiment was tried of feeding the same animals successively with hay alone; then, successively, with hay mixed with starch, oil, rape-seed, clover, etc., thus giving a greatly varying proportion of nitrogenized food. The milk was very carefully analyzed, after each change of food, without showing the slightest variation in its chemical constitution. The conclusion was, therefore, arrived at that the variation or improvement in the quality of the milk is to be accomplished rather by a careful regard to the breed than to the food supplied to the animal.

These remarks, of course, do not apply to the peculiar taste imparted to milk in consequence of the character of the food of the animal; since it is well known that the milk of cows which have fed upon garlic very soon furnishes evidences of that fact to the taste."

Remarks. — We do not regard the above statement as correct. The experiments made upon our herd of cows prove that the *quality* of the milk is sensibly influenced by change of food and treatment. The *caseine* and *butter globules* can be largely increased in the milk of cows by modifications of diet. Some cows at the farm, purchased of owners who treated them badly, and fed them poorly, improved wonderfully under better treatment, not only in the quantity of the lacteal secretion, but in the *quality.*

By the "richness" of milk, we suppose is meant the nutrient principles found in the fluid, and it is upon this understanding of the term that we base our dissent from the statement.

SEEDS AND CUTTINGS.

A New Fact in Agricultural Chemistry. — It has long been known that the quantity of nitrogen contained in cereal crops frequently very far surpasses the amount contained in the manured earth from which they are grown; and the manner in which the additional nitrogen has been acquired is one of the many puzzles of agricultural chemistry. That it is derived from the air, there is no question, but in what manner? Has it been absorbed by the plants directly from the air, or has it been first withdrawn from the atmosphere by some of the constituents of the soil, with which it could form compounds which were capable of vegetable assimilation? According to *Les Mondes,* M. Deherian seems to have succeeded in demonstrating that *in the presence of organic matter oxygen combines directly with nitrogen,* forming a compound analogous to the ulmic or humic acid, produced by neutralizing an acid with the potassic solution of garden mould. Into a perfectly dry tube he introduced oxygen, nitrogen, ammonia and glucose, and on heating the mixture found that a black nitrogenous matter was formed, while at the same time a portion of the nitrogen disappeared from the atmosphere of the tube.

Rain to Order. — The new system of weather signals is likely to enable the farmer to know pretty certainly when rain is coming; and it is not impossible that he may yet be able to have rain when he wants it, whatever the weather predictions may say. In England, where experimental agriculture is carried to an extreme almost unknown with us, the invention of methods of irrigation has been very ingenious. At Stoke Park, a tract of twenty acres is irrigated by artificial rain, the system being quite successful. The water was applied every night last summer in showers, except when natural rain made it unnecessary. The apparatus consists of pipes laid in the ground, supplied from an elevated reservoir, into which water was pumped by machinery. The financial exhibit made by the results of the experiment is said to be a good one. The interest on the money invested in the necessary machinery, and the cost of operating it, aggregated \$95 per acre for the entire tract of twenty acres. Likewise the income per acre aggregated \$200, being made up of the proceeds of one crop of grass and grazing in the autumn of 1870, and two crops of hay in 1871. The net profit was thus \$105 per acre. On land of the same tract and same character, used for the same purpose, but where the irrigation was omitted, the net profit per acre was but \$45.

A New Use for Fresh Eggs. — The *Scientific Press* quotes the testimony of a gentleman in San Francisco with regard to the value of fresh eggs in affording nourishment to weak animals. He remarked that he had known a young colt which to all appearances was nearly dead, the breath of life being barely perceptible, to be quite instantly revived by giving it one or two fresh eggs. The same results, in several cases to which he was knowing, have followed the administering of eggs to weak calves, and also to feeble and chilled lambs. A remedy so simple, so easy at hand and so effectual in the cases mentioned — which often occur with calves and lambs — should be remembered by our readers.

Keeping Cream. — Next in importance to having the milk perfectly pure and sweet, and freed from all animal odors, comes the matter of keeping the cream after it is taken off the milk. In the first place, the less milk there is with the cream at the time it is set in the cream jar, the better. A great deal of carelessness is shown in this matter, for be it known that milk makes cheese, while the cream only makes butter, and the more milk there is in the cream at churning time, the more cheesy-flavored will be the butter, and therefore the more likely to spoil afterwards unless excessively salted. Really pure good butter requires very little salt, while butter as ordinarily made will soon spoil unless well salted, or kept covered in brine.

Secondly, the cream jar must be of the very best quality of stone-ware; thick glass would be still better; and it must have a cover that will exclude all dust and insects.

Thirdly, the cream jar should be kept in a place where no noxious odors or gases can be absorbed when the jar is open to add more cream, and also where the temperature can be kept cool and equable, say at about 60°; and, lastly, the cream is to be made into butter as soon as it just begins to sour, and when the jar is emptied it is to be thoroughly cleaned and scalded in boiling water before being again used.

Grafting Wax. — The following recipe is from a practical nurseryman of large experience; resin, six pounds; beeswax, one pound; tallow, one pound; melt, and work until cold. This is to be used warm, when working in the house. For out-door work, use one pint of linseed oil in place of the tallow in the above formula; or take one to two pounds less of resin, one half to one pound more of beeswax, and one and one half pints of linseed oil; to be melted, made in a mass, and applied by hand.

Fowls Poisoned with Lead. — An English clergyman lately sent the editor of *Land and Water* some ducks and chickens which he thought were suffering with lead palsy, and it appeared from a *post mortem* examination of one of the ducks, which died soon afterwards, that his suspicions were well grounded. It seems that in the vicinity of lead works, especially in Wales, poultry and other animals often suffer from drinking the water of streams polluted by the lead ore washings. Horses and cows sometimes become diseased in this way. Mr. F. Buckland, commenting on the subject, says: "On the South Tyne I lately heard of an old hen-wife who, when her chickens are poisoned by lead ore, simply takes a knife, opens their crops, turns out the poisonous material with her finger, sews up the crops again and lets the birds go; they don't seem to mind having their crops cut open. I also heard of a whole flock of geese being poisoned by drinking water from a lead mine. In this case the loss to the owner was not very great, for he simply picked up his dead geese, and, instead of driving them alive in a flock into the neighboring town, he carried them in a cart and sold them as dead birds — without of course, giving 'the cause of death.' I never heard that anybody was poisoned by eating those geese. . . . . In the case of lead ore poisoning of chickens, ducks, and other birds, I think the fatal effects are produced not so much by the lead — as the miners do not allow much of *that* to go as waste into the river — but by the mundic sulphate of barytes and sometimes arsenic, which is contained in the lead ore washings."

As we have formerly reminded farmers, the animals they keep are as liable to suffer from the use of impure and polluted water as they themselves are; and yet they are often extremely careless with regard to the water furnished to their cows and other stock. This is to be both inhuman and blind to one's own interest. It is as unthrifty as it is cruel.

Poultry-Keeping for Women. — We have urged the importance of gentleness in the treatment of cows, and it is quite as important in the care of other domestic animals. The *Poultry World* (an excellent journal, published monthly in Hartford, Conn., at one dollar a year) incidentally refers to this point in recommending poultry-keeping for women. It says: "There are many women, who, especially within the last half-dozen years, while the price of eggs has been so high, make money much faster by tending poultry than by sewing. It is an occupation especially suited to women, because it involves patience and constant attention to details rather than strength. Then, again, the hardest thing for many men to learn, in handling either poultry or bees, is gentleness. How many times we have seen boys, and men with no more sense than boys, jerk hens roughly from their nests, enter the poultry-house abruptly and frighten the occupants till they rush in a fluttering mass into the farthest corner, and keep the poultry community in constant agitation and distress. But all domestic animals appreciate the manners of women attendants when they are fortunate enough to be cared for by them. Now that there are women gardeners and florists who by commendable industry and business qualities have risen to eminence in those callings, and while one of the most successful, if not *the* most successful, bee-keepers in the whole country is a woman, we hope to see others give poultry more attention than it has hitherto received. Aside from profit, the keeping of fine poultry for fancy is an elegant pastime very popular with English ladies, and we see no reason why the fashion should not be adopted here."

MAXIMS FOR THE FARMER.

1. *Only good farming pays.* He who sows or plants, without reasonable assurance of good crops annually, had better earn wages of some capable neighbor than work for so poor a paymaster as he is certain to prove himself.

2. *The good farmer is proved by the steady appreciation of his crops.* Any one may reap an ample harvest from a fertile virgin soil; the good farmer

alone grows good crops at first, and better and better ever afterward.

3. *It is far easier to maintain the productive capacity of a farm than to restore it.* To exhaust its fecundity, and then attempt its restoration by buying costly commercial fertilizers, is wasteful and irrational.

4. *The good farmer sells mainly such products as are least exhaustive.* Necessity may constrain him, for the first year or two, to sell grain, or even hay; but he will soon send off his surplus mainly in the form of cotton, or wool, or meat, or butter and cheese, or something else that returns to the soil nearly all that is taken from it. A bank account daily drawn upon, while nothing is deposited to its credit, must soon respond, "No funds;" so with a farm similarly treated.

5. *Rotation is at least negative fertilization.* It may not positively enrich a farm; it will at least retard and postpone its impoverishment. He who grows wheat after wheat, corn after corn, for twenty years, will need to emigrate before the term is fulfilled. The same farm cannot support (nor endure) him longer than that. All our great wheat-growing sections of fifty years ago are wheat-growing no longer, while England grows large crops thereof on the very fields that fed the armies of Saxon Harold and William the Conquerer. Rotation has preserved these, as the lack of it ruined those.

FLORICULTURAL NOTES.

Tenacity of Life in Portulacaceous Plants. — Specimens of *Lewisia rediviva*, a portulacaceous plant, large-flowered and fleshy, growing in British Columbia, Oregon, and California, will grow, although they have been dried and in the herbarium for two or three years; and indeed the samples are often troublesome from sprouting whilst between the papers. One species, collected by Dr. Lyall of the British Navy, was "immersed in boiling water" to stop this growing propensity, before submitting to the drying process, and yet more than a year and a half afterwards it showed symptoms of vitality, and subsequently it produced its beautiful flowers in the Royal Gardens at Kew. That pest of our gardens, purslane, belongs to the same family, and is almost equally hard to kill.

Sleeping Flowers. — Almost all flowers sleep during the night. The marigold goes to bed with the sun, and with him rises weeping. Many plants are so sensitive that they close their leaves during the passage of a cloud. The dandelion opens at five or six in the morning, and shuts at nine in the evening. The goat's-beard wakes at three in the morning, and shuts at five or six in the evening. The English daisy shuts up its blossom in the evening, and opens its "day's eye" to meet the early beams of the morning sun. The crocus, tulip, and many others, close their blossoms at different hours towards the evening. The ivy-leafed lettuce opens at eight in the morning, and closes forever at four in the afternoon. The night-flowering cereus turns night into day. It begins to expand its magnificent sweet-scented blossoms in the twilight; it is full-blown at midnight, and closes never to open again with the dawn of day. In a clover-field not a leaf opens till after sunrise. Those plants which seem to be awake all night have been called "the bats and owls of the vegetable kingdom."

Change of Habits in a Plant. — We referred, some months ago, to a singular instance of a recent change of habit in the case of the *Kea* or mountain-parrot of New Zealand. The same observer, Mr. Thos. H. Potts, has noted in *Nature* a somewhat similar instance of the change of habit in a plant. The *Loranthus micranthus* is one of the most showy parasites belonging to the New Zealand flora, and is nearly allied to the English mistletoe. Originally parasitic on native trees belonging to the orders *Violarieæ* and *Rutaceæ*, it appears now to have nearly deserted these in favor of trees introduced since the colonization of the island by Europeans, especially the hawthorn, plum, peach, and laburnum. The latter tree was only introduced in 1859, and appears now to be one of its most favorite resorts, where it is abundantly visited by the European honey-bee, also of recent introduction.

Loudon, the Landscape Gardener. — Loudon was a man who possessed an extraordinary working power. The son of a farmer near Edinburgh, he was early inured to work. His skill in drawing plans and making sketches of scenery induced his father to train him for a landscape gardener. During his apprenticeship, he sat up two whole nights every week to study; yet he worked harder during the day than any fellow-laborer. During his studious hours he learned French, and, before he was eighteen, translated a life of Abelard for an Encyclopædia. He was so eager to make progress in life, that when only twenty, while working as a gardener in England, he wrote down in his Notebook: "I am now twenty years of age, and perhaps a third of my life has passed away, and yet what have I done to benefit my fellow man?" An unusual reflection for a youth of only twenty. From French he proceeded to learn German, and rapidly mastered that language. He now took a large farm for the purpose of introducing Scotch improvements in the art of agriculture, and soon succeeded in realizing a considerable income. The Continent being thrown open on the cessation of the war, he proceeded to travel for the purpose of observation, making sketches of the system of gardening in all countries, which he afterwards introduced in the historical part of his laborious "Encyclopædia of Gardening." He twice repeated his journeys abroad for a similar purpose, the results of which appeared in his Encyclopædias — perhaps among the most remarkable works of this kind, and distinguished for the immense mass of useful matters which they contain, all collected by dint of persevering industry such as has rarely been equalled.

A Correction. — In our "Atoms" last month we stated, on the authority of one of our Western exchanges, that the corn raised at the Iowa Agricultural College cost double its market value. The fact is, that in the very dry season of 1870, when the crops in many neighboring fields were a total failure, the cost of the corn raised by the college was more than the *present* market price, but much below the price at that time. The corn raised last year appears to have cost only about *half* its market value, and the yield to the acre was nearly double the average in the vicinity for the same variety of corn. This is much to the credit of the college, and results like this will be the best possible argument in favor of the establishment of such institutions. We are heartily glad to make this correction, for while we have felt obliged to criticise the management of some of the agricultural colleges, we know that others are doing excellent work, and among these none, in our opinion, stands higher than the Iowa College.

A Point in Botany. — A correspondent, referring to the article in our last number, on "Wild Plants for Hanging Baskets," copied from the *Horticulturist*, in which "the yellow-blossomed wild strawberry (*Fragaria vesca*)" is recommended, says: "I have never seen, never heard of a yellow-flowered strawberry before." Perhaps, as he suggests, the writer had in mind *Waldsteinia fragarioides* of Gray's Manual; but there *is* a "yellow-blossomed strawberry" (*Fragaria Indica*, growing in Pennsylvania and the South, according to Wood), and she may have meant that plant.

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, MAY 1, 1872.

POPULAR SUPERSTITIONS.

It is the work of true science to dispel absurd and superstitious notions from the human mind, and to replace distorted and foolish beliefs by those founded upon the ascertained laws of nature, and the positive facts resulting from intelligent research. This work of science has been in a great measure performed, and many of the old superstitions have been rooted up and fully discarded. Still, there are some that remain, and they exert a decided influence not only upon the uneducated and the vulgar, but upon those of the opposite class.

Superstitions in especial reference to thunder and lightning seem to have abounded in every country from a very early period. It is believed among the Mohammedans at this day that safety from the destructive effects of thunder and lightning is insured by the presence of children, whose innocence is supposed to appease the wrath of the Almighty against the guilty; and this supposed charm is commemorated in some old Spanish verses. The German writers contribute amply to the general fund of mystic lore in connection with this subject, and the works of fiction of both French and Italian authors abound in similar allusions.

Lord Byron observes, "The eagle, the sea-calf, the laurel, and the white vine, were amongst the most approved preservatives against lightning in ancient times; Jupiter chose the first, Augustus Cæsar the second, and Tiberius never failed to wear a wreath of the third when the sky threatened a thunder-storm. These superstitions," he remarks, "may be received without a sneer in a country where the magical properties of the hazel twig have not lost all their credit; and perhaps (he continues) the reader may not be much surprised to find that a commentator on Suetonius has taken upon himself gravely to dispute the virtues of the crown of Tiberius, by mentioning that, a few years before he wrote, a laurel was actually struck by lightning at Rome.

"The Curtian lake and the Ruminal fig-tree in the Forum, having been touched by lightning, were held sacred, and the memory of the accident was preserved by a *puteal*, or altar, resembling the mouth of a well, with a little chapel covering the cavity supposed to be made by the thunderbolt. Bodies scathed, and persons struck dead, were thought to be incorruptible; and a stroke not fatal conferred perpetual dignity upon the man so distinguished by Heaven.

"Those killed by lightning were wrapped in a white garment and buried where they fell. The superstition was not confined to the worshippers of Jupiter; the Lombards believed in the omens furnished by lightning, and a Christian priest confesses that by a diabolical skill in interpreting thunder, a seer foretold to Agilulf, Duke of Turin, an event which came to pass, and gave him a queen and a crown."

It seems indeed an amusing idea that any one should write seriously in condemnation of such superstitions as these, in the nineteenth century. However extraordinary it may appear, it is

nevertheless an indisputable fact, that absurdities similar to the foregoing are actually believed and confided in for safety in England, to this hour; and by persons too not, in the ordinary sense of the word, uneducated. The fears of superstition, as well as its consolations, are peculiarly within that class of feelings which are said to begin in the nursery and end only in the grave; and so congenial to weak understandings is the love of the marvellous, and so despotic the control of the horrors of the supernatural, that the age of manhood is not always or necessarily the harbinger of the age of reason.

There are a great many popular superstitions in reference to other subjects, equally irrational with those on the subject of lightning, and which are very commonly resorted to by the ignorant. Among others, that in cases of persons drowned, if quills filled with quicksilver be stuck in loaves of bread, and thrown into the water, they will by some magic influence float about till they come directly over the spot where the dead body lies, and there remain stationary; little less ridiculous than the Irish legend, that the dead body, touched by the hand of its murderer, will indicate symptoms of reanimation. It is commonly believed among English farmers that bacon from pigs killed when the moon is on the wane will not be good; and in some places an idea prevails that in the construction of feather-beds the exclusion of certain feathers is indispensable for making an easy death-bed.

The highest and most educated, even the most eminent judges and divines, have been tainted with similar infirmities. It is yet barely a century since the penal statutes against witchcraft were repealed in England; and the superstitious trial by wager of battle was demandable so late as 1819. But the light of the present day is fast dispelling such foolish beliefs in this and all other countries, and soon they will cease to be remembered.

PROFESSORS TREADWELL AND MORSE.

WITHIN a short time America has lost two great inventors of whom she may well be proud. Professors Treadwell and Morse were both born in the year 1791, and have died within a month of each other. Prof. Morse's name is known throughout the world. Wherever the click of the telegraph is heard, there also has been heard the announcement that its inventor is dead.

And yet this invention was not perfected until its author was beyond the age at which many men think of giving up active business. The first successful line was the one from Baltimore to Washington, and was built in 1843. The man who made this invention possible, Prof. Henry, of the Smithsonian Institution, still lives. His discovery of induced magnetism supplied the one thing that was lacking in order to make the telegraph a success, for Franklin had discovered that electricity could be made to traverse wires. To Morse is due the credit of combining these discoveries, and inventing the machine to record the impulses of electricity sent through the wire.

Prof. Treadwell is less widely known than Prof. Morse, but he started on his career as an inventor at a much earlier period, having invented a machine for cutting wood screws when he was but little over twenty. He then turned his attention to printing-presses, and made and put in operation the first power-press that was ever used in America. He also invented the turn-out used on single track railroads, and machines for making heavy cordage, some of which are still in use. But the great invention of his life was the substitution of steel and wrought iron for cast iron or brass in the manufacture of cannon. His first device was the mere substitution of these metals, but he found that with the old form of gun this would be too expensive. He therefore made a careful investigation of the proper proportions of the various parts of the gun, and the result of his work was the adoption of the form of gun that is now used in the army and navy, in which every part is proportioned to the strain upon it. The working out of his ideas has produced those destructive engines of modern warfare known as the Armstrong, Krupp, and Blake guns, and all the vast array of steel and wrought iron ordnance.

By his will his property, after some small bequests are paid, is divided into five equal parts, of which one is given to each of the following institutions: American Academy of Arts and Sciences, the Boston Athenæum, the Boston Public Library, the Library of Harvard University, and the Public Library of the town of Ipswich, his native place.

SODA AND MINERAL WATERS.

THE approach of the warm season leads us to devote a few words to the consideration of the nature and healthfulness of the various beverages which are sold by druggists, confectioners, grocers, etc., under the names of soda water, mineral water, Seltzer water, etc. Within a few years the sale of these beverages has largely increased in most of the towns and cities in this country, and a vast expense is incurred by dealers in fitting up apparatus of marble and silver through which to dispense the effervescing liquids. The apparatus is certainly very elegant and attractive, and indicates that the business is so profitable as to be thought worthy of heavy outlays in order to provide counter appliances.

Soda water, or aërated water, is simply common water largely charged with carbonic acid under pressure. If this is prepared in a careful and cleanly way, and in proper vessels, there can be no serious objection to its being used freely during the summer months by persons in ordinary health; but if, on the contrary, it is manufactured by slovenly and incompetent dealers, and copper vessels are used, it becomes not only a filthy, but a poisonous beverage. Carbonic acid acts vigorously upon copper, forming the green carbonate of the metal, and when vessels are employed which are not coated with the metal tin, the poisonous salt is produced in large quantities. This is dissolved in the water, and when drank freely has a very pernicious influence upon the health. When copper fountains are opened by manufacturers for repairs, or for the purpose of re-tinning, they are often found covered with a deposit of copper salts, and we have seen crystals hanging from the upper surfaces like stalactites from the roof of a limestone cave. Too much care cannot be taken with copper vessels used for preparing aërated waters, and dealers owe it to their friends and customers not to allow them to be acted upon by the acid. The materials used in the manufacture of the water should be pure, and the utmost cleanliness and care observed in the manipulating processes. We wish that all copper vessels could be dispensed with, and we think that iron ones should be used in preference, as they have been employed successfully by many dealers.

Respectable and competent druggists are usually vigilant and careful regarding the character of the waters they dispense, and the beverage so cooling and grateful can be procured in a pure condition of those worthy of being trusted.

THE MINERAL PHOSPHATES.

SEVERAL correspondents have requested us to state the *exact* amount of commercial sulphuric acid required to decompose 100 lbs. of the South Carolina phosphatic rocks. It must be understood that these phosphates vary much in composition, but as they are generally sold by analysis it will be very easy to calculate in each case how much acid must be added to decompose the specimen. In the first place, we have to add enough to decompose the carbonate of lime, and convert it into the sulphate; then enough must be added to change the tricalcic phosphate into monocalcic phosphate, according to the following formulas: —

$$CaCO_3 + H_2SO_4 = CaSO_4 + CO_2 + H_2O$$
$$Ca_3P_2O_8 + 2H_2SO_4 = CaH_4P_2O_8 + 2CaSO_4.$$

Acid of 1.8426 sp. gr. has the formula H_2SO_4, so that we can calculate directly from the above equations how much to use.

For instance, the analysis gives the following composition of the phosphate: —

Carbonate of lime	5.00
Native phosphate of lime	60.00
Silica, Water, Organic Matter, etc.	35.00
	100.00

We have,

$$CaCO_3 : H_2SO_4 :: 5 : x$$
$$Ca_3P_2O_8 : 2H_2SO_4 :: 60 : y.$$

and $x + y =$ the amount of acid to be used. As the first two members of the above equations remain constant, we may simplify matters by dividing them once for all; and the rule then becomes, —

Multiply the per cent. of carbonate of lime and of phosphate of lime by the factors .98 for the carbonate and .603 for the phosphate.

$$\text{Then } 5 \times .98 = x = 4.90$$
$$60 \times .603 = y = 36.18$$
$$41.08$$

giving 41.08 pounds of acid for 100 pounds of the above phosphate.

The above will apply equally well to bone char, or any other phosphate of which the formula is known. It is best in practice, however, to use considerably less of the acid, in order to avoid the presence of any free sulphuric acid.

THE NAPHTHA FIEND.

UNDER the above head, the *New York Tribune* is doing a good work in exposing the dangerous frauds of the naphtha peddlers, and warning the people against their so-called "fluids," "oils," "gasolines," etc., which are warranted "inexplosive." W. H. Coleman, Esq., of Geneva, N. Y., sends the following communication to the *Tribune*, in which he alludes to the service the JOURNAL has performed in explaining the dangers of naphtha, and exposing the frauds in its sale. The "Danforth Fluid," alluded to in the communication, has been several times spoken of

in our columns, and its perilous nature pointed out.

To the Editor of the Tribune: —

Sir, — Your recent attack upon the naphtha peddlers of New York is well deserved and well performed. The credit for first exposing this devilish fraud is due to Dr. J. R. Nichols, of Boston, who, five years ago, in his *Journal of Chemistry*, fully explained the nature of kerosene and naphtha, described the methods used by dishonest dealers, and from time to time warned the public to be on their guard against every kind of burning fluid except pure kerosene. His efforts led to the passage of the first law ever enacted upon the subject, but the remarkable apathy of the public, who seemed ready to risk any danger for the sake of having a cheap and brilliant light, rendered it and similar ones nearly dead letters. Soon after my removal to this place, in 1870, a man called at my house to sell Danforth's Patent Non-explosive Fluid, which he highly recommended as being perfectly safe. I quickly saw that it was only a naphtha preparation, and told the man what I thought of it very plainly. On further inquiry, I learned that an agency had been established in the village, and that the sales were very large. I therefore wrote an article for the village paper, showing up the whole business, and denouncing the Danforth oil in plain terms. In a few days I was waited upon by both the local and the county agents, who questioned me closely as to my knowledge of oils, and said that Mr. Danforth would take the matter in hand. Next week the paper contained a reply from Mr. Danforth, denouncing the writer of the attack, offering a reward of $100 for the first case of explosion in the use of his oils, and daring me to meet him in a public test of his fluid and of kerosene.

Finding myself in for a fight, I placed a sample of the fluid in the hands of Professor Towler of the Medical College, for analysis, and with little effort hunted up several cases of well-authenticated explosions of the fluid. Prof. Towler's analysis proved all and more than I expected, for he not only exploded the fluid, but nearly set the college in flames. I then wrote to Danforth, naming day and place where I would meet him for the public test, giving him ample time to come on. He replied, saying that owing to press of business he could not come, but that the county agent would be in attendance. The day came, the local agent collected samples of all the kerosene in town, in the full belief that his superior would arrive to vindicate himself, and blow his opponents to parts unknown, and Prof. Towler and a few citizens awaited events at the college. The day passed, and nobody came. Then I wrote to Danforth, stating that I had exploded his fluid, and met all his requirements, and requested him to forward a check for that $100 which I had fairly earned. It is needless to say that it never came. However, all this did not seem to affect the local trade very greatly, though the agents were frequently changed. Finally, the store was closed, and the agency transferred to a man who kept an eating saloon on another street, and thereafter eatables and naphtha were sold together.

Last fall, returning from Rochester in the cars, I met the young man who was local agent at the time above spoken of. He had since gone into the tree-selling business, and talked very freely about his experience in the oil business. The county agent had cheated him out of his salary, and had himself been sold out by the sheriff. Danforth also, he said, had been arrested in Albany by a dupe to whom he had sold a local right, and who soon discovered that the right had been resold to dupe number two.

I supposed that this had finished him, until your exposé disclosed his agencies in New York. Finish him if you can, Mr. *Tribune*. He is a head centre in the naphtha trade, and must have made a handsome fortune — in fact, several of them.

Wm. H. Coleman.

Geneva, N. Y., *March* 9, 1872.

EDITORIAL NOTES.

Secretary Flint's Agricultural Report for 1871–2. — Some journalists outside of our State would have their readers believe that husbandry in Massachusetts is in a very bad way, and that our soils have become so exhausted as to be unfit for cultivation. The most excellent and interesting *Annual* which our Agricultural Secretary sends out from his office at the State House every year, is well calculated to dispel any erroneous impressions formed from reading careless statements in distant newspapers. We doubt if any volume is issued in any part of the country which contains so much that is of real value to the agricultural interests of the country as the Massachusetts State Report; and the volume just issued is one of the best of the series. It presents accurate reports of the discussions and addresses upon agricultural topics at the meetings of the State Board, and also many of the valuable papers which appear in the transactions of the local societies. It contains the results of the observations and experiments of some of the most careful and sagacious soil cultivators in the State, and a large amount of practical information is presented upon the raising of the cereal grains, fruits, roots, early vegetables, etc. The Secretary deserves much credit for his indefatigable efforts to promote the great interests of husbandry in this ancient Commonwealth.

Ohio "Schoolmarms" on Physiology, etc. — After a recent examination of female teachers in Ohio, some of the unsuccessful candidates complained that injustice had been done them, whereupon the examiners were so cruel as to publish extracts from the papers written by the rejected applicants. The following are a few specimens of the answers: "The food is first masticated, and then passes through the phalanx;" "Respiration is the sweating of the body;" "The chest is formed of two bones, the sternum and spinal cord;" "Emphasis is placing more distress on some words." One candidate says that "Virginia obtained its name from the Virgin Mary;" another that "it was so named by Queen Victoria calling it a Virgin State."

Force and Energy. — The distinction between these terms, now so often employed by scientific writers, is well stated in the following extract from an article by Dr. F. W. Pavy, in the *London Lancet*: —

"By 'force' in rigid signification is understood the power of producing 'energy;' by 'energy,' the power of performing work. To give an illustration: powder has force, the cannon-ball energy; but to speak of the force of the cannon-ball is inexact. I may also remark that the words 'actual' and 'potential' are in frequent use to qualify the state in which energy is met with. By actual energy is meant energy in an active state, energy which is doing work. By potential energy, energy at rest, — energy capable of doing work, but not doing it. In a bent cross-bow there is potential energy, — energy in a state of rest, but ready to become actual or to manifest itself, when the trigger is pulled. Again, actual energy is evolved from the sun. By vegetable life this is made potential in the organic compounds formed. In these organic compounds the energy is stored up in a latent condition; potential energy is reconverted into actual energy when they undergo oxidation during combustion, or in their utilization in the animal economy."

☞ For the cuts on page 122 we are indebted to Rolfe and Gillet's "Handbook of the Stars."

ATOMS.

Last year, 268,800 tons of iron were mined in Missouri, and 910,984 tons in Michigan. — We see that Professor Wedl contests Professor Lostorfer's boasted discovery of peculiar bodies in syphilitic blood, and asserts that they are only masses of fatty particles and protoplasm, which are found in healthy blood. — There were no less than 13,174 deaths from small-pox in the seventeen largest towns of Great Britain during the past year. — The manufacture of rails (for railroads) in this country has doubled in the last six years. — From some remarks in the *Pall Mall Gazette* on the necessity of a revision of the British marriage laws, we infer that in England no legal marriage can take place except in the "canonical hours," or between eight A. M. and noon. — We see that the paper on "Fire-proof Floors," to which we have elsewhere referred, is reprinted in full in *Van Nostrand's Engineering Magazine* for April. — The poet Whittier, in a letter to the editor of the *Literary World*, commends that paper as "filling, in a very satisfactory manner, an important but heretofore unoccupied place in our periodical literature," and says that he has "learned to place a high estimate upon the ability, candor, and conscientious thoroughness and impartiality of its critical reviews and notices." — Bouchardat has found milk sugar in the juice of the *Achras sapota* at Martinique; one sample containing fifty-five per cent. of cane sugar and forty-five per cent. of milk sugar. — It is popularly supposed that a wide-spread epidemic has a marked effect upon the general mortality, but statistics prove that the great tide which carries away the generations of men, is but slightly rippled in its flow by any such cause, and no "run" on the life insurance offices is likely to be the result. — According to Berthelot, benzoic chloride is a sensitive reagent for alcohol, being very slowly decomposed by water, while if the liquid contains .001 of alcohol, benzoic ether is at once formed, and may be recognized by its peculiar odor. — The Sewage Inquiry Commission, at Birmingham, England, report that the well water used by at least 105,000 of the population of that city "consists in reality of filtered sewage." — Dr. Letheby, in his "Lectures on Food," gives the following valuable piece of information concerning Indian corn, which will be as new to our Yankee readers as it doubtless was to the London cockneys: "The young grain, called cob, is, however, more palatable, and forms, when boiled in milk, an American luxury, which takes the place of green peas." — The celebrated cosmetic known as "Kalydor," is said to be made of bitter almonds, blanched, 1 ounce; corrosive sublimate, 8 grains; rose-water, 16 ounces. — The *University Monthly* for March is one of the best numbers of an educational magazine that we have seen this long while. — *Old and New* commends Rolfe's editions of Shakespeare's plays as "an exquisite handy-volume series." — The largest iron casting ever attempted was lately made at Newcastle-on-Tyne, being an anvil block of 125 tons, intended to be used with a 20-ton hammer, in forging Armstrong guns. — Alcoholic solutions of perchloride of iron are not precipitated by carbonate of lime, and may therefore be used, more or less concentrated, for imparting various shades of yellow to white marble. — *Fireside Science* continues to receive the emphatic commendation of the best critics, not only in this country, but in England, where it has been very favorably noticed by the *Saturday Review*. — *Nature*, quoting from Quetelet, says that "the mean man is a little under five feet eight inches in height, and measures about thirty-five inches around the chest;" but we have known some very mean men whose altitude and circumference varied considerably from these figures, and we venture to say that mean men *can* be found of almost any stature or "bust measure," as the dealers in paper patterns phrase it. — M. Delesse has lately

published a paper on "The Oscillations of the Coasts of France;" but who will attempt to describe the oscillations of French politics? — Russia proposes to observe the transit of Venus in 1874, from a chain of stations 100 miles apart, extending from Kamschatka to the Black Sea.

LITERARY NOTES.

PRESIDENT CHADBOURNE, of Williams College, delivered at the Lowell Institute in this city, in 1871, a course of lectures upon *Instinct, its Office in the Animal Kingdom, and its Relations to the Higher Powers of Man.* These lectures have recently been published by Messrs. Putnam & Sons, New York. We have read the book with much interest, as we do all the works of its distinguished author. Although treating upon a difficult and quite abstruse subject, it is made clear and comprehensible to even popular readers, and we think those who seldom open treatises upon any branch of intellectual philosophy will be delighted with its plain and lucid reasoning. The book should go into circulating and Sunday-school libraries, and into families, as it is calculated to exert a salutary moral influence, as well as to improve and enlarge the intellect.

Plain Talk about Insanity, its Causes, Forms, Symptoms, and Treatment, by T. W. Fisher, M. D., formerly connected with the Boston Hospital for the Insane (published by Mr. Alexander Moore, of Boston), is a timely work, as the public interest in the questions regarding the proper treatment of the insane has never been greater than at the present time. There is a growing feeling, both among physicians and sensible, observing men in all the walks of life, that our method of herding the insane together, as we do, in hospitals, is not the best that can be devised. As we intend at some time to discuss this subject in a more extended manner, we will only say that Dr. Fisher's book is well worth reading, and that it contains much that is sensible and worthy of consideration. It can be easily understood by the non-professional reader.

The same publisher has issued *Animal and Vegetable Parasites of the Human Skin and Hair*, by Dr. B. Joy Jeffries. This work presents to the medical profession the results of much study and experience upon a subject which ought to be better understood. However unpleasant the idea may seem, only too many of the human family in the most civilized countries are annoyed or rendered miserable by the presence of animal parasites. It is not alone the poor and the dirty that are troubled with parasites, but the cleanest and wealthiest are often tormented with them to a degree which renders life intolerable. Dr. Jeffries explains what parasites are, where they come from, how they live and thrive on the skin, in the skin, and in the deep tissues of the body. The book is an exceedingly handy little manual, and undoubtedly will find many readers.

Messrs. Scribner, Armstrong, & Co. have published two more volumes of the "Illustrated Library of Travel" which we commended last month: *Wild Men and Wild Beasts*, by that "mighty hunter," Gordon Cumming; and *Arabia*, by Bayard Taylor, an admirable summary of all that travellers have learned concerning one of the least known but most interesting of lands. They have also issued another of the second series of "Wonder Books:" *Wonders of Electricity*, from the French of J. Baile, with valuable additions (especially where the author, after the usual French manner, has ignored foreign inventions and discoveries), by Professor J. W. Armstrong; and the *Memoir of Robert Chambers, with Autobiographic Reminiscences of William Chambers*, in which the latter, as the London *Athenæum* well says, "has told the tale of his own and his brother's heart-rending beginnings with such concentrated clearness, that here may be learned lessons of self-denial, patience, unflagging perseverance, independence, and cheerfulness (the greatest sustainer of all), which comprise a whole education, not only for the humblest in station, but for the least intellectual."

The Harpers have published Vol. III. of *Brougham's Autobiography*, and Vol. II. of *Tyerman's Life of Wesley*, both of which are even more interesting than the preceding volumes, and will be very welcome to numerous readers who have been waiting for them; *Ancient America*, by John D. Baldwin, A. M., which seems to us more valuable for its excellent *résumé* of the facts of American archæology than for its theories and speculations; and two more volumes of the revised edition of Dr. Barnes's "Notes," being those on *First Corinthians* and on *Second Corinthians and Galatians*.

The Appletons have reprinted the revised edition of Sir John Lubbock's *Prehistoric Man*, containing much new matter, and giving the results of the latest investigation on a subject of absorbing interest; *Three Centuries of English Literature*, by Professor C. D. Yonge, which with some minor faults has many great merits, and is likely to be useful to the student as well as the general reader; and *Man and his Dwelling Place*, an Essay toward the Interpretation of Nature, by James Hinton, author of "Life in Nature," "The Mystery of Pain," etc.

The University Publishing Company, who are preparing a series of school-books with special reference to the wants of the South, though by no means exclusively for that latitude, have recently added to their list a *Practical Business Arithmetic*, by L. Fairbanks, A. M., which is very complete and satisfactory, and *How to Draw*, by A. S. Avery, explaining "the right and the wrong way," in a manner that ought to enable the pupil to attain the one and avoid the other with very moderate guidance on the part of the teacher.

TO CORRESPONDENTS.

WE have received several long and interesting communications on "Medical Philosophy," for which we regret that we cannot find room. The subject is better suited to a quarterly review than to a journal like ours, and it would be impossible to do it justice in the space we have at command without doing injustice to a hundred other topics that claim our attention each month.

A friend who has more than once contributed to our columns sends us some comments on our note concerning "Anæsthetics in the Slaughter-house," and suggests that the sufferings of the criminal on the gallows might be alleviated in a similar way. This has been proposed more than once, and there is no novelty in the idea of using anæsthetics in killing animals. The merit of Dr. Richardson's plan is that it furnishes a cheap and safe agent, and a simple and convenient mode of administering it, — which, so far as we are aware, has not been done before.

Two or three communications already in type are crowded out of this number, but will appear in our next.

Medicine.

LATIN AND GREEK IN MEDICAL EDUCATION.

IN the Valedictory Address to the graduating class at Louisville, delivered March 1, 1872, by Prof. R. O. Cowling, there are some judicious remarks on this subject, from which we make the extract below. It should be understood, however, that while the speaker assigns little *practical* value to the dead languages in the training of the physician, he does not underrate them as means of general culture. In the latter part of the address, he strongly recommends them as worthy of study for their own sake, and gives them a prominent place among the studies to be taken up, if possible, after entering upon professional life. This is good counsel, but not one out of a hundred is likely to profit by it.

Is Latin essential to a doctor? I think so. It has been used so long in the nomenclature of our profession that we could not change it if we would. Some years ago they tried in New York to simplify the law by translating the terms, but utterly failed. It was more dignified to say the writ of *ne exeat* than the writ of "no go," and *habeas corpus* than "take his carcass," in which manner the profane were wont to construe these terms. And, besides, Latin is the great catholic bond of medicine. Try it yourselves some time in a foreign land, when you feel cut off from the world by the unintelligible jargon which is sounding around you, and see how sweet it is to know a message for pil. hydrarg. to an apothecary will as certainly bring blue mass in Vienna as here in Kentucky. Besides, this is one of the demands the community makes upon doctors. It does not like vernacular medicine. Paregoric is too bald to pay three dollars for, and next to the tritest pleasantry in medicine — the "distressingly healthy" joke ranks first — is that many a simple Simon whom calomel would slay thrives on the hydrarg. chloridum mite. But grant that Latin is essential, then how much? It has been variously estimated from the Latin grammar up to several books in Virgil. By far the principal part of Latin with which medicine is concerned consists in the terms of anatomy and the materia medica. As to the first, I am sorry to think how little they do bother most men after graduation. In the materia medica which he must so constantly use, it is little else besides the vocabulary which is required, for I take it that he who writes the directions of his prescriptions in Latin must take the pains to translate them. The little that is required beyond the vocabulary is the genitive case. It would indeed be more elegant to use it when required; but I venture to say that not one in a hundred doctors can lay his hand on his heart and declare he was ever guiltless of its omission. Now for this wonderful amount of Latinity, why vex young Galen's soul with the intricacies of the subjunctive mood, or test his engineering skill with Cæsar's bridge, or rouse up his already harassed sensibilities with the sufferings of Æneas?

But because the necessity of a certain amount of Latin is granted, there is no reason why medicine should be saddled with Greek. In these modern days of specialties there is an alarming tendency to this. I wonder if the soothsayers in ophthalmology do not smile together over the terms with which they blind their art. It is certainly not a pleasant thing to have one's eyelids grown together; it is terrible to have it called anchyloblepharon; and bad as is an inflammation of the retina, what is life worth when we know this is amphiblestroidites? Can any one believe that medicine is advanced by such a nomenclature as this? Macaulay has said that one reason why no one knows anything of Indian history is on account of its outrageous names. But the "Bundelcunds" and the "Punjaubs" of that language are as the prattle of children when compared with the tremendous titles with which the modern specialist obscures his art. What a flood of light the pure ray of English would let in! We call the instrument for crushing stones a lithotrite. The Germans more sensibly call it simply stone-breaker. If a knowledge of Greek is to further a barbarous coinage of words, it would be better for medicine that some imperial ukase could abolish it entirely.

He who judges a medical student by the same standard as he would school-boys, knows little of his character. He is not forced to his work; he comes to it in dead earnest. He knows he has so much time, and so much money, and he invests his capital to the best advantage, with an eye to its returns. I have not seen that the Latin or Greek necessary to the understanding of medical terms offered him special difficulty. Indeed it has been a matter of astonishment to me how readily they are mastered by men who had no previous knowledge of these languages.

PRESCRIBING FOR INFANTS.

THE following sensible hints on this subject are from a lecture by Prof. J. O'Reilly, published in the *American Practitioner* for April, 1872: —

There are two points in the general medication of children to which I wish especially to call your attention. One is the subject of thirst, the other is the intervals at which medicine should be given.

In quite a number of infantile diseases the stomach is very capricious, and to keep it quiet is one of our greatest troubles. This difficulty is often caused by the attendant not understanding the difference between hunger and thirst. The sick child is fretful, and cries and pulls at its mother's breast; and she, willing to do anything that soothes it, permits it to nurse. It sucks, and in a few moments rejects the milk; but cries again, and the mother again yields it the breast only to have the stomach again reject its contents, and thus the fight goes on until the infant is exhausted. The doctor gives medicine to quiet the irritable stomach, and the mother counteracts its effect by overfeeding. What I wish to express is the fact that the child is not hungry; it does not want the breast; but is thirsty and wants drink. In health the breast is food and drink, but in disease the craving is that of thirst, not of hunger, and the stomach which rejects the milk because it is unable to digest it would be calmed by a cool beverage. In other words, were water given to the child in the place of the breast, the stomach would be relieved, and in many cases the child saved. This difference between thirst and hunger in the infant is a point well worth noting.

Medicine should be given to infants in small but often-repeated doses. The interval should be only half as long as that for the adult. The reason for this is that the digestive organs of the infant act much more rapidly than those of the adult, and a

medicine to have its effect kept up must be supplied in accordance with its entrance into and disappearance from the system.

HEAT AS A POISON.

One of the French journals gives an account of some curious experiments by M. Claude Bernard on the effects of heat upon animals. It appears from these that heat, when it attains too high a degree, acts like a poison, and destroys feeling and motion. It seems to act directly on the muscular element; and the loss of muscular power necessarily produces death by arresting the action of the heart and circulation. The degree of heat which must not be exceeded for cold-blooded animals is from 115° to 120° F., for mammalia 128° to 131°, for birds 140° to 145°. In each case the maximum differs by a few degrees only from the animal's normal temperature. There is, then, an inward medium, the temperature of which is kept up by that of the blood — a certain atmosphere of heat, so to speak, which should remain unalterable. The artificial increase of this heat leads to the most serious consequences as soon as it exceeds a very few degrees. To what particular poisons, then, can heat be assimilated? Those must be sought which have a direct action upon the contractile muscular element, such as the *antiar* (the milky sap of the *Upas antiar*), the *vas*, and the *corwal*, American vegetable poisons. These substances, probably, have the same chemical action upon the blood as heat. The precise action of heat upon the blood is thus stated by M. Bernard: The blood of an animal killed by heat becomes black, the oxygen it contains is rapidly transformed into carbonic acid, and finally disappears. This is not a true toxical action, but rather an excitement of the vital and normal properties of the red particles. The black blood of the rabbit killed by heat is still living; it absorbs oxygen by contact with the air, and again becomes ruddy, if the experiment is tried in time. Between 167° and 190° F., however, the blood coagulates, loses its vital properties, and cannot again become red. Heat above a certain degree kills the muscles without killing the blood. The chemical character of this poisoning of the muscles by heat is the most obscure part of the subject. It now remains for chemists to analyze the phenomena which accompany the muscular rigidity and cessation of motion produced by heat, and thus to solve the problem of the precise action of this poison, as they have done in the case of certain others.

MEDICAL MEMORANDA.

Bisulphite of Soda in Throat Diseases. — Dr. Tyrrell, in the *Pacific Medical Journal*, commends, as a new remedy in this class of affections, bisulphite of soda, given in large and continuous doses. Diphtheria, inflammation of the tonsils, and quinsy, though local exhibitions, have their source in poisonous fermentations of the blood, the same as scarlet fever and other zymotic diseases. It is held that the salt prescribed enters into the circulation and retards putrefactive fermentation. Dr. T. failed of success when he administered it in small doses and in three hour intervals; but when he gave thirty grain doses every hour, day and night, so as to saturate the system with the salt, he was almost invariably successful in removing all the severe symptoms in twenty-four hours. He asks physicians to give this medicine a trial, that the curative effects may have more extended proofs.

Stag Pills. — Pills "purely vegetable," have been a popular nostrum in this country, but in the Celestial Empire those of a thoroughly animal character appear to be in demand. A Chinese druggist at Ningpo invites the public to swallow "Pills manufactured out of a whole stag, slaughtered with purity of purpose, on a propitious day." The wealthy wholesale druggists are in the habit of purchasing large and handsome stags, which they expose in a pen at the door of the shop until "a propitious day" is selected for the animal's conversion into pills, when he is deliberately pounded entire into pulp, from which pills are made.

The Limit of Longevity. — Sir Henry Holland, in his interesting "Recollections of Past Life" (just reprinted here by the Appletons) refers to the question whether there is any trustworthy evidence of any human life longer than a century. He himself believes that there have been well authenticated instances of the kind. In the report of the Irish Registrar-General for the third quarter of 1871, the deaths of six centenarians are recorded. The Registrar of Cookstown District reports the death of a woman aged 102, and a man 108, and says: "I have made careful inquiry respecting these two cases, and have no reason to think the ages are exaggerated; both are remembered as 'old people' by individuals long past their climacteric." In the Dervock district, Ballymoney Union, the registrar reports "a death at the advanced age of 105 years, authenticated."

It is stated in several medical journals of recent date that "Harvey Thacker, who died recently in California, was 128 years old at the time of his death." If there is satisfactory evidence of this extraordinary longevity, it would be interesting to know more about the case.

Varying Effects of Poisons on Different Animals. — It is a well-known fact that what is poison to one animal may be taken by another with entire impunity. In illustration of this proposition, we are informed that strychnine, so fatal to most animals, may be eaten by certain species of monkeys with perfect safety. In the case of an East India monkey, known as the Lungoor (*Presbytis entellus*), one grain was first concealed in a piece of cucumber, which was eaten by the animal with no apparent effect. Three grains were afterward given, and with the same result. To test the strychnine used, three grains were administered to a dog, which proved almost immediately fatal. Another Indian monkey, known as the pouch-cheek monkey, has been found to be more susceptible than the Lungoor, but not so much so as the dog.

It is also stated that pigeons can take opium in large quantities with no injurious consequence; goats, tobacco; and rabbits, belladonna, stramonium, and hyoscyamus.

Vital Statistics. — The Philadelphia *Medical Times* says, that half of all who live die before seventeen. Only one person in ten thousand lives to be one hundred years old, and but one in a hundred reaches sixty. The married live longer than the single; and out of every thousand born only ninety-five weddings take place. Of a thousand persons who have reached seventy, there are of clergymen, orators, and public speakers, forty-three; farmers, forty; workmen, thirty-three; soldiers, thirty-two; lawyers, twenty-nine; professors, twenty-seven; doctors, twenty-four. Farmers and workmen do not arrive at good old age as often as clergymen and others who perform no manual labor; but this is owing to the neglect of the laws of health, inattention to proper habits of life in eating, drinking, sleeping, dress, and the proper care of themselves after the work of the day is done. These farmers or workmen eat a heavy supper on a summer's day, and sit around the doors in their shirt-sleeves, and, in their tired condition and weakened circulation, are easily chilled, laying the foundation for diarrhœa, bilious colic, pneumonia, or consumption.

A Possible Risk in the Use of Chloralum. — Professor Fleck, of Dresden, in a report upon the products of the English "Chloralum Company," asserts that these preparations contain chloride of lead, copper, and arsenic, therefore that their use is not without danger. He estimates the disinfectant proportional power of chloralum as compared to chloride of lime, to be as 74 is to 100. We also quote the analysis of chloralum liquor published by the Professor. According to this investigation, 100 parts of chloralum contain —

82.32	per cent.	of water.
0.15	"	of chloride of lead.
0.10	"	of chloride of copper.
13.90	"	of aluminium.
0.42	"	of iron.
3.11	"	of calcium, and some sulphate of lime.

In the chloralum powder he declares he has found 0.72 per cent of chloride of arsenic.

First Use of a Mineral Medicine. — The *British Medical Journal* says: "Legend has it that this was the oxide of iron. Melampus, who lived about two centuries before the fall of Troy, holding an augury to discover a cure for impotence, was directed to seek for a certain knife which had lain for a long time in a tree, where it had been stuck after it was used for sacrifice. The rust scraped off this, and given to his patient for ten days in wine, was warranted by a sapient old vulture to effect a cure."

CARBOLIC ACID RECIPES.

Carbolic Toilet Water. — Crystallized carbolic acid, 10 parts; essence of mille-fleurs, 1 part; tincture of quillaya saponaria, 50 parts; water, 1,000 parts. Mix. The saponine replaces soap with advantage. The above should be employed, diluted with ten times its bulk of water, for disinfecting the skin, for washing the hands after any risk of contagion, etc.

The *tincture of saponine* in the above is made by taking of bark of quillaya saponaria, 1 part, and of alcohol (90°), 4 parts. Heat to ebullition, and filter.

Carbolized Amylaceous Ointment. — Pure starch, 3 parts; hot water, 20 parts. Mix in the ordinary way (the starch being made first into a paste with cold water, and then hot water added), to a stiff consistence; then add olive oil, 1 part; glycerine, 3 parts; carbolic acid, 1 part, and thoroughly mix in a mortar. When cool, this is a soft jelly, which can easily be applied as ordinary ointment. It is much more efficacious than one the base of which is entirely fat, and it is an agreeably cool application.

Carbolized Tooth-Wash. — Water, 1,000 parts; essence of meat, 2 parts; tincture of saponine, 50 parts; pure carbolic acid, 10 parts. Mix. A dessert-spoonful, in a quarter of a tumblerful of water, serves as an excellent preparation for cleansing and preserving the teeth.

Carbolized Oil. — Pure carbolic acid, 1 part; olive oil, 6 parts. Linseed oil is sometimes used as a vehicle, but olive oil is preferable, as being less prone to oxidation.

Antiseptic Lead Plaster. — Olive oil, 12 parts (by measure); litharge (finely ground), 12 parts (by weight); beeswax, 3 parts (by weight); crystallized carbolic acid, 2½ parts (by weight). Heat half the olive oil over a slow fire; then add the litharge gradually, stirring continually until the mass becomes thick, or a little stiff; then add the other half of the oil, stirring as before, till it becomes thick again. Then add the wax gradually till the liquid again thickens. Remove from the fire and add the acid, stirring briskly till thoroughly mixed. Cover up close, and set aside to allow all the residual litharge to settle; then pour off the fluid and spread upon cloth to the proper thickness. The plaster made in this way can be spread by machine and kept rolled in stock, and in a well-fitting tin canister will retain its virtues for any length of time.

Carbolic Acid Paper. — This paper, which is now much used for packing fresh meats, for the purpose of preserving them against spoiling, is made

by melting five parts of stearine at a gentle heat, and then stirring in thoroughly two parts of carbolic acid; after which five parts of melted paraffine are to be added. The whole is to be well stirred together until it cools; after which it is melted and applied with a brush to the paper, in quires, in the same way as in preparing the waxed paper so much used in Europe for wrapping various articles.

CARBOLIZED MIXTURE FOR ZYMOTIC DISEASES. — Dr. Alex. Keith advocates the following: Take of carbolic and acetic acids, each from 1 to $1\frac{1}{2}$ f. drachms; tincture of opium, chloric ether, each 1 f. drachm; water, to 8 f. ounces.

A tablespoonful every four hours until the fever subsides.

SMALL-POX ITEMS.

SMALL-POX IN CHINA. — Small-pox is called the "bean disease" in the Chinese language, from the resemblance of the vesicle to a small bean or some other form of pulse, a kind of food very largely grown in China. The disease dates from the reign of the first Emperor of the (Eastern) Han dynasty, Kwang Wu, who reigned A. D. 25–28. It is said to have been imported from some portion of Central Asia, or from some part of Southwestern China now included in the nominal empire, by some Chinese troops returning from a foreign campaign. This adds another instance to the important list of diseases propagated by armies in ancient and mediæval times. Inoculation has been practised amongst the Chinese for a thousand years or more, showing that the disease must soon have clamored for some interference, even at the hands of an Eastern people, strong in their belief in fatalism. This latter failing is attested by the facts that the disease is called the *Tien-hwa*, or "heavenly flower," and that the malady has been deified under the name of "Holy Mother of Small-pox." Temples are erected in every part of the empire in honor of this goddess, and every family visited by the disease sends some worshipper with offerings to the shrine of this old hag.

In order to avoid any offence to her, the disease, one of the most horrible of all afflictions, is spoken of as the "felicitous circumstance," or some other periphrastic or propitiating term. The earliest work on the disease is a kind of treatise called "Wan-jin-shi-tau-chin-lun," first published in 1323. Several other works have been written on the disease; some on inoculation. It is curious that in Chinese the malady is called *Hwa*, the "flower," the equivalent of the word *exanthema*.

SMALL-POX THEATRICALS. — An English paper gives the following account of a theatrical entertainment, which would not have drawn a very full house if it had been dependent upon outside patronage: "The officers of the Hampstead Small-pox Hospital and the convalescent patients have, with the permission of the authorities, fitted up one of the unoccupied wards as a theatre. The opening entertainment consisted of a concert by the patients, and an amateur performance of the farce 'Box and Cox.' Several songs were very well sung by the patients, and the characters in the farce were well sustained by the officers. Two patients performed on the piano and flute, and the audience, consisting of all the patients who were able to attend, and all the officers and servants who could be spared from their duties, are said to have been delighted with their evening's amusement."

TAKING A HORN. — An interesting memento of the discoverer of vaccination has recently been presented to the Royal College of Physicians by Sir John William Fisher. It consists of a cow's horn, beautifully polished, presented to Sir J. W. Fisher, in the year 1813, by Dr. Jenner, and polished by himself. The gift was made in grateful acknowledgment of services rendered to Jenner's sick children by Mr. Fisher, then a medical assistant in Soho. The horn is now mounted in silver, and bears an appropriate inscription stating the circumstances under which it was presented to the College. Dr. Burrows, the President, in asking the acceptance of the horn, stated that it was probable — though there was no record of the fact — that the horn had been taken from one of Dr. Jenner's favorite cows on which he made his experiments on vaccination.

SELECTED FORMULÆ.

COATING FOR PILLS. — The London *Chemist and Druggist* gives the following as an efficient coating for pills: —

℞ Æther	100 parts.
Balsam of tolu	10 parts.
Colophonium	1 part.
Absolute alcohol	10 parts.

Macerate till the resin is dissolved.

Sugar-coated pills may be made by first rolling them in a mortar in the above æthereal solution, and then transferring to a sheet of writing paper with the sides bent upwards, shaking being continued till they are perfectly dry. Then to a small quantity of *saccharated albumen* add a few drops of water, at the same time beating for a short while, so that a thick paste will be formed. Into this mass the pills are stirred, and when moistened on all sides, quickly poured into a wooden pill-box, which has been previously filled about one third with the finest powdered sugar obtainable, and immediately shaken, or rather rolled, in a lively way and with great force, separating from time to time those cohering. When no more sugar will adhere they are dried over a gentle fire, taking care not to bring them too near the stove, lest they should crack. Shaking, of course, must be continued till dryness is effected.

Saccharated albumen (*albumen cum saccharo*) is prepared as follows: Take the white of an egg, and in an evaporating dish beat with it as much powdered sugar, passed through a very fine sieve, as will make rather a thick fluid. Then place it in a water-bath and evaporate to dryness, stirring constantly, that no sugar may be deposited. Pulverize, and set aside for further use.

SCENT POWDER. — The following recipe for scent powder to be used for wardrobes, boxes, etc., gives an article far superior to the mixtures sold in the shops: coriander, orris root, rose leaves, and aromatic calamus, each one ounce; lavender flowers, two ounces; rhodium wood, one fourth of a dram; musk, five grains. These are reduced to a coarse powder. The scent on the clothes is as if all fragrant flowers had been pressed in their folds.

ROSE TOOTH POWDER. — The following is a good formula:

Pulv. Myrrh	
Bi Carb. Soda, aa	℥ij.
Pul. Orris Root	
Pulv. Cuttlefish Bone, aa	℥ij.
Precip. Chalk	℥vi.
Otto Rose	gtt. xv.

Mix, and color with carmine.

CASTOR OIL POMADE. — Mix the following:

Castor Oil	4 oz.
Prep. Lard	2 oz.
White Wax	6 dr.
Oil Bergamot	
Oil Lemon, aa	$\frac{1}{2}$ dr.

DIARRHŒA AND BOWEL CORDIAL. — The following is an excellent formula for a cordial to keep in the household, and was prepared by a physician who has used it with great success in his practice: Chalk mixture, $3\frac{1}{2}$ oz.; tincture of Jamaica ginger, $\frac{1}{2}$ oz.; laudanum, 1 drachm. Mix, and keep in a cool place. Shake the bottle before using. Dose for an adult, one teaspoonful as often as necessary; children, half dose or less.

LINSEED SYRUP. — To make linseed syrup for a cough, boil one ounce of linseed in a quart of water for an hour; strain it, and add to the liquid the juice of two lemons and a half pound of rock candy. If the cough is accompanied by weakness and loss of appetite, add half an ounce of powdered gum arabic. Set this to simmer for half an hour, stirring it occasionally. Take a wine-glass full whenever the cough is troublesome.

FLORIDA WATER. — The *Druggists' Circular* gives the following recipe:

Olei Lavandulæ	2 drachms.
" Bergamot	2 "
" Limonis	2 "
Tinct. Curcum.	1 drachm.
Olei Neroli	1 "
" Melissæ	30 drops.
" Rosæ	10 "
Alcohol, deodorized	2 pints.

LINT. — Next to cotton, the vegetable fibre most extensively used for textile fabrics is flax, the Latin name of which is *linum*, — hence come the names of linen and lint. The fibres of cotton and flax, viewed under a microscope, will be found to be different; the fibre of cotton is angular, or bladed, while that of flax (linen) is perfectly round and smooth. It is this difference in their natural formation that constitutes the superiority of linen over cotton as a material for dressing wounds, or as a fabric for clothing the body. Lint is the unwoven fibre of linen. By wear, and much washing, which it necessarily undergoes, linen becomes softer than when new; it undergoes a partial decay, and the much-prized linen eventually becomes "rag." In this state it is fit only to be converted into paper or lint. Lint is, in fact, the woolly fibre of old linen, "thrown" or slightly "felted" together (as manufacturers term it) into the material form so named. The flax plant yields not only linen by means of its fibre, but it also, by expression, gives a valuable oil from its seeds, known in commerce as linseed oil. The residue, after the oil is expressed, is called linseed cake, and is excellent food for cattle. Each product of the flax plant, both in peace and in war, has its value either as linen, linseed, or lint. — *Scientific American.*

PRIMITIVE MEDICAL PRACTICE. — A gentleman in Alabama, in exerting himself one day, felt a sudden pain, and fearing his internal machinery had been thrown out of gear, sent for a negro on his plantation, who made some pretensions to medical skill, to prescribe for him. The negro, having investigated the case, prepared and administered a dose to his patient with the utmost confidence of a speedy cure. No relief being experienced, however, the gentleman sent for a physician, who on arriving inquired of the negro what medicine he had given his master. Bob promptly responded:

"Rosin and alum, sir."

"What did you give them for?" continued the doctor.

"Why," replied Bob, "de allum to draw the parts togedder, and the rosin to sodder um."

The patient eventually recovered. — *Banner of the South.*

HOMER ON PHYSIC. — DOCTRESS THETIS. — Anæsthesia has been traced as far back as the exsection of the rib in the garden; and now comes a writer in the *N. Y. Medical Journal*, claiming for Homer a knowledge of the art of embalming. When Patrocles, a friend of Achilles, was slain, according to the Iliad, the body was washed and anointed with ointment nine years old, and laid on a bed and covered with fine linen from head to foot; and over all was spread a white mantle. The next day Thetis came and made a *post-mortem* injection into the body in order to preserve it, "and then she instilled into it through the nostrils ambrosia and ruby nectar, that his body might be uncorrupted." Thetis would appear to have been the first female physician. — *Pacific Med. and Surg. Journal.*

Boston Journal of Chemistry.

VOLUME VI. BOSTON, JUNE, 1872. NUMBER 12.

Familiar Science.

THE HOLTZ ELECTRICAL MACHINE.

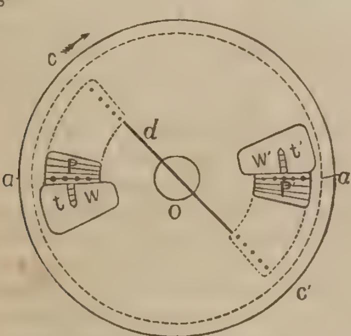
BY PROF. C. A. YOUNG.

UNQUESTIONABLY, one of the most remarkable of the scientific instruments which have originated within the last few years is the Holtz Electrical Machine, so named from the German physicist who invented it in 1865.

Those of our readers who have enjoyed the advantages of academy, high school, or college, probably recollect the old machines, in which the electricity is slowly produced by the laborious friction of a glass plate or cylinder upon a rubber coated with an amalgam of mercury and tin. In the new machine, on the contrary, the electricity is produced in quantities perfectly amazing to one familiar only with the old apparatus, and, without friction at all, solely by induction, or *influence*, as the Germans call it; indeed, in Germany, the instrument is commonly known as the "Influenz-electrir-maschine."

As originally devised by Holtz, the construction was essentially the following, though in the hands of different makers it has received various forms: —

By means of a pulley and multiplying wheel, a thin glass disc, varnished with shellac, and from 15 to 30 inches in diameter, is made to revolve swiftly behind a fixed plate of a little greater diameter, also of thin glass varnished, and as close to it as possible, without actually touching.



In the fixed plate two "windows" are cut out, as shown in the figure at w and w'. On the *front* side of this plate (remote from the revolving plate) are pasted two coatings or "armatures" of thin paper (indicated by p and p' in the diagram), just at the edges of the "windows," and to these paper armatures are attached two pointed tongues of card-board, t and t', which extend into the centre of the window spaces. The axis of the revolving disc passes freely through the centre of the fixed plate, which is perforated for the purpose at o.

Just *behind* the revolving plate, and opposite the paper armatures, are placed two "collecting combs," each consisting of a row of sharp metallic points directed towards the plate, indicated by the rows of dots at a and a' in the figure. These combs receive the electricity generated, and by suitable connections convey it to a pair of insulated conductors (not represented in the diagram), from which the sparks are obtained. Usually the conductors are provided with a pair of sliding brass rods, having knobs at each end to serve as electrodes, which can be pushed into contact, or separated to any desired distance.

The machine is put into operation by bringing the knobs together, and holding near one of the armatures a piece of ebonite previously electrified by rubbing with a cat-skin; a piece of glass, electrified by friction with silk, answers nearly as well. Then, if the air is thoroughly dry, on putting the plate into rotation in the direction of the arrow, a very few seconds will bring the machine into a state of intense excitement.

The plate, which before turned with perfect freedom, will move somewhat stiffly, as if it encountered a resistance; a peculiar rushing noise will be heard, a strong odor of ozone will be perceived, and if the room be dark, most beautiful fringes and stars of light will appear upon the points of the combs and the card-board tongues. When the machine is once in operation, the exciting ebonite may be taken away, and the activity will continue as long as the rotation is kept up.

On separating the electrodes a few inches, but not too far, a continuous stream of sparks will play between them, and if they are connected each to one of the coatings of a Leyden jar, the sparks will become intensely brilliant, though shorter and less frequent.

But although the power of the machine, even in this form, far surpasses anything before known, it is subject to some serious inconveniences. It is not possible to obtain from it sparks more than four or five inches long; and if the knobs are separated to a distance ever so little exceeding the striking limit, the machine almost instantly loses its activity, and must be excited anew. The same thing happens if it be allowed to stand unused for fifteen or twenty minutes.

These difficulties have been almost entirely removed by a slight modification introduced by Poggendorff a little more than two years ago. He extends the paper armature over an arc of about 60°, as indicated by the dotted lines in the figure, and adds a second pair of combs at c and c', which are connected to each other by the "diametral conductor" d — merely a stout brass wire.

Thus modified, a machine with a 16-inch plate, from which, under the former arrangement, nothing more than a 2½ or 3-inch spark could be obtained, gives easily 7 or 8 inches; the machine does not lose its activity, however widely the electrodes are separated (it is not necessary to bring them into contact even to excite it); and it may stand unused for hours in a dry room, and yet be ready to start at once into full action with a few turns of the crank.

The beautiful little instruments of this size, which Ritchie of Boston now sells for $35, are far more effective than the imposing machines with plates from 2½ to 3 feet in diameter, which twenty years ago used to adorn our apparatus rooms at prices ranging in those days of cheapness from $100 to $200. All these "influence machines," however, require for their successful working a dry atmosphere, and they are perhaps a little more sensitive in this respect than the frictional machines which they supersede.

More recently Poggendorff has combined these machines in pairs, with the best results. He puts together two such machines, driven by a single crank, back to back, at a distance of about a foot, having between them the ebonite insulating pillars, upon which the electrodes are mounted.

A machine of this description, made by Borchardt of Berlin, for Dartmouth College, with plates only twenty inches in diameter, gives simple sparks from 12 to 13 inches long, and Leyden-jar sparks of 9½ inches. The two Leyden-jars, mounted upon the top of the electrodes, are made of glass very nearly ½ inch thick, and have each a coated surface of about ⅔ of a square foot.

Ordinary jars of thinner glass, and exposing about one square foot of coated surface, are fully charged and discharged with a spark 2 inches long 75 times a minute. The frictional machine belonging to the college, — a very fine one of its class, with a plate 34 inches in diameter, — under the most favorable circumstances, can be made to do the same between 3 and 4 times a minute. The new machine is therefore something more than twenty times as powerful, and the labor of working it is incomparably less.

As yet these machines have not found any important technical application. Ozone, however, is already used to some extent in bleaching operations, and they furnish such quantities of this gas, with so little expenditure of power, that it would seem quite likely they may be made useful in this direction.

A discussion of the theory of their action would be unsuited to these pages; indeed, though in the main this theory is simple enough, and easily understood by any one acquainted with the laws of electrostatic induction, there are some peculiarities in their behavior which are not yet satisfactorily explained, and may require for their elucidation the discovery of some new law of electrical action.

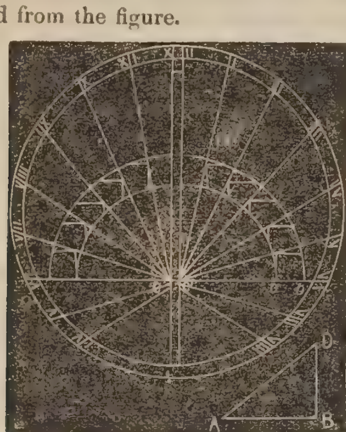
DARTMOUTH COLLEGE, *April* 2, 1872.

SUN DIALS.

A VERY pretty ornament for pleasure grounds, and one that is sure to attract a great deal of attention, is a sun dial. Any person with a little mechanical ingenuity may easily construct one that will give the time on bright days to within a very few minutes of the true time, though

of course this, being solar time, will differ from mean or clock time.

Sun dials may be vertical, horizontal, or equatorial. The latter is the most simple form, and consists of a circle divided into twenty-four equal parts, and so placed that its plane shall be parallel to the plane of the equator. The *style* is a fine wire perpendicular to this plane, or parallel to the line passing through the poles of the earth. The circle must of course be divided on both sides, as one half the year the sun will illuminate one side, and the other half the other side. The form in most common use, however, is the horizontal. In this the upper edge of the style is used for casting the shadow, and is made parallel to the lines passing through the poles, or in other words forms with the horizontal plane an angle equal to the latitude of the place. The construction of the dial will be readily understood from the figure.



First, construct the triangle ABD, making the angle at A equal to the latitude of the place. For instance, at Boston it would be equal to about $42\frac{1}{3}$ degrees.

Then at any convenient distance, such as B, make the angle B equal to a right angle.

Draw two parallel lines on the plate that it is wished to divide, at a distance apart equal to the width of the style, and through the points C and C', which may be one fourth the diameter from the centre of the plate, draw the line VI–VI perpendicular to these two lines; this gives the six o'clock line, the double line giving the twelve o'clock lines. Then with a radius equal to AD, draw quadrants from the points C and C' as centres; also draw quadrants with the radius AB from the same centres. Divide the quadrants into six equal parts. From each of these divisions on the outer quadrant draw lines parallel to the six hour line, and from each of the points on the inner draw lines parallel to the 12 hour line; through the point of intersection of these two lines draw lines from the centres C and C'. These will give the hour marks. In order to put the dial into position, it must be placed so that the 12 hour lines are parallel to the meridian; this may be readily done with a surveyor's compass, if the variation of the needle is known; or it may be adjusted at night, when the pole-star is visible, by placing it so that the style points directly towards it. A third method is to take a piece of board, and draw a number of concentric circles on it, and fix it firmly on the dial support; then drive in a short piece of wire in the centre of the board, so that it shall project above it three or four inches. This wire must be perpendicular. Now, observe it in the morning, and mark the places where the shadow of the end of the wire just touches in turn the various circles; repeat this observation in the afternoon. Bisect the chords connecting the two points on the same circle, and draw a line from this point to the centre of the circle; this will give the meridian line. By observing several circles and taking the mean of all the observations, the result will vary but little from the truth. The board may now be removed, and the dial placed in the same position. The style is made with the same angle as the triangle ABD, and is placed so that the angle A coincides with the six hour line. B falls a little short of the twelve hour mark. The marks for seven and eight in the evening, and four and five in the morning, are continuations of the corresponding morning and evening hours.

MICROSCOPICAL INVESTIGATION.

In the essay upon Vinegar in the March No. of the Journal, is found the following paragraph, to which Mr. Charles Stodder of this city appends some interesting comments: —

"How they ['ferment globules,' or the yeast plant] act, in the work of breaking up organic compounds like sugar, is not precisely understood. It is difficult to closely investigate the changes under the microscope, as the evolution of bubbles of carbonic acid in the saccharine solution is so copious that observation is in a great measure cut off."

That the work of "breaking up organic compounds," can ever be understood, explained, or seen under the microscope, is very problematical, but as yet there is no evidence before the public that the research has been conducted with the best modern resources of the microscopist. With one instrument of investigation, the inverted microscope, the object will be not under the microscope, but the microscope under the object. With this instrument the evolution of the gas will interfere much less with the observation of the processes going on. Then, most of the published accounts of investigations of this kind, in France and Germany, appear to have been made with instruments of the construction of ten, fifteen, or twenty years ago, with powers of 400 to perhaps 1,000 diameters. Now, *immersion* objectives of $\frac{1}{16}$ to $\frac{1}{50}$ of an inch focus, giving with ease powers from 1,600 to 10,000 diameters, are in constant use. It is not known that such instruments have ever been applied to this class of studies. They have given remarkable results in other investigations, and until they have been applied to the yeast plant, "morbid or germinal growths," etc., we do not and cannot know all that may be learned about them. It is with such instruments of the better quality that these organisms will have to be studied. Interest in microscopy is rapidly growing in this country. Hundreds of young men have procured their instruments. Here is a branch in which almost everything is yet to be learned, and fame and honors will be the reward of those who add to human knowledge.

Very few European microscopists, when publishing their results, ever describe the instruments they work with; as a general thing they merely say the object was magnified so many diameters, forgetting, or often not knowing, that 500 diameters with one instrument may be vastly inferior or superior to the same power with an instrument by another maker. Astronomers always record and publish the instrument *their* observations are made with. The microscopist ought to do the same. He should give the maker of his objective, its angular aperture, and *real focus*, not merely what the maker sold it for; for it is now a well-known fact that the instruments of some of the most renowned makers are really very different things from what the makers call them. In fact, in the words of Dr. W. M. Carpenter, "$\frac{1}{4}$'s are often $\frac{1}{5}$," and in the words of Mr. F. H. Wenham, "$\frac{1}{8}$'s are often $\frac{1}{9}$ or $\frac{1}{10}$, and sometimes $\frac{1}{12}$!" Thus the makers may obtain a reputation for the performance of a low power to which they are not entitled. C. S.

THE NATURE AND OPERATIONS OF INSTINCT.

The following is a summary of the leading points of Professor Chadbourne's Lowell Lectures on *Instinct* (noticed in our last number), with some of the illustrations given under the various heads: —

The nature of Instinct is not defined till its manifestations have been carefully investigated in all their diversity of modifications. It is at length defined to be "an impulse to a particular kind of voluntary action which the being needs to perform as an individual or representative of a species; but which he could not possibly learn to perform before he needs to act." It "includes all the original impulses, excepting the appetites;" and also includes "that knowledge and skill with which animals are endowed, which experience may call into exercise, but which it does not give." The appetites are regarded as functional and as proper conditions for the activity of certain instincts.

The operations of instinct are simulated in inorganic nature, and on a still higher scale in plant life. The Catch-fly pours out a sticky fluid which holds the smaller insects. The Venus's fly-trap puts forth leaves fashioned to act like barbs for holding their prey. The Pitcher-plant beguiles insects down into its deep cavern along hairs pointing downward that hinder retreat. The provisions for the fertilization of plants, for the diffusion of the seeds, and for the securing of them in places favorable to their germination and development, are in many cases exceedingly like instinct. Plants, like some animals, even become protectors to other species of life: as the oak forms a gall or oak-apple which serves as a home and food for the gall-fly.

The first connection of Instinct with these instinct-like processes is seen in the provision for the nourishment of the young animal life. The raising of the head and the opening of the bill to receive food by the young robin, to which the act of the parent bird in supplying the food is a corresponding act of instinct, is an example.

Pure instinct needs no experience. It goes before to preserve life until knowledge from experience is possible. It works by a wisdom of which its possessor has no apprehension. The theory of transmitted skill involves an ancestry certainly of marvellous ingenuity. How did they come by it? How did the species survive till these geniuses appeared? The theory of natural selection accounts for the survival of the fittest; but how does it account for that characteristic in the animal by which it preserves itself? Hibernating animals feed voraciously in the autumn, when food is abundant, and accumulate fat to an unwonted degree; instinct then leads them to their winter's retreat, when the whole vital activity is so reduced that life is maintained for months without food. How were the species preserved till the changes in structure and function corresponding to these hibernating habits were effected? Then we find some species of animals dependent for their preservation on other species. The caw-bird lays its eggs in the nests of other birds. The owner of the nest hatches the eggs and nourishes the young as its own. When mature, the foundling forsakes its home and all the birds it has ever known, to seek its own species, hatched in scattered nests, and mates and lives henceforth with them. Darwin tries to account for the hexagonal cell of the bee on the principle of economy. The bee wishes to save as much as possible of honey from going into wax. But

the question is, how came the bee to be a builder at all? Nor does the existence of the instinct to build such cells turn on the continuance of bee-life through the winter, as Darwin would have it. For some wasps, that perish every fall, leaving only eggs to perpetuate the species, build mathematical cells like honey bees.

Instinct is not infallible. It may be deceived. Flies lay eggs upon the carrion-plant, which has the odor of putrid flesh. Very young birds open their bills when any sound is made upon the edge of the nest. The hen mistakes a crystal of salt for gravel.

Animals learn from experience. The elephant, that has broken through a bridge, fears to trust himself upon another. The wild squirrel, when first caught, trembles with fear; he learns to trust his captor implicitly. The fox will dig out his trap and spring it, and then take all the bait. Animals also remember; they love and hate; they have an executive power of will. Man has instincts. The difference between man and the animal creation below him is, that in him intelligence rules instinct, while in them instinct rules intelligence. In animals instinct is the proper guide because the highest; in man instinct needs control. Man, besides, has higher instincts than animals. He has the sense of obligation, the grand instinct on which morality grounds itself. He has the sense of a relation to a higher being than himself. He has thus not only moral but religious instincts.

CURIOUS EXPERIMENTS WITH ICE.

Professor Bottomley, of Glasgow University, in a recent lecture to his class, placed a lump of ice as large as an apple on a piece of wire gauze, and on this a board, weighted with 12 pounds. Before the conclusion of the lecture, a considerable quantity of ice was found on the lower side of the gauze, firmly united to that above, though apparently forced through the meshes in a room at 15°C. (59°F). In a second experiment he placed a block of ice on two parallel boards near together, passed a loop of wire over the ice, and hung weights on the ends. Various sizes of wire were tried, and in the final experiment, a wire one tenth of an inch in diameter was used, weighted with 56 pounds. It passed entirely through the block of ice, and fell upon the floor; but this block of ice, though the plane of passage was clearly marked, was not divided, nor could it be split in this plane with a knife and chisel.

This remarkable result he explains to be a consequence of Thomson's theory of *regelation.* The stress upon the ice, due to the pressure of the wire, gives it a tendency to melt at the point in contact with this wire, and the ice, in the form of water intermixed with fragments and new crystals, moves so as to relieve itself of pressure. As soon as any portion of the mass is thus relieved, freezing takes place throughout it, because its temperature is reduced below that of the freezing point of water at ordinary pressures, by melting of contiguous parts. The obvious tendency of the ice under the pressure from above is thus, by a series of meltings and re-freezings, to allow the passage of the wire and yet remain a solid block.

NOTES ON SCIENTIFIC TOPICS.

The Vapor of Mercury. — Mercury is a very peculiar liquid, and it has been supposed that its vaporization presented some exceptional phenomena. Faraday considered that the metal ceased to give off vapor at a temperature of —7° C. (19.4° F.), and that at higher temperatures the vapor — contrary to the general law of diffusion of elastic fluids — forms a very thin layer over the surface of the liquid. The matter has lately been investigated anew by M. Merget, and the results are given in a paper published in the *Comptes Rendus.* He first attempted to find a reagent of greater delicacy than gold-leaf, which was the material employed by Faraday as the test of the presence of the metallic vapor. He finds that paper washed over with an ammoniacal solution of nitrate of silver, or with chloride of gold, platinum, palladium, or iridium, is capable of indicating the presence of infinitesimal traces of mercury, the action of the latter on either of the above metallic salts being to reduce the metal of these compounds, and thus form a more or less intense stain on the paper. By aid of this delicate test he has proved: "(1) that the vaporization of mercury is a continuous phenomenon, that it does not even cease on the solidification of the metal; (2) that the vapor possesses considerable diffusive power, which, though not measurable with exactitude, appears to attain a limit little short of that assignable to it by the dynamical theory of gases; (3) that like other elastic fluids, mercury vapor condenses on such substances as carbon, platinum, etc., which exert no chemical action on it, and that it passes with great facility through porous bodies, such as wood, porcelain, etc." M. Merget discusses numerous practical applications of the above principles, more especially "a method of photography without light," based on the above reducing action exerted by mercury on salts of certain metals.

A Substitute for the Spectroscope. — Herr Lommel has devised three very simple instruments, which, in his opinion, can be used, instead of the spectroscope, for the detection of substances by their colors or colored flames. He calls these the *erythrophytoscope*, the *erythroscope*, and the *melanoscope*, — names *not* very simple, nor, with the exception of the second, specially significant as Greek derivatives. In the first, two colored plates of cobalt blue and dark yellow oxide of iron glass are laid upon each other, and, by inserting them in black pasteboard, with a slit for the nose, something like a pair of spectacles is made of them. The combined glasses are only transparent for the ultra red, for yellow green, for blue green, and blue rays; and they cut off all other colors. Substances known to possess these colors, or to impart them to the flame of a spirit lamp or Bunsen burner, can be detected by viewing them through such spectacles. The *erythroscope* (that is, *red-seer*) consists of a cobalt glass and ruby glass, which allows only the ultra red, beyond Fraunhofer's line B, to pass. The third combination, called the *melanoscope*, consists of a dark red and clear violet glass, through which only the middle red tints can pass. Any one who possesses the facility of alternately using the right and left eye could employ two combinations at once, and thus cover nearly the whole length of the spectrum. For the use of students in laboratories, the inventor believes that this arrangement could be frequently employed for the detection and separation of a large class of bodies which give characteristic colors to flames; and that, by practice, the learner would soon be able to assign the true position to each color nearly as well as if he used the scale usually attached to the spectroscope. We doubt, however, whether the contrivance will prove of so much practical value as Herr Lommel anticipates.

Thermometrical Experiments. — The Providence *Journal* describes the following interesting experiments made in that city with an excellent glass-mounted thermometer.

In the house, with open windows, it stood at 90.2°. Out of doors in the shade, at 95°; freely suspended in the sun, six feet above the greensward, 99.5°. In the same position, with wet bulb, 79.9°: with bulb covered with black silk, 109.96°. When laid upon the grass in the sun, it rose to 104°. Laid upon white cloth, placed upon the grass, 105.0°, and when similarly placed upon black silk it indicated 113°.

The experiments with different colored coverings show very conclusively the utility of light-colored clothing for those who are obliged to be exposed to the direct range of the sun at high temperatures; and the experiment with the wet bulb shows as clearly the value of free perspiration in keeping down the temperature of the body, which, however, the observer finds in his own person, notwithstanding the perspiration while making these experiments, to have risen to 100.5°, which is about two degrees above the usual standard for cooler days. The average temperature of the healthy human body throughout the year, in temperate climates, is 98.4°; while in tropical regions it is about one degree higher.

Spontaneous Generation. — The controversy concerning the possibility of the development of low forms of organic life from inorganic matter still continues. Volumes have been written on the subject, and many more will doubtless be written before the contest comes to an end. "The issue of the question," as the *Christian Union* remarks, "has no direct bearing upon theology. Christian philosophers are too enlightened now to accuse the microscopist or chemist of atheism and blasphemous ambition to become a creator, because he watches the conditions of the activity in nature of the Power which we believe to be divine. This absurd denunciation has been indulged; but we have grown wiser in regard to the true spirit of science. If certain inorganic matters brought together under certain conditions will give rise to life, the experimenter who brings them together is no more a creator of life than if he introduced organic germs to produce it. In both cases he is merely an observer."

It is a curious fact, by the by, that when Redi, in the seventeenth century, promulgated the doctrine that life can only proceed from life (*omne vivum ex vivo*), he was accused of contradicting the Scriptures, which asserted that bees were generated from the body of a dead lion.

Our readers may thank us for defining some of the polysyllabic names by which the various theories on this subject are known. *Biogenesis* is the general term for the production of life from life; it includes *homogenesis*, or the reproduction of similar forms, *xenogenesis*, or the generation of something foreign and permanently different from the parent form, and *heterogenesis*, which is properly the same as the foregoing, but has been used to denote the production of different kinds of young. *Abiogenesis*, or the origin of life without antecedent life, is the better term for "spontaneous generation." Dr. Bastian employs for the assumed origination *de novo* of certain monads the term *archebiosis*.

HOUSEHOLD HINTS.

To Restore Scratched Furniture. — Scrape one pound of beeswax into shavings in a pan; add half a gallon spirits turpentine, and one pint linseed oil. Let it remain twelve hours, then stir it well with a stick, into a liquid; while stirring, add one quarter pound shellac varnish and one ounce alkanet root. Put this mixture into a gallon jar, and stand it before the fire, or in an oven, for a week (to keep it just warm), shake it up three or four times a day. Then strain it through a hair sieve and bottle it. Pour about a teaspoonful on a wad of baize, go lightly over the face and other parts of mahogany furniture, then rub briskly with a similar wad dry, and in three minutes it will produce a dark brilliant polish unequalled.

Another preparation may be made as follows: Make a mixture of three parts linseed oil and one part spirits of turpentine. It not only covers the disfigured surface, but restores wood to its original color, and leaves a lustre upon the surface. Put on with a woolen cloth, and when dry, rub with woolen.

A Noiseless Way of Feeding a Coal Fire. — You know what a racket is caused, even by the most careful hand, in supplying coals to a grate or stove, and how, when the performance is under-

taken by Biddy, it becomes almost distracting. If you don't remember, take notice the first time you are ill, or you have a dear patient in your care, or the baby is in a quiet slumber. Let some one bring on her coal scuttle or shovel, and revive your recollection. Well, the remedy we suggest is to put the coals (or coal?) in little paper bags each holding a shovelful. These can be laid quietly on the fire, and as the paper ignites, the coals will softly settle in place. You may fill a coal-scuttle or box with such parcels ready for use. For a sick room, a nursery at night, or even for a library, the plan is admirable. Just try it. Besides, it is so cleanly. If you don't choose to provide yourself with paper bags, you can wrap the coals in pieces of newspaper at your leisure, and have them ready for use when occasion requires. — The above suggestion from an exchange is worth making a note of.

Hard and Soft Water for Cooking. — The effects of hard and soft water in cooking vegetables vary materially. Peas and beans cooked in hard water, containing lime or gypsum, will not boil tender, because these substances harden vegetable caseine. In soft water they boil tender, and lose a certain rank, raw taste, which they retain in hard water. Many vegetables (as onions) boil nearly tasteless in soft water, because all the flavor is dissolved out. The addition of salt often checks this (as in the case of onions), causing the vegetables to retain the peculiar flavoring principles, besides much nutritious matter which might be lost in soft water. Thus it appears that salt hardens the water to a degree. For extracting the juices of meat to make a broth or soup, soft water, unsalted and cold at first, is best, for it much more readily penetrates the tissues; but for boiling meat where the juices should be retained, hard water or soft water salted is preferable, and the meat should be put in while it is boiling so as to seal up the pores at once.

Fastening Loose Window Sashes. — The most convenient way to prevent loose window sashes from rattling when the wind blows, is to make four one-sided buttons of wood, and screw them to the stopes which are nailed to the face-casings of the window, making each button of proper length to press the side of the sash outwards when the end of the button is turned down horizontally. The buttons operate like a cam. By having them of the correct length to crowd the sash outwards, the sash will not only be held so firmly that it cannot rattle, but the crack which admitted dust and cold air will be closed so tightly that no window-strips will be required. The buttons should be placed about half way from the upper to the lower end of each stile of the sashes.

Cucumber Salad. — A lady correspondent of *Hearth and Home* says: "We have just prepared our winter's supply of cucumber salad, and this is how we made it: There were about a dozen ripe "White Spine" cucumbers lying on their vines, and these we picked, washed, pared, cut into strips, taking out the seeds, and then to each dozen cucumbers — which we cut up into pieces like small dice — we put twelve large white onions, chopped, six large green peppers, also chopped, one quarter pound each of black and white mustard seed, and a gill of celery seed. These were all mixed together, a teacup of salt added, and they were then hung up in a cotton bag to drain for twenty-four hours. Then the salad, with enough clear cold vinegar added to cover it, was put into stone jars and fastened nearly air tight. In six weeks it will be fit for use. It looks as well as it tastes, so white and crisp, and makes an elegant salad for a joint of cold meat. It is not like the Spanish salad, that requires 'a counsellor for salt, a miser for vinegar, a spendthrift for oil, and a madman to stir it up,' but it is quite as good in its way, and not very troublesome to make."

The Arts.

ALLOYS OF COPPER AND ZINC.

These two metals will mix with each other in all proportions. The color of the alloy varies with the proportion of zinc present, from almost copper red to zinc white. The alloys are made by mixing granulated copper and zinc in proper amounts, placing the mixture in black lead or Hessian crucibles, and putting these in a suitable furnace. The alloy must be removed as soon as melted, since by exposure to a high temperature it loses zinc.

Several of these alloys have received distinctive names. *Pinchbeck* contains 6 or 7 parts of zinc to 93 or 94 parts of copper. It has a reddish color, resembling red gold, and was formerly much used for cheap watches and jewelry. When pale gold became fashionable, the alloy was also changed, and it was called *oreide;* this consists of 10 parts of zinc to 90 of copper. Another alloy which is frequently used as a base for gilded articles is called *tombac*, and contains from 20 to 30 parts of zinc, and 70 to 80 of copper. *Dutch gold*, which is used for imitation of gilding, is composed of 14 parts of zinc, and 86 of copper. This is malleable, and can be hammered into very thin sheets.

Brass contains 33.3 parts of zinc, to 66.7 parts of copper, varying, however, somewhat from those proportions according to the use that is to be made of it. It has several advantages over pure copper, besides being cheaper. It is much easier to work in the lathe, being harder and not so tough. It will also make perfect castings, which are hard to obtain from pure copper. A little lead is frequently added to brass, as it is not so tough, and does not clog the file, when containing about one per cent. of this metal. *Prince metal* and *mosaic gold* are of the same composition as brass.

Ormolu contains equal parts of copper and zinc. *Muntz* or *yellow metal* differs from other brass in that it may be rolled when hot; it contains 40 parts of zinc to 60 of copper. The ordinary hard solder for brass may be made by melting two parts of brass with one of zinc.

Sterro metal contains, besides copper and zinc, a little tin and iron; it is very hard, and has been proposed as a substitute for yellow metal in sheathing ships. *Mallet's brass*, which is used for protecting iron from oxidation, contains 25.4 parts of copper, to 74.6 of zinc.

MEMORANDA IN THE ARTS.

Iron Ship-Building in Denmark. — The building of iron ships appears to be rapidly becoming an important branch of industry in Denmark. Although for the last fifteen years small iron vessels, designed for trading between the various Baltic ports, have been built at Copenhagen, it is only recently that the construction of large steamers has been attempted. At present several of 1,000 tons are being built, and one of these, it is stated, will be employed in laying down the telegraph cable between China and Japan. Two steamers, each of nearly 900 tons — the *Rolf* and the *Thorwaldsen* — have just made the passage to New York, and these are said to be the first iron vessels built in Denmark which have ever entered that port.

Iron-Clads at a Discount. — It has been suggested that the admirers of the old wooden line-of-battle ship, with its hearts of oak, and the thousand memories that song and romance have helped to endear, will pluck up spirit again from a rather provoking accident that has happened to one of the best of the British iron-clads. The *Hotspur*, commanded by Lord John Hay, was run into by what the *Army and Navy Gazette* describes as an "old Dublin pig-boat," and besides having her ports and boats carried away, "was mauled so severely" as to be obliged to put into harbor for repairs. The old pig-boat, on the other hand, appears to have sustained no injury at all, and went on her way without any difficulty. It will be remembered that at the battle of Lissa the most formidable iron-clad in the Italian Navy was run down and sunk by Admiral Tegethoff in a wooden vessel. The same thing, if we mistake not, occurred in our own war. It would seem, therefore, that iron-clads are not yet invincible even to unarmored antagonists.

A Big Clock. — The clock on the Parliament Houses in London is the largest in the world. The four dials of this clock are twenty-two feet in diameter. Every half minute the point of the minute hand moves nearly seven inches. The clock will go eight and a half days, but it only strikes for seven and a half, thus indicating any neglect in winding it up. The pendulum is fifteen feet long, the wheels of cast-iron, the hour bell is eight feet high and nine feet in diameter, weighing nearly fifteen tons, and the hammer alone weighs more than 400 pounds. This clock strikes the quarter hours, and by its strokes the short-hand reporters in the Parliament chambers regulate their labors. At every stroke a new reporter takes the place of the old one, whilst the first retires to write out the notes he has taken during the previous fifteen minutes.

Bleaching Ivory. — Ivory is bleached by exposure to sunlight. For piano makers and others, it is prepared by first sawing it into thin sheets or plates. These are placed on suitable frames under glass, and exposed to light for several months. The frames are of peculiar construction and patented. They are so arranged as to shift, thus reversing the exposure of the ivory, so that both sides may be duly acted upon by the light.

The Petroleum Supply. — The London *Chemist and Druggist* remarks that, however soon the English supply of coal may be exhausted, it is certain that the world contains petroleum enough to last until the grandchild of the latest born baby shall no longer care for light or heat. It has not been thought necessary to carry the calculation farther, for the most strained courtesy would hardly insist that we should interest ourselves in a generation remoter than the one we have named. The oil is at present obtained from a certain limestone, which is to be found throughout the United States, and it is highly probable that if this should ever be exhausted, a still more abundant supply will be found in other strata. It would not seem that the petroleum originates in this limestone, but that the latter is merely saturated with it. In the neighborhood of Chicago there are enormous deposits of this oil-bearing limestone. The least thickness of the mass is thirty-five feet, and it has been estimated from experiment that each square mile of it contains 7⅜ million barrels, each of forty gallons, of petroleum. As a means of comparison, it may be stated that the total product of the great Pennsylvania oil-region from 1860 to 1870 was twenty-eight million barrels. Four square miles of the Chicago limestone contain a greater quantity.

Keeping Fish Fresh with Sugar. — A method adopted in Portugal for preserving fish consists in removing the viscera and sprinkling sugar over the interior, keeping the fish in a horizontal position, so that the sugar may penetrate as much as possible. It is said that fish prepared in this way can be kept completely fresh for a long time, the savor being as perfect as if recently caught. A tablespoonful of sugar is sufficient for a five-pound fish.

GOLDEN RECIPES.

GOLD POWDER. — Gold powder for gilding may be prepared by putting into an earthen mortar some gold leaf, with a little honey or thick gum water, and grinding the mixture till the gold is reduced to extremely minute particles. When this is done, a little warm water will wash out the honey or gum, leaving the gold behind in a pulverulent state.

Another way is to dissolve pure gold, or the leaf, in nitro-muriatic acid, and then to precipitate it by a piece of copper, or by a solution of sulphate of iron. The precipitate (if by copper) must be digested in distilled vinegar, and then washed (by pouring water over it repeatedly), and dried. This precipitate will be in the form of a very fine powder. It works better, and is more easily burnished than gold leaf ground in honey as above.

GOLD VARNISH. — Turmeric, 1 drachm; gamboge, 1 drachm; oil of turpentine, 2 pints; shellac, 5 ounces; sandarac, 5 ounces; dragon's blood, 7 drachms; thin mastic varnish, 8 ounces. Digest with occasional agitation, for fourteen days, in a warm place, then set aside to fine, and pour off the clear.

GOLD SIZE. — Yellow ochre, 1 part; varnish, 2 parts; linseed oil, 3 parts; turpentine, 4 parts; boiled oil, 5 parts; mix. The ochre must be reduced to the finest powder, and ground with a little of the oil, before mixing.

EXPLOSION OF STOVES HEATED BY NAPHTHA. — The *Gas-light Journal* says: "We hear of numerous instances of the explosion of stoves in which the light oils of petroleum were employed as the source of heat. Several persons have been burned to death, and a large amount of property has been destroyed by fire. Notwithstanding these fatal accidents the sale of the dangerous oil goes on, and the patent lamps and stoves are sent all over the country. We must again utter a note of warning, and remind our readers that it would be quite as wise to try to burn gunpowder in a stove, as it is to use naphtha for heating purposes. By means of a very ingenious apparatus, and the practice of great skill, Bunsen burned gunpowder and analyzed it; that is no reason why everybody else should repeat the experiment. It is equally possible to burn naphtha and explosive oils in lamps and stoves, but as the precautions to be observed are numerous and difficult of execution, no one but the best trained chemist ought to venture to use these liquids for heat or light. The sale of such articles to the public ought to be prohibited by the most stringent laws."

TO CLEAN LAMP CHIMNEYS. — When you wish to clean a lamp chimney, hold a linen cloth against one end of the chimney and place the other end in your mouth; breathe in it until it is covered inside with moisture, push the cloth into the chimney with a smooth slender stick, and rub it around until the moisture is absorbed; repeat the process and breathe over the outer surface also; rub this with a cloth until dry, and you have a clean, bright chimney. Soft newspaper will take the place of a linen cloth. Do not use cotton cloth on any glassware.

ALL IS NOT GOLD THAT GLITTERS. — If the following is not true, any practical chemist will bear testimony that it is at least *ben trovato*. A verdant-looking Vermonter appeared at the office of a chemist with a large bundle in a yellow bandanna, and opening it, exclaimed: "There, doctor, look at that." "Well," said the doctor, "I see it." "What do you call that, doctor?" "I call it iron pyrites." "What, isn't that gold?" "No," said the doctor, and putting some over the fire, it evaporated up the chimney. "Well," said the poor fellow, with a woe-begone look, "there's a widder woman up in our town has a whole hill of that, and I've been and married her!"

Agriculture.

HOW GYPSUM ACTS UPON SOILS.

A VERY interesting discussion followed the delivery of the address we gave at the Fall River meeting of the Massachusetts State Board of Agriculture last autumn, at the close of which we remarked: "There are certain points in husbandry which ought to be assumed as *settled*, and when a matter is settled it ought not to be continually opened and brought back again into the field of controversy. This is too much the case with matters connected with our agricultural operations. In this industry there are certainly some established principles or facts which should serve to guide us, and we must seize hold of them and hold on to them, and add as many more as we can. In this way agriculture will be brought to as near a scientific basis as is possible."

President Chadbourne, of Williams College, in replying to these observations, assented to them in general, but he thought that "with all our science and all the general rules we can lay down, there are still very many things which we do not understand in farming." He instanced the fact that we did not yet know why gypsum or plaster would produce remarkable effects on one piece of land and not on another. He stated that he had applied it to his own fields with no good results, and he could not understand the cause of failure.

The exact way in which gypsum produces its fertilizing effects is not well understood, although it is understood that the chemical changes or transformations which occur when it is brought in contact with soils are not of a uniform or fixed character. Upon the conditions which exist, as regards the presence of vegetable matter and moisture, depend the changes that take place. We have proved by actual experiment that gypsum is capable of absorbing ammonia from the air and also from decomposing vegetable matter, being thereby changed into hydrosulphide of ammonium; and this again may be changed into carbonate of ammonia by absorption of carbonic acid from the air. These changes take place when gypsum is brought in contact with moisture and vegetable matter. Whatever other decompositions may take place under different circumstances, this must be regarded as the most important, as from it plants are supplied with food of the highest value. From these ascertained facts we should infer that plaster must prove highly serviceable to moist, mossy hills, and also to meadows not too wet, and this has proved correct so far as our observations extend. Often we have found that the *north* side of a hill will be greatly benefited by plaster, while upon the southern exposure it has no perceptible effect. This is due to the fact that the northern slope is cooler, or oftener in shade, and has more moisture, and a larger amount of partially decayed vegetation, to aid in the promotion of those chemical changes to which we have alluded.

It is certain that it does not matter so much what may be the nature of the soil to which we apply plaster, as external agencies are principally concerned in fitting it for plant food.

While the question as to how plaster acts in all cases as a fertilizer cannot be regarded as fixedly *settled*, yet we have certain facts to guide us in its application which are of the highest importance. With what we know, it would be absurd for a farmer to apply the agent to a dry silicious plain, or to a hot, impoverished hill; and also it would be unwise to sow it upon a meadow which is covered by water six months in the year. It must also be observed that the season has much to do with the effects of plaster. During the past three or four seasons of extreme drought, its application has notably failed upon almost all fields, but as soon as we have continued moisture through the summer months, it will manifest its influence upon vegetation.

Plaster may be applied with confidence to pastures and fields which are strong enough and moist enough to sustain a good growth of deciduous trees. Pine lands are not usually benefited by it. A hillside where moss will grow so as to crowd out good grasses is usually promptly benefited by plaster, and the white clover comes in at once. These suggestions we think may serve as an imperfect guide in applying a cheap and important fertilizing agent to our fields, and also serve to show that we are not entirely in the dark respecting one of the most obscure problems connected with husbandry.

INTERESTING FARM EXPERIMENTS.

WE have been greatly interested in the report of some experiments made by Mr. C. D. Hunter, chemist, at the farm of our friend Wm. Lawson, Esq., Cumberland, England. This is the well known "Blennerhasset" farm, which, during the past five years, has been largely devoted to experimental purposes under the direction of Mr. Hunter. His experiments have been conducted with much care, and extend over a wide field. On seeds, nitrate of soda applied alone, in 1868–1871, gave, as the average of the four years, 54 stones of hay for every cwt. of manure applied; when used along with superphosphate and muriate of potash, it gave 58 stones of hay per cwt. Sulphate of ammonia used alone gave 50 stones (a stone is 14 pounds) of hay per cwt., and in conjunction with mineral manure $48\frac{1}{2}$ stones. Peruvian guano, again, used alone for three years, gave about eight stones less than sulphate of ammonia for the same period, or equal to 42 stones; and in mixture it gave equal to 30 stones. Nitrate of soda, it will be seen, proved the best nitrogenous manure for hay, and also went furthest when used along with a mineral manure. On a clay soil only one experiment was tried last season. The land was in a very poor condition; the unmanured crop weighing only about 10 cwt. per acre. On this poor clay sulphate of ammonia proved superior, giving when applied alone a return of 65 stones per cwt. of manure, and with superphosphate and muriate of potash 95 stones. Nitrate of soda gave alone 39 stones of hay, and in mixture 66 per cwt. The experiments on oats are fairly trustworthy, but having been tried on but one soil and under the unusual conditions of three years on the same land, they must not be regarded as entirely applicable to ordinary farming. From a want of reliable no-manure and mineral-manure plots for comparison the figures given may be, as a whole, a little too high or too low; but the comparisons between the three manures are quite exact. Applied alone, sulphate of ammonia proved superior for oats; and, taking its return per cwt. of ma-

nure at 12 stones of corn, Peruvian guano gave 11, and nitrate of soda nearly seven stones. Applied in conjunction with mineral manure, nitrate of soda proved superior; and, taking its return per cwt. at 20 stones, sulphate of ammonia gave 18, and Peruvian guano 17 stones. It is rather curious to find nitrate of soda last when used alone, and first when in mixture. One point seems, however, pretty well established, namely, that sulphate of ammonia and Peruvian guano proved of nearly equal value in both cases. The guano used was the Chincha Island of best quality, the supplies of which are now exhausted; but any guanos containing over six or eight per cent. of ammonia will prove a good corn manure. Barley was also experimented with for three years upon the same soil: the same remark applies to this as to oats, namely, that the weight, as a whole, may be a little too high or otherwise, but that the comparisons are just enough. Nitrate of soda here takes a decided lead all through, and, taking its return per cwt. of manure at 20 stones of corn, Peruvian guano gives only nine stones. Sulphate of ammonia was not tried alone, but in mixture proved superior to Peruvian guano: thus, nitrate of soda used with mineral manure gave about 14 stones of corn, sulphate of ammonia 11½, and Peruvian guano about seven stones per cwt. of nitrogenous manure. This shows nitrate of soda twice as valuable for barley as Peruvian guano, and slightly superior to sulphate of ammonia. On potatoes he experimented very largely, and has, from over 400 trials, a number of very valuable facts bearing upon the seed cultivation and manuring for this crop. An average of six very reliable plots gives 161 stones of potatoes as the produce per cwt. of sulphate of ammonia, used in conjunction with superphosphate and nitrate of potash; Peruvian guano, in the three years' trial against this, gave equal to 99 stones, and nitrate of soda 39 stones. Some other experiments place nitrate of soda still lower, and two trials with Peruvian guano used alone, give 84 stones per cwt. of manure, but these are not strictly comparable with the others, being on different soil each year.

From the foregoing experiments on the action of nitrogenous manures, it is evident that the value of a manure is affected by the source of its nitrogen as well as by its amount, and that a statement of the raw materials used in making the manure is essential to a correct estimate of its value. An analysis protects the farmer from adulteration, and a composition may protect him from misapplication: thus, if these results hold good on the generality of light soils in Cumberland, it is evident that a potato manure containing nitrate of soda is much inferior to one containing sulphate of ammonia, though both may analyze the same percentage of nitrogen; four per cent. of this being supplied by either 16 per cent. of sulphate of ammonia or by 26 of nitrate of soda. Again, suppose two grass manures, and let one contain 30 per cent. of nitrate of soda; this would make it analyze about four and two thirds per cent. of nitrogen, and it would be better value for light land than one analyzing five per cent. of nitrogen furnished by 20 per cent. of sulphate of ammonia, though the latter — if the one experiment on clay land proves of general application — would be of more value again for stiff soils.

POTASH IN CORN COBS.

Several months ago we published the results of analysis of corn cobs raised at Lakeside farm, with the view of showing their nutritive value. The ash constituent of the cobs was not alluded to, although some interesting facts may be stated regarding it. The corn cob is very rich in potash, and it has been suggested that our supplies of the alkali might be greatly increased, if all the cobs produced in the country were collected, burned, and the ash lixiviated to procure the potash. The average amount found in the ash of cobs is about 7½ pounds of the carbonate in the hundred, which is twice as much as is found in the ash of the willow, the richest of all woods in this salt. If it were practicable to procure and remove the potash from all the cobs grown in the United States, it would indeed constitute a mountain of the valuable alkali.

The corn crop of the United States, for 1870, was 1,094,000,000 bushels, of which amount

Illinois yielded	201,378,000	bushels.
Indiana "	113,150,000	"
Missouri "	94,990,000	"
Iowa "	93,415,000	"
Making a total of	502,933,000	bushels.

in four States alone.

The corn crop of the whole country, for 1871, was 1,100,000,000 bushels, which, at 14 pounds cobs to the bushel, will yield 15,400,000,000 pounds, or 7,700,000 tons of cobs, containing an average of three fourths per cent. pure carbonate of potassa. We have the enormous quantity of 115,500,000 pounds of that valuable alkali lost to commerce annually, which, if thrown into trade, would add very largely to the general resources of the country.

A VERY GOOD COMPOST.

A very good fertilizing compound is manufactured by using the following substances according to the directions given. The mixture has been called "Liebig's great Fertilizer," as it is stated that it originated with him. This is doubtful, but it is a very judicious and sensible combination nevertheless, easy to prepare, and cheap. It will prove serviceable for corn, wheat, and the other cereal grains, and also for grapes.

This amount will do well, applied to one or two acres, and it will cost not far from $16: —

1. Dry peat, twenty bushels.
2. Unleached ashes, three bushels.
3. Fine bone dust, three bushels.
4. Calcined plaster, three bushels.
5. Nitrate of soda, forty pounds.
6. Sulphate of ammonia, thirty-three pounds.
7. Sulphate of soda, forty pounds.

Mix numbers one, two, and three together; then mix numbers five, six, and seven in five buckets of water. When dissolved, add the liquid to the first, second, and third articles. When mixed, add fourth article.

WHEAT LANDS IN ENGLAND AND RUSSIA.

In the eleventh century the average production in wheat per acre, in England, was stated to have been only 6 bushels. To-day the average in England is 27 bushels. This progress is due to our having more knowledge about agriculture. We know more about soils, about implements, manures, etc., than in the olden time. One reason for the advancement we see, is the improvement in our agricultural implements. Thus the plough has been wonderfully improved over what it was in Europe in the Middle Ages.

It is knowledge that men want. The difference between England of five centuries ago and of to-day, is a difference in knowledge. Knowledge has enabled England to multiply many times the products of agricultural operations, and also to multiply the number of human beings she can support. Much of this knowledge is traditional, but it is also preserved in the records — the writings of those who have studied those subjects.

In England to-day there are no exhausted lands; they are not allowed to deteriorate. What is taken off is supplied again, and this is the only true economy. We cannot take away from our land, and not restore, without injuring the soil.

Russia, unlike England, seems to be following in the footsteps of this country in the neglect of her wheat lands, and, as a consequence, complaints are already being made that the average yield of her grain crops is constantly growing less. There, as the *Scientific Press* says is the case in California, valuable farmyard manure is, in many places, being conducted to the nearest waste ground or stream as a nuisance. Still, Russia is buying largely of reaping and threshing machines, as well as other agricultural machinery.

SEEDS AND CUTTINGS.

Small Farms at the South. — The *Journal of the Farm* remarks, that at length the popular mind of the South appears to be awakened to the fact, that small farms, instead of unwieldy plantations, are the great need of that section. The worn-out condition of the majority of these overgrown farms is the strongest argument against them, and in fact the only one that need be advanced. If the owners of these large tracts would sell off one half, and devote the proceeds to the improvement of the remainder, the beneficial results would be seen in a very few years. This is especially applicable to Virginia, where the spirit of agricultural improvement is manifesting itself in a most gratifying manner, and it is in this State that the disposition to cultivate fewer acres, and cultivate them better, is beginning to be largely developed. There are, therefore, or are likely to be, large quantities of excellent land in the market for sale, which can be purchased at very moderate figures, and which should attract the attention of those who are seeking investments of this character. With smaller farms, and an increased population in consequence, there is no reason why the Old Dominion should not again assume her rightful position in an agricultural sense.

Dairy Products. — Statistics show that the value of the annual products of milk is nearly equal to the value of imports for the year ending June 30, 1871. Milk, consumed as food, at three cents a quart, is worth annually $275,000,000; butter, $195,000,000; cheese, $29,000,000; condensed milk, and whey and buttermilk, used in raising pork, $10,000,000; making a total of $509,000,000. The imports of all kinds are worth $520,000,000. So that from American cows' udders is squeezed every twelve months an equivalent to one fifth of the national debt. All the greenbacks and the postal currency in the country could buy only four fifths of it.

Bass-wood for Drains. — The *American Rural Home* says that Mr. Root, a leading farmer in western New York, finds bass-wood (ordinarily one of the most perishable of all kinds of wood) is one of the best sorts of timber for underground logs or pipes for conveying water over farms. He claims that bass-wood soaks full of water, and is constantly saturated — a condition well known to favor durability. He has three hundred rods of water pipe made of bass-wood saplings, now laid nine years, and perfectly sound.

Boston Journal of Chemistry.

Jas. R. Nichols, M. D., *Editor.*
Wm. J. Rolfe, A. M., *Associate Editor.*

BOSTON, JUNE 1, 1872.

THE JOURNAL.

This number of the Journal closes Volume VI., and we take the opportunity of thanking our numerous friends and patrons for their most generous support. During a period of six years the Boston Journal of Chemistry has continued its monthly visits to thousands of happy homes, and its readers are scattered from the wild regions of Alaska to the verdant glades of Florida. In every State and Territory of the United States, and in many of the countries of Europe, and to Australia, South America, Sandwich Islands, etc., the Journal has found its way during the past six years; and this has been accomplished with but little effort on our part. Its mission is to supply valuable scientific facts and information to all intelligent readers, to improve and elevate the masses, and render life happier. We have abundant evidence that in this work it has been successful, and so, although wearied with other cares and responsibilities, which in themselves would seem a sufficient burden, we shall continue to labor for the benefit of our readers, so far as strength will permit.

PATRONS IN ARREARS.

We have the names of a few patrons upon our books who have not paid for the present volume of the Journal, and also there are a number who are in arrears for two years. We have placed in the papers directed to them bills, to which we trust they will give prompt attention, as it is important that our accounts should be adjusted at once.

ACROSS THE BIG FERRY.

We design to spend a few months in Europe the present season, leaving in the *Siberia*, June 4th. The many exacting cares and responsibilities which have crowded upon us during the past ten years have so far exhausted our energies that relaxation is necessary. We shall leave the Journal in good hands, and hope upon our return to have secured a store of strength and information which will enable us to make the paper more attractive and useful.

WHOLESALE POISONING FROM THE USE OF A "PATENT SANITARY WATER PIPE."

It appears from the following statement published by the Board of Health of the city of Sacramento, Cal., that the citizens have been suffering severely from the poisonous effects of a new "sanitary composite" water pipe used for conducting water into dwellings in that city: —

In the discharge of their duties, both officially and professionally, the Board of Health deem it incumbent on them to publish the following statement: —

No less than seventeen cases of illness, presenting all the most unequivocal signs and symptoms of lead-poisoning, have come to our knowledge within the last month in this city. Most of these cases have partaken of the characteristics of slow, chronic poisoning, clearly diagnosticated in lead, from ordinary colic, by a blue line on the dental edge of the gums, whilst some of them have been suffering terribly for several months, previously to our becoming cognizant of the fact, with intense muscular pains and loss of power, more or less approximating paralysis — all of them occupying residences supplied with water from pipes made of a patent composite metal, advertised and known as a "sanitary water pipe." It is here proper to remark, that the earlier symptoms of this affection are so obscure in their origin, and simulate so closely other diseases of the stomach and bowels, that physicians are frequently in doubt as to the true nature of the cause of suffering until sufficient time has elapsed to obtain positive signs of metallic poisoning — lead, which is the most easily dissolved metal in water, and at the same time most poisonous in minute quantities, being a cumulative poison. In no single instance referred to above had the patient not been subjected to the action of the water served from the aforesaid composite metal pipe; and not a solitary case has been heard of, in the whole city, of symptoms coördinate with those described, where the old lead pipe had been in use.

As soon as our suspicions became aroused as to the cause of suffering, directions were forthwith issued to discontinue the use of the water supplied by the composite pipe, when a steady and happy alleviation of the most urgently distressing symptoms — such as the dragging and twisting pain of the bowels, the obstinate constipation, and, in the worst cases, vomiting — ensued. Under these circumstances a meeting of the Board of Health was called, and the whole matter confided to the hands of our secretary, with a request that he would make such an investigation as the emergency rendered necessary, and report the result to the board. We now beg leave to call attention to the following very satisfactory report which has been adopted by us, and which, it will be observed, not only confirms the correctness of the suspicions that were entertained, but also positively establishes the fact that the composite pipe in question is not only detrimental to the health of our citizens, but is also dangerous to life, and should under no conditions be employed in distributing the waters, at least of the Sacramento River.

(Signed) I. E. Oatman, M. D., President.
F. W. Hatch, M. D.
W. R. Cluness, M. D.
G. L. Simmons, M. D.
Thos. M. Logan, M. D., Secretary.

The water passing through these pipes was analyzed by J. F. Rudolf, chemist, and found to contain both lead and arsenic in notable quantities. It does not appear from the reports of the chemists, secretary, or Board of Health, that any investigation has been made into the nature of the "composite sanitary pipe," and so we are left in the dark regarding a most important point. It may be the highly "sanitary" galvanized iron pipe, or the "brass pipe," or (which is more probable) it may be a "new invention" of some genius whose ignorance or stupidity has led to the poisoning of a whole community.

It is very strange indeed that intelligent people are so easily duped and deceived. It would not seem possible, when contemplating the extraordinary advantages which are afforded for acquiring knowledge, that an irresponsible adventurer could appear in any city or town, and induce the inhabitants to use a service pipe for water conduction, constructed of different metals of unknown character. It seems unaccountable that a single foot of the filthy, dangerous, zinc-covered pipes, could have been used for water conduction in any part of New England; and yet, in the city of Cambridge, which has within its precincts the most famous university in the country, it has been employed to a considerable extent. It is true cultivated people are not all medical men or chemists, but it is reasonable to infer that education of any kind must lead to the exercise of proper caution upon all matters which involve sanitary results. An education which does not enable persons to discriminate between the preposterous pretences of a quack, and the reasonable and careful statements of a scientific man, is certainly very defective. In these days, devices of every kind and for all possible uses are urged upon the attention of the community, and it is manifestly the part of wisdom to hesitate to adopt anything, unless its merits have been fairly investigated by those who are competent to judge and entitled to full confidence.

FALLEN GREATNESS.

The recent return of the birthday of the Prince Imperial of France brought vividly to mind the circumstances under which the young man was ushered into existence. We were in Paris sixteen years ago, upon the 16th of March, and were personally cognizant of what transpired in the city upon that auspicious day. In a splendid apartment of the Palace of the Tuileries the child was born, while the courts and waiting rooms of the Imperial residence were crowded with the most distinguished generals and statesmen of the empire. Outside, the booming of cannon was heard, and the dingy barracks of the *Invalides* were enveloped in the smoke of gunpowder. All over France the day was spent in rejoicing, more or less sincere, that a son and heir to the throne of the empire was born. Upon the occasion, it was hoped that the representatives of the great Powers, who were assembled in Paris to settle the conditions of peace, would reach a fixed result and proclaim it to the world. But in this the Emperor was disappointed, as the final documents were not signed until about two weeks after the birth of the Prince. The preparations for the birth were interesting and curious. For more than a fortnight the cannon upon the grounds at the *Hôpital des Invalides* had been kept loaded, and the veteran gunners, with lighted match-rope, were marching to and fro behind them, ready at the first signal from the Palace of the Tuileries to ignite the charges and proclaim to the people of the city not only the fact of the birth, but the sex of the child. No preparations or arrangements were made for a Princess. We crowded our way through the thronged street to the millinery establishment where was placed on exhibition the clothing for the expected child, and the vast array of little socks, sacks, dresses, etc., were of the most costly nature, and exquisitely wrought of lace and satin. Hearing the guns booming early in the morning of the 16th of March, 1856, we rushed out of our chambers to learn the news, and were informed that the Emperor's star was still in the ascendant; "a *garçon*" had been added to his household.

Such were some of the circumstances under which the youth was born who recently celebrated his sixteenth birthday in exile, at Camden House, Chiselhurst, England. He came a fugitive to England a few days after the Revolution of September 4, 1870, and, after a brief sojourn at Hastings, took up his residence with the Empress, where they were rejoined by the

Emperor only after the conclusion of peace and his release from Wilhelmshöhe. At the date of his arrival in England, the health of the young Prince, which had never been very robust, was rendered still more precarious in consequence of the disastrous campaign of 1870, and the repose and quiet of his new place of residence, coupled with the bracing English atmosphere, soon effected in his physical appearance, as well as in all other essential respects, a change truly marvellous. From a slight and somewhat effeminate lad, he rapidly grew into a strong, healthy, well conditioned youth, fond of outdoor sports and exercises, an excellent horseman, and in all respects as ruddy and hardy as the majority of English boys of his age. There is in his entire bearing a manly simplicity most engaging, and immediately noticed by all who come in contact with the Prince.

A considerable number of ladies and gentlemen went from London to present their respects to the Emperor and Empress upon their son's birthday anniversary, and they received a cordial greeting from the distinguished exiles.

Shortly after 11 o'clock their Majesties and the Prince Imperial, with their household suite, and all the ladies and gentlemen who had arrived in the morning from London, set out on foot from Camden House to attend Divine service at the Roman Catholic chapel at Chiselhurst, distant about a quarter of a mile from Camden House. Their Majesties crossed Chiselhurst common, respectfully greeted by large numbers of persons assembled to see them, and upon entering the chapel took their places in chairs provided for them, immediately in front of the altar. A high mass was then chanted, several priests taking part in the impressive ceremonies, which terminated with the *Te Deum*, the performance of the entire mass occupying nearly an hour and a half. The pretty little chapel was charmingly decorated with flowers, and was, of course, crowded in every part. At the conclusion of Divine service the Imperial family returned on foot to their residence, accompanied by their friends, and again saluted with every demonstration of sympathy by a throng much more numerous than had previously assembled.

A simple reception was held immediately afterwards by their Majesties and the young Prince, on the spacious lawn in front of the principal façade of Camden House, each of those present receiving a kindly pressure of the hand, and a few courteous words from the Imperial family. The Empress, who appears to have in some degree recovered from the terrible mental trials she has recently undergone, manifested, by her winning vivacity and gracious manner, her lively appreciation of the sentiment which had brought together the ladies and gentlemen assembled around her; and the Prince Imperial made the best possible impression upon all present by his manly, unassuming attitude, and the beaming smile with which he received the felicitations of his friends.

CARBONIC ACID.

It is often stated as one of the wonders of plant life, that plants are able to do what the chemist has failed to do, that is, to decompose carbonic acid.

While it is extremely difficult to decompose carbonic acid, completely separating it into carbon and oxygen, nevertheless it is quite easy to partially decompose it. If we pass a stream of the gas through a tube containing red-hot coals, the coals are burnt at the expense of half the oxygen contained in the carbonic acid, and carbonic oxide is the result. Hydrogen, iron, and zinc act similarly towards it, abstracting half its oxygen.

Potassium burns in it with a red light, producing carbon and carbonate of potassium. This experiment may very readily be shown to a class by taking a tube about three fourths of an inch in diameter and ten inches long, bent at right angles near the upper end, which is sealed in the lamp. A piece of potassium about the size of a pea is introduced into the tube, which has been previously filled with dry carbonic acid over mercury, as all aqueous vapors must be avoided; by inverting the tube the potassium is lodged in the upper end of the bent portion. If it is now heated by a lamp, the first action is to expel a portion of the carbonic acid from the tube; as soon however as the potassium approaches a red heat, it takes fire and burns vividly, completely absorbing the carbonic acid, if it is present in sufficient quantity. Sodium also decomposes carbonic acid, but without taking fire. In the presence of the alkalies at red heat, phosphorus and boron have the same action.

FAIRMOUNT WATER.

The good people of Philadelphia are content to use very objectionable water, if the specimen sent to us for analysis by a gentleman of that city fairly represents the fluid flowing from the Fairmount water-works. The specimen sent to us contained in each U. S. gallon (231 cubic inches): —

Inorganic matter	4.67 grains.
Organic matter	2.62 "
Total solid contents . . .	7.29 "

A large amount of iron was present in the water, which undoubtedly came from the iron pipes through which it passed. The organic matter was in a state of putrefactive change, and communicated to the water a very offensive odor. This matter largely comes from sewage, and must render the water to a certain extent injurious to health. The water distributed through the Fairmount works has undergone serious deterioration since it was examined by Prof. E. N. Horsford several years ago. His results at that time gave, in each U. S. gallon, —

Of inorganic matter . . .	2.30 grains.
Organic matter	1.20 "
Total solid contents . . .	3.50 "

CANNED FRUITS.

The impression prevails among those who use the fruits freely which are put up in tin cans, that they are injured thereby, and this impression is in many cases correct. We have long contended that all preserved fruits and vegetables should be stored in glass, and that no metal of any kind should be brought in contact with them. All fruits contain more or less of vegetable acids, and others that are highly corrosive are often formed by fermentation, and the metallic vessels are considerably acted upon. Tin cans are held together by solder, an alloy into which lead enters largely. This metal is easily corroded by vegetable acids, and poisonous salts are formed. Undoubtedly many persons are greatly injured by eating tomatoes, peaches, etc., which have been placed in tin cans, and we advise all our friends who contemplate putting up fruits the present summer to use only glass jars for the purpose.

A NEW WORK ON ELEMENTARY CHEMISTRY.

Messrs. Ivison, Blakeman, & Phinney, of New York, publish Prof. Nichols's abridgment of Eliot and Storer's "Manual of Elementary Chemistry." The original work has been greatly condensed, but we are sorry to find that its diffuse and defective character is in a measure retained. Several chapters on the components of carbon have been added, which are of considerable importance. As a rule, the experiments are too minutely described, and nothing is left for the teacher or pupil but the mere manipulation, every step of which is given in detail. There is also found on several pages a repetition of statement, using language slightly modified, which would have been better omitted. For instance, on page 220, it is stated that "Potassium carbonate is a *hygroscopic* salt, and very soluble. When exposed to damp air, it *deliquesces* or becomes *moist*." On page 56, alluding to chlorine: "It combines with hydrogen with explosive violence, when a mixture of the two gases is heated, or even exposed to sunlight;" then immediately follows: "In direct sunlight the union is so instantaneous as to be attended with explosion." There are also several errors of statement which should be corrected in future editions. On page 246 it is stated that "Calcic phosphate is a valuable manure, no matter from what source it is obtained, if it is reduced to a fine powder." This is wrong. The mineral phosphates differ from the bone phosphates. The mineral, being found mostly in the form of apatite, is *entirely inert in powder*, and in order to exert fertilizing influence, must be acted upon by acids.

We could point out a considerable number of serious errors and defects in the work; but we do not wish to appear captious, or unreasonably inclined to fault-finding. Prof. Nichols deserves credit for the pains he has taken to abridge the work of Storer and Eliot, and there is much in the arrangement to commend; but an elementary text-book upon any department of science should be compiled with the greatest care, for if we start our youth wrong, it is almost impossible to set them right in after life.

[Communicated to Boston Journal of Chemistry.]

PROFESSOR DANIEL KIRKWOOD.

I have noticed in your excellent journal several references to Professor Kirkwood, and to what he has done, with extracts from his publications. It occurred to me that your readers might be interested in a brief sketch of the man and his labors. Professor Kirkwood is one of our most eminent scientific men, and a scholar of whom America may well be proud. It is quite certain that no other living man approximates so nearly to the celebrated John Kepler in certain mental characteristics, habits of study, and methods of "handing down" the laws of Nature in the physical world, and it is doubtful whether any other has lived. His mind seems to be stored with fruitful hypotheses, which hard and consecutive thought, intuitive perception of what must be true in Nature, and long and tedious calculations, in very

many instances, have proved to be truthful representations of Nature's laws.

The Student and Intellectual Observer, a scientific periodical published in London (Groombridge and Sons, Paternoster Row), has an article of twelve pages in the number for August, 1869, by the distinguished astronomer, Richard A. Proctor, F. R. A. S., devoted to the scientific researches of Prof. Kirkwood. The writer of the article is a man capable of appreciating the value of Prof. Kirkwood's labors, and he has spoken of them as they deserve. I shall here give the concluding paragraphs: —

"It would not be easy to exaggerate the importance of Prof. Kirkwood's researches. Founded as they are, not on speculative fancies, but on the well-established laws of planetary motion, they are worthy of the closest attention. I believe they will inaugurate new and important processes of thought, by means of which the noble but hitherto intractable problems connected with the formation of the solar system may be found capable of solution."

Daniel Kirkwood was born in Hartford County, Maryland, September 27, 1814, so that he is now in his fifty-eighth year. His advantages for education when a boy were, as is too often the case, *dis*advantages. When he was sixteen years of age he went to York County, Pennsylvania, and attended during the winter a school taught by his cousin, Samuel J. Kirkwood (who has since been Governor of Iowa), then a boy near the same age. His principal studies were arithmetic and geography. When he was nineteen years of age he also began to teach. But I have no space for details. I can only say that, his mind once awakened, the acquisition of knowedge became both a pleasure and a necessity, and in course of time he found his mind well stored with the elementary and the higher mathematics, and with the facts and principles of science. Two colleges have conferred on him the honorary degree of A. M., and one the degree of LL. D. It is well known that he is the discoverer of what is called "Kirkwood's Analogy," a law which binds together the masses and rotations of the planets of our system. This discovery was made known about the year 1849. Except about a year, while he was in Washington and Jefferson College, Pennsylvania, he has been in the Indiana State University, as professor of mathematics, since 1856. In 1867 he published a valuable work on "Meteoric Astronomy." The reader will find a very interesting article of his on the Nebular Hypothesis, in the *Monthly Notices of the R. A. S.*, vol. xxix. pp. 96–102. DAVID TROWBRIDGE.

EDITORIAL NOTES.

A SATCHEL GUIDE FOR THE VACATION TOURIST IN EUROPE. — This is the title of a little book just published by Messrs. Hurd and Houghton, which seems to us to be precisely what is wanted for the large and growing class of travellers who are finding out that a summer vacation abroad costs less than a shorter one spent at the seaside or mountain resorts in our own country. For those who have *not* yet found this out, the book is worth buying for the "Introductory Hints" alone, which show more fully and more clearly than any similar work within our knowledge how cheap a foreign tour may be made without any sacrifice of comfort or enjoyment.

There are, we believe, only three European guide-books published in the United States. Two of these are large works, covering all the countries of Europe, and excellent for those who can spend a year or more on the foreign tour, and who are as well off in point of "lucre" as of leisure. The other is professedly a "short trip" guide, but errs in covering too much ground, so that it is little else than an "abridged" *general* guide. It is also marred by many inaccuracies, especially such as arise from an ignorance of the French and German languages. The writer of a guide-book ought, it would seem, to have at least a smattering of those foreign tongues, if only to save him from saying that Ehrenbreitstein means "the *bright* stone of honor," calling the Conservatoire des Arts et Métiers at Paris "the Conservatory of Arts and *Measures*," and the like. But the chief defect in all these books is that they do not give the inexperienced tourist the information that he most needs, if he would make the most of his time and his money. They lay down a lot of separate routes, but do not tell him how to *combine* them so as to save unnecessary travel, which wastes both time and money, to say nothing of patience and comfort. Neither do they tell him how to travel economically. They give a little general advice on that point — so general that it is practically worthless — but nothing definite and precise. The only hotels they commend, or even mention by name, are the more expensive ones, while the book before us makes it a point to enumerate the cheaper ones also. The author has evidently made a special study of the wants of all classes of tourists, and not merely of those who travel "regardless of expense." We have no doubt that among the readers of the JOURNAL there are hundreds of hard-worked men of moderate incomes — physicians, clergymen, teachers, students, and others — who would at once make up their minds to indulge in a vacation in Europe, after reading this "Satchel Guide," since they would see (what they may never have suspected) that it is a luxury by no means beyond their reach.

CARELESSNESS IN SANITARY ADVICE. — A popular journal, in an article on disinfectants, gives directions for making chlorine on a scale that requires ten ounces of salt, and six ounces of strong sulphuric acid, and puts the apparatus to work for ten or twelve hours in a room tightly closed; but adds no hint in regard to the possible *bleaching* action of the chlorine, though he refers to using the agent even in a "parlor." This is an illustration of the mistake too often made by those who write on scientific matters for unscientific readers. They forget that the precautions in the use of dangerous chemical agents which are perfectly familiar to themselves are wholly unknown to those whom they are addressing. No one should write on such topics for "the million," unless he knows how to put himself in the position of his readers, and to look at things from that "stand-point."

AN ASTRONOMER'S POODLE. — We see in the *Pall Mall Gazette* an amusing account of a recent scene in an English court-room. The estate of the late Sir James South is in process of administration, and it appears that, among other bequests, he gave one of his female servants an annuity of £30 a year during the life of a favorite dog named Tiger, of which she was to take care. The Chief Clerk certified that he was unable to say whether the annuity was still payable, having no means of ascertaining whether the dog was living or not, and the executor thereupon called for the production of the animal for the purpose of satisfying the court whether the estate was still chargeable with the annuity or not. Mr. Little, Q. C., and Mr. Martin, who appeared for the dog, having consented to his being produced, "a matronly looking female was ushered into the solicitors' well, and from the folds of an ample cloak appeared the features of a fat and panting little lap-dog, that surveyed the scene with glassy eyes, and resented the intrusion upon his privacy by a few feeble barks as he was carried from the court." No sooner had he retired than his counsel rose and demanded that £1,000 Consols should be set apart to secure his annuity. The Vice-Chancellor, however, held that the rule of the court which applied to human beings did not extend to dogs, and said that the executor's personal undertaking for the rest of the dog's life would be sufficient. "This denial of the usual security granted in such cases seems certainly a little hard upon the dog, whose position in other respects appears to be precisely identical, or, as lawyers say, 'on all fours,' with that of a human legatee. He has as yet, however, given no notice of appeal."

GREENBACKS AND GRAVITY. — Paper money is light stuff compared with the substantial coin that it represents, but in the aggregate it is heavy enough. The Secretary of the Treasury reports the following statistics on this subject:

	Pounds.	Cost.
National bank notes . . .	100,858	$78,669.24
Greenbacks	206,639	175,344.45
Fractional currency . . .	319,176	243,406.94
Bonds	110,873	91,387.63
Internal revenue stamps	78,062	36,689.14
Total	812,608	$625,494.40

But this is not all. There is a reserve of paper to be manufactured into greenbacks, fractional currency, bonds, and revenue stamps, amounting to 257,183 pounds, costing $204,812.36; so that the grand total of paper used or to be used in our paper money, is 1,069,791 pounds, costing $830,306.76. It will give the reader some idea of the amazing bulk of our paper money, bonds, etc., to know that 535 tons of paper are required for their production.

FIRESIDE SCIENCE. — In the course of a very commendatory notice of this book, the *Scientific Press* of San Francisco remarks: —

"It is one of the most encouraging signs of the times that there is a growing demand and taste for really valuable and instructive reading, and he who can render science attractive to the busy working men and women of our country is better than he who taketh a city. The demand of the day is that science should be brought down to the comprehension of the popular mind, and made to minister to the needs and pleasures of the people. To do this it must be divorced from the trammels of technology, and made plain and attractive to the common mind. There is no difficulty in doing this; and he who most successfully leads in this new path of literature is engaged in a noble and most important work for the elevation of the masses. 'Fireside Science' should find a place in every home in the land."

ATOMS.

THE question has been raised whether the druggist was justified in selling vermifuge to the small boy who asked for "a bottle of subterfuge." — It was Biot, we believe, who said: "In doubtful questions, the ignorant believe, the half-learned decide and the man of science examines." — It is stated that iron by hydrogen often contains impurities, such as oxides and carbonates, and even cyanide of potassium; and it would be well to test it for the last, since it is so dangerous. — Professor Blot, of culinary renown, always urged that flour should be kept in bags, not in barrels; and we see that Herr Poleck, of Silesia, has recently shown that there is good ground for the advice, as the flour kept long in barrels undergoes an incipient decomposition, by which the gluten is partially changed into a soluble substance. — An English physician has written a book to prove that "consumption *always* originates from the breathing of pre-breathed air;" and, though that may be putting it rather strongly, there can be no doubt that rebreathed air is one of the most fruitful sources of this and many other forms of disease. — Dr. Roux says that the French, by daily using copper cooking utensils, take copper enough into the system to render its detection in the blood an easy matter. — A plan for uniting the Black and Caspian Seas by a canal, at an expense of fifty millions of dollars, is engaging the attention of the Russian government. — To illustrate the extent of the match-making in Marseilles (France) it is stated that a single firm employs 600 hands, and consumes annually for

the production of matches 2.5 tons of phosphorus; 7 tons of chlorate of potassa; 1.5 tons of coloring matter; 8 tons of red-lead; 16 tons of refined sulphur; 50 tons of stearine; 25 tons of spun cotton wicks; more than 50 tons of Japan wax; and 100 tons of wood. — We send to Great Britain annually fifteen millions of dollars to buy spool cotton. — The very conservative vestrymen in the London parish of St. George's, Hanover Square, have been roused to righteous indignation by certain measures of sanitary reform proposed within their precincts; and at a recent meeting one of the members, waxing rhetorical under excitement, protested against "the highly impertinent effort which had been made to force a new sewer down their throats!"

THE HALL TREADLE. — What is known as "the Hall Treadle" is really not one of the patent devices of the day which are of doubtful utility, but an invention well calculated to benefit every member of the household. By its use the labor of running sewing-machines is greatly reduced, and it contributes to the health and comfort of every person who uses them. It has received the warm commendations of all competent judges who have examined it, and it should be applied to every machine in use where steam power is not employed. It can be attached to the different kinds of machines, and the expense is so small that all may avail themselves of its benefits.

LITERARY NOTES.

THE Harpers have published Mr. Rolfe's edition of *Julius Cæsar*, the fourth of the annotated and illustrated series of Shakespeare's plays which he is preparing. Rev. E. A. Abbott, the author of the "Shakespearian Grammar," says of this series: "I have not seen any edition that compresses so much necessary information into so small a space, nor any that so completely avoids the common faults of commentaries on Shakespeare — needless repetition, superfluous explanation, and unscholarlike ignoring of difficulties." This is an important testimonial to the value of these little books, coming as it does from one who has a thorough acquaintance with the whole range of Shakespearian literature, and who has himself shown so much discrimination and taste in his criticism of the poet.

The same publishers have issued the *Annual Record of Science and Industry for* 1871, edited by Mr. Spencer F. Baird. It is an able and judicious compilation, and seems to us decidedly better in its way than the "Annual of Scientific Discovery," which we have more than once commended. It is a good feature in the editor's plan that he gives the authorities for the various items and notes, and thus makes the work of value to the scientific man for purposes of reference, as well as a useful summary of the year's progress in science for the general reader.

The Appletons have published *How the World was Peopled*, a series of "Ethnological Lectures," by Rev. Edward Fontaine, a work of no scientific value and of no interest whatever, except as an illustration of the rashness with which ignorant men sometimes presume to write on subjects that require eminent judgment as well as extensive study and research. Those who have neither knowledge nor wisdom are not likely to enlighten the world with regard to these great problems of modern science.

Less pretentious but intrinsically far more valuable books are the two little *Science Primers* just reprinted by the same house. One is on *Physics*, by Balfour Stewart, and the other on *Chemistry*, by Roscoe. We doubt, however, whether they are exactly adapted to the wants of American schools. They are too brief and elementary for high schools, and require too much apparatus for the lower grades of schools. As furnishing admirable hints for oral instruction and simple experiments to illustrate such lessons, they will be very suggestive and useful to teachers, even if they are not found available as text-books. They cost only fifty cents each.

A Woman's Experience in Europe, by Mrs. E. D. Wallace, published by the Appletons, is not so brilliant and sprightly as Miss Trafton's "American Girl Abroad," but it is nevertheless more entertaining than the average of books of travel. She has the woman's eye for things to which men are often blind, and a pleasant feminine way of telling them.

Messrs. Scribner, Armstrong, and Co. have added *A Miller's Story of the War* (otherwise known as "The Plebiscite") to their edition of the tales of MM. Erckmann-Chatrian. There are few historical fictions that are better worth reading than those from the double pen of these literary "Siamese twins." The same house reprint George Macdonald's *Within and Without*, a poem that is as charming as his novels, which is saying a good deal. All these books may be found at Noyes, Holmes, & Co's.

The *Popular Science Monthly* is a new magazine, edited by Prof. Youmans, and published by the Appletons at $5.00 a year. It is largely eclectic in its make-up, but contains some valuable original papers, with literary notices, miscellany, notes, etc. The first number is a very good one.

Medicine.

SEA-SICKNESS.

THE cause of sea-sickness, and the question of its curability, have both been the subject of a good deal of discussion. Some have asserted that it is always due to mere imagination or nervousness; but though this is undoubtedly a frequent cause of the malady, it is certain that it is not the invariable one. We have seen people sea-sick when the ship was moving more smoothly and steadily than a railway car, and it was easy to believe in that case that the expectation of the nausea was all that produced it. On the other hand, people who supposed themselves proof against an attack of the kind have been the victims of a sudden seizure. They neither feared nor anticipated anything of the kind, and it could not have been brought on by any mental cause whatever. Animals, moreover, are not exempt from sea-sickness. We have known a cat — not a "land-lubber" of a puss, but one of sea-going habits, that had crossed the Atlantic more than once — to be wretchedly sick in very rough weather; and we have heard of horses and dogs that were similarly affected. No one will assert that in these instances imagination had anything to do with the nausea.

Dr. Wollaston suggested, more than sixty years ago, that sea-sickness results from pressure of blood upon the brain; and it is well known that injury or pressure on the brain is almost invariably attended by vomiting, which is indeed its earliest symptom. Dr. Wollaston explains the way in which the pressure upon the brain is produced by the motion of a ship at sea, by reference to the action of mercury in the tube of a barometer. He says that "If a barometer be carried out to sea in a calm, the mercury will rest at the same height as when on shore; but when the ship falls by the subsidence of the waves, the mercury is seen apparently to rise in the tube which contains it." He considers that the action of the blood on the brain, at the moment of the descent of a ship, is identical with that of the mercury in the barometer, and that there is an actual pressure, and even a blow, which, by frequent repetition, produces nausea and vomiting. The action in both cases is due to the *inertia* of the liquid, which tends to remain where it *is*, and not to follow the movement of that which contains it; in other words, the mercury stays *up* when the barometer tube goes *down*. In like manner the blood tends to remain stationary when the head is carried downward, and the result is virtually the same as it would be if the blood were forced upward into the head. This produces an unnatural pressure upon the blood-vessels of the brain, and nausea and vomiting follow. This view is confirmed by the fact that the nausea is most marked when the ship is *descending*. Sir James Alderson, in a recent article on this subject in the *British Medical Journal*, states that this is the invariable experience of sufferers from sea-sickness, and he adds: —

"They are also conscious at that particular time of an instinctive effort to sigh, or take a deep inspiration, the meaning of which is manifest. During deep inspiration the chest is dilated for the reception of air, and its vessels become more open to admit blood, so that a return of blood from the head is then more free than at any other period of complete respiration; whilst, on the contrary, by the act of expelling air from the lungs, the ingress of blood is obstructed. This obstruction is proved by observation when the surface of the brain is exposed by the operation of trephining; a successive turgescence and subsidence of the brain is then seen in alternate motion with different states of the chest. A deep inspiration, therefore, at the time of the descent of the ship, tends to counteract the turgescence of the brain."

The sickness induced by waltzing is to be explained in a similar way. In this case, the blood is forced up into the brain by centrifugal force, just as a liquid tends to rise in a vessel that is whirled round rapidly. Swinging also sometimes causes nausea; and with regard to this Dr. Wollaston remarks as follows: —

"Sickness by swinging is evidently from the same cause as sea-sickness, and that direction of the motion which occasions the most piercing sensations of uneasiness, is conformable to the same explanation already given. It is descending forwards that this sensation is perceived, for then the blood has the greatest tendency to move from the feet towards the head, since the line joining them is in the direction of the motion; but when, in the descent backwards, the motion is transverse to the line of the body, it occasions but little inconvenience, because the tendency to propel the blood towards the head is then inconsiderable."

Now this may suggest how to alleviate sea-sickness, and perhaps to prevent it. If we know how the movement of the ship acts upon the brain, we see what must be done in order to neutralize the action. This, which Sir James Alderson considers "the only rational way of averting sea-sickness," we will give in his own words: —

"The first point is wholly to avoid the upright posture. Every one knows that it is a common practice to lie down, and this is done almost instinctively, but it is also known that to do so, though frequently successful, is not invariably so. The way in which the motion in a swing affects the brain affords the proper explanation why lying down is not invariably successful; and shows that it is necessary, not only to take a recumbent position, but to lie in the right direction. A person lying down with the feet towards the bows of a ship is, while it descends in pitching, in the same position as a person in a swing descending forwards, in which case we have seen that sickness is produced by blood being forced upon the brain. On the contrary, a person lying down with his head towards the bows is, during the descent of the ship, in the position of one descending backwards in a swing, in which case the pressure by the blood will be towards the feet, and, therefore, relief rather than an inconvenience will be experienced, the tendency being to reduce the natural supply of blood to the brain. It is necessary, not only to lie down, but to do so with the head to the bows; and it is highly desirable that this position should be assumed before the ship begins to move. There is a secondary advantage to be gained by closing the eyes, and so shutting out the confusion arising from the movement of surrounding objects."

THE SLOW ADVANCE OF MEDICAL SCIENCE.

THE following extract from General Bolles's Address contains some interesting illustrations of the slowness with which progress in practical medicine has been made; but in this respect its history does not materially differ from that of other departments of science. Important discov-

eries are often but imperfectly appreciated for many years after they are made, and practical applications of them are sometimes suggested long before any one carries them out. Of course, there are striking instances of the opposite kind, but that does not make the others less remarkable in their way.

Not until 1628, eight years after the landing at Plymouth, was the circulation of the blood discovered and demonstrated. The true *theory of respiration* was established at a still later day. Haller's "Elementa Physiologiæ Corporis Humani," in 1747, first presented anything worthy to be called the science of human physiology. Vaccination, that most blessed discovery in medicine, was made known by Jenner in 1798. In 1816 an accident gave to medicine and mankind the stethoscope, one of the most effective instruments of medical investigation. Lannec, the lucky discoverer and inventor, thus tells the story of his good fortune: "I happened to recollect the great distinctness with which we hear the scratch of a pin at one end of a piece of wood by applying our ear at the other end. I rolled a quire of paper into a kind of cylinder, applied one end of it to the patient's chest, and was surprised and pleased to find that I could perceive the sounds and vibrations of the heart's action more distinctly than I had ever been able to hear them by the immediate application of the ear." Not until 1846 was ether, or any other anæsthetic, admitted by the medical faculty as a legitimate portion of the *materia medica*. This application of anæsthetics and other recent medical discoveries was long ago hinted at and half known; and the delay of their full knowledge and adoption by physicians can be explained by no cause less discreditable than culpable carelessness. A hundred and ninety-one years before ether was adopted, Denis Papin, a French physicist and physician, suggested the use of anæsthetics to deaden pain in surgical operations. But no one acted on his suggestion. In 1795 Richard Pearson recommended the inhalation of sulphuric ether, and in 1800 Sir Humphry Davy spoke of *nitrous oxide* as adapted to this beneficent purpose. But no medical college or practitioner gave ear to this gospel of relief. For nearly half a century thereafter doctors talked occasionally, and occasionally wrote, about anæsthetics, but did not adopt and use them; and ether — divine handmaid of healing — was not authoritatively recognized until Morton, on the 16th day of October, 1846, in the Massachusetts Medical College, was allowed to administer it to a patient about to undergo a painful surgical operation. For nearly two hundred years after gunpowder was first used in European warfare, gunshot wounds were cauterized with boiling oil, to neutralize their supposed poison. An accidental discovery put an end to this cruel practice. In 1536 the illustrious Ambroise Paré, then an army surgeon, observed that wounded men who had, for lack of oil, escaped this horrible torture recovered more speedily and certainly than those who had been so cauterized. After that we hear no more of boiling oil for gunshot wounds. The same keen-eyed observer was the first surgeon who found out that a simple ligature would stop that flow of blood after amputation which had, till then, been checked by applying red-hot iron to the wounded surfaces; and this discovery led to the general abandonment of the old and barbarous method of treatment. It seems incredible that malpractices so coarse and cruel should have prevailed so long. Still stranger is it that customs of torture equally shocking have continued even to our own day. Dr. W. J. Walker informed me, some ten or twelve years ago, that when he entered the profession no surgeon's amputating saw in Boston, except his own, had its teeth either *set*, or so shaped and sharpened as to cut in both their forward and backward movements across the bone. Of course such saws as were in use would *bind* and jar horribly, and inflict unspeakable agonies upon the wretched victims subjected to their operation. What can be thought of surgeons who failed to see and know, or who, seeing and knowing, left unreformed, a mischief known to every wood-sawyer, and which the dullest apprentice would have discovered and remedied in half an hour's handling of his tools?

BOGUS MEDICAL COLLEGES.

HOW MEN ARE LICENSED TO MURDER — PROBABLE PUNISHMENT OF THE DIPLOMA-PEDDLERS.

THE licensed vice and incompetency in medical practitioners which the notorious Bowlesby case revealed, last summer, directed attention to various bogus diploma agencies in Philadelphia. Among the institutions which were exposed, were the University of Medicine and Surgery, in South Ninth Street, and the American University and the Eclectic Medical College, No. 339 South Seventh Street, both of Philadelphia, their heads being respectively Dr. Paine and Dr. John Buchanan. A reporter, assuming the part of a medical student unable to obtain a degree in England, communicated with the agent of Buchanan's College, in Brooklyn, and was told that for $100 he might have a diploma. Further investigation proved that a diploma might be obtained with the greatest facility, and in answer to a question of the reporter in his assumed character as to the nature of the examinations required, Dr. J. Dunbar Hylton naively declared: "O, they are not very severe. I first ask a few questions about antidotes to the principal poisons, and the other professors don't bore a man to death as they will do in some other colleges." Becoming desperate at the exposures, Hylton afterward wrote that in view of a contingency which he considered very remote, he "would sell diplomas for A. M., M. D., and H. D., to every saint or rascal in the land who had cash to buy, male or female, and when they were supplied, to the bears that roam the polar floes, to the birds that cut the liquid air, the fish, the dogs, and every breathing thing on earth."

While these colleges were chartered under the Pennsylvania laws, their faculties and lecturers had no existence except in the type of the elaborate prospectuses. A legislative committee in Philadelphia recently concluded an investigation into the bogus diploma trade, after having elicited abundant evidence to justify a revocation of the charters of Paine's and Buchanan's colleges. One of the latter's professors testified that he had blank diplomas, and "would sign one quicker than wink if he could make money by it." Buchanan himself admitted that one of his degrees had been sent to a man in consideration of a gift of $25 to the college; and a physician stated that he had bought a scholarship in Paine's University for $75, although he wrote no medical thesis and passed no examination; an "herb doctor" swore that Buchanan had presented him with a diploma as a "mark of honor." Another "doctor" received a diploma, his only qualification being that he "had been a janitor for seven years in the Baltimore Medical School." Several others testified to the like effect. The testimony given by James McShane is particularly ridiculous. He stated that he worked for Dr. Paine, and "did some work" for the "Eclectic;" he was no graduate, but, in Paine's establishment, he sometimes "ran the dissecting-room," and "acted as teacher;" he was also offered a professorship in the American University, then at Tenth and Chestnut Streets, and a "professorship of anatomy" in the "Eclectic;" he had been offered diplomas to sell, and had been asked by Dr. Paine to teach.

A strong feeling of resentment has been aroused in Philadelphia, and there is promise that not only will the charters of the infamous colleges be revoked, but Paine, Hylton, and Buchanan seem likely to be punished. — *New York Tribune.*

COLORED SPECTACLES.

THE following interesting note has been sent us by Dr. J. H. Stearns, U. S. Surgeon at the Asylum for Disabled Soldiers, Milwaukee, Wisconsin: —

The photographer uses orange-colored glass to exclude the actinic rays of light, and why some optician has not had the genius to see that orange is the proper color for spectacles instead of green or blue for persons of weak eyes, is beyond my comprehension.

A room in the hospital with which I am connected, is lighted through orange-colored windows, and is used for patients who have certain diseases of the eyes requiring the exclusion of the actinic rays of light. It has been very satisfactory. Orange, I believe, is also the proper color for bottles containing chemicals affected by the light.

MEDICAL MEMORANDA.

RE-IMPLANTATION OF TEETH. — At a recent meeting of the Odontological Society of England, Mr. Steele called the Society's attention to this subject, and stated that he recently had a tooth of his own extracted with great care. The tooth was in an exquisitely sensitive condition from exposure of the pulp, and gave pain on the least change of temperature. It was taken out under the influence of nitrous oxide gas; the dental canal was cleansed, and the carious portion of the crown was removed. After being stopped in the usual way, the tooth was replaced in its socket, the operation having lasted about half an hour.

TO PREVENT THE RUSTING OF STEEL INSTRUMENTS. — For this purpose the *Lancet* confidently recommends a mixture of equal parts of carbolic acid and olive oil, smeared over the surface of the instruments. This plan is much used by medical officers in the navy, and is found to preserve the polish and brightness of the steel, however moist and warm the climate may be.

A "PLUCKY" CHEMIST. — At Preston (England), Mr. Edward Foster, a chemist and druggist, has been summoned twelve consecutive times at the police court for not having his child vaccinated, and has paid heavy fines for not obeying the law in this particular. On each occasion he has addressed the bench in support of his conduct, opposing vaccination, and he asserts that he intends to resist to the end of the chapter.

HINTS ON DISPENSING MEDICINES. — A correspondent of the London *Chemist and Druggist*, in an article on this subject, gives the following suggestions concerning the preparation of ointments: —

"When you have an extract, such as belladonna, to mix with lard or any other fat, if you attempt to mix them together direct, there is considerable difficulty in getting a smooth ointment; but if you soften the extract first with a little hot water, and rub it smooth, then add the lard, or whatever it may be, you have no trouble.

"Glycerine is now frequently prescribed in ointments, and is difficult to mix. Well, supposing it to be ordered with Ung. Zinci, as is often the case, do not use ready-made zinc ointment, but weigh the proper quantity of oxide, rub the glycerine with it, and then add the lard; you have then a good smooth ointment, which does not separate; of course, the same plan can be adopted with any other powder. If there be no powder, melt the ointment, but do not let it get too hot, and beat the glycerine in and stir till cold; it then mixes much better, but still, if there be a large proportion of glycerine, it will separate after a time."

Physical Development in Old Times Compared with Our Own Day. — Mr. T. W. Higginson has taken pains to compare the vital statistics of several generations of two old New England families, and he finds, to the dismay of those who mourn the physical degeneracy of woman since the days of our great-grandmothers, that the stock has improved, if anything. He adds: —

"No man of middle age can look at a class of students from our older colleges without seeing them to be physically superior to the same number of college boys taken twenty-five years ago. The organization of the girls being far more delicate and complicated, the same reform reaches them less promptly, but it reaches them at last. The little girls of the present day eat better food, wear more healthful clothing, and breathe more fresh air than their mothers did. The introduction of india-rubber boots and water-proof cloaks alone has given a fresh lease of life to multitudes of women who otherwise would have been kept housed whenever it so much as sprinkled. It is desirable, certainly, to venerate our grandmothers, but I am inclined to think on the whole that their great-granddaughters will be the best."

Chloroform in the Treatment of Biliary Calculi. — Dr. John Barclay, in a communication to the *British Medical Journal*, mentions the case of a man who had suffered for twenty-three years from gall-stones, and knowing that ethers are solvents of cholesterine, he prescribed chloroform in doses of two or three drops three or four times a day, on the chance of reaching the calculi through the blood. The pain, tenderness, distension, and jaundice, all disappeared together, and in the eight years which have since elapsed, the patient has never had another attack.

MILK FOOD FOR INFANTS.

Dr. Fleetwood Churchill, in the last edition of his standard treatise on "Diseases of Children," discussing the subject of milk food for infants, says: "I have found an excellent milk food made by beating up an egg, with a pint of new milk and a pint of water, and putting it on the fire in a saucepan till it is on the point of boiling, then allowing it to cool, straining it if necessary, and adding sugar. It does not coagulate, and is seldom vomited. I learned its value from my friend, Dr. Halahan. Any of the milks [from cows, goats, etc.] thus modified will generally agree well with the child, and may form the staple food for some months; but feeding differs practically from nursing in this, that whilst a child will thrive upon mother's milk alone for nine months or a year, it seems absolutely necessary to change the *food* occasionally, or the child will suffer from derangement of the stomach and bowels.

"Dr. Dewees has laid down some very important rules for feeding with milk, a portion of which I shall extract: 1. The milk should be pure, *i. e.* not skimmed or previously reduced by water, and should be used as quickly as possible, especially in warm weather, after it has been drawn from the cow. 2. The milk should be given as soon as possible after its mixture with the water and sugar, lest it should be disposed to ferment before it is exhibited. 3. It should never be mixed but when wanted, and no more should be provided than the child will take in a short time; for it is much better to prepare fresh than to run the risk of its becoming sour before it is used. 4. In weather that is unfavorable for keeping milk, it should be placed in the coolest place that can be commanded, or kept in often-changed cold water. 5. Should the slightest tendency to acidity be observed in the milk, it should be rejected without hesitation, nor should an attempt be made at its supposed restoration, by using an additional quantity of sugar, as this will eventually but increase the evil."

SELECTED FORMULÆ.

A Good Diaphoretic. — Dr. S. C. Osborne, in the *American Practitioner*, highly commends the following formula, stating that in intermittent fever it is of great use, not only in shortening the paroxysm, but also in lessening the dose of quinine necessary to prevent relapse. The first dose usually nauseates for the hour, but after this nausea is absent, and the third dose rarely fails to induce profuse diaphoresis.

Take of Chloroformi Sp. etheris nitrosi Tinct. opii camphor Vini antimonii	āā fl℥ss.
Aquæ	fl℥vi.

Mix. S. For adults, teaspoonful every hour until the fever abates.

"Jackson's Cough Syrup." — According to the *Lancet and Observer*, the formula for this preparation has not been uniform, and therefore the Cincinnati College of Pharmacy has recently presented the subjoined one as a uniform standard: —

℞ Fl. ex. ipecac	ʒss.
Fl. ex. senegæ (℥j. Rad. Senegæ to f℥j)	ʒiij.
Fl. ex. rhei	ʒiv.
Syr. simplex	℥xxxj.
Morphiæ murias	gr. viij.
Ol. sassafras, guttæ	xxxij.

M. ft. mistura.

Hereafter, all prescriptions for this mixture will be prepared in that city on the above formula.

For Otitis. — The following is recommended by Dr. Brownrigg of Mississippi as a remedy in acute otitis: —

Take of Tobacco	ʒj. (cut fine.)
Glycerine	ʒj. M.

S. Five drops in the ear once a day.

For Tapeworm. — *L'Union Medicale* gives the following as Suvacher's formula: —

Take of Castor oil	60 grammes (15 ʒ by weight.)
Oil of turpentine	15 grammes (3.8 ʒ.)
Gum arabic	15 grammes (3.8 ʒ.)
Mint water	60 grammes (15 ʒ.)
Simple water	30 grammes (7.6 ʒ.)

Mix, and make a potion, to be taken early in the morning at one draught.

Glycerine of Tar. — The following is from the same authority: —

Take of Tar	150 parts.
Yellow of egg	150 "
Glycerine	300 "

Mix. This preparation is of the consistency of a pomade. It does not adhere to the skin, and may be diluted with water.

To Mask the Taste of Castor Oil. — According to a correspondent of the Boston *Medical and Surgical Journal*, the following formula affords a method of completely disguising castor oil: —

Glycerine, Ol. ricini, āā	f℥ij.
Ol. cinnam.	♏iv.

The essential oil should be rubbed up with the glycerine, the castor oil added, and the mixture well shaken before using.

The editor of that excellent quarterly, *New Remedies*, remarks that "This seems to be the best method of disguising castor oil yet devised."

Carminative Powder for Infants. — This is a Vienna recipe: —

Take of Fennel seed	25 grains.
Aniseed	50 "
Powdered sugar	350 "
Powdered opium	1 "

Make into a powder, ten grains of which will contain .02 grains of opium.

Tincture of Gelseminum in Tetanus. — In the *Baltimore Medical Journal* is recorded a recovery from tetanus, for which gelseminum was administered. The disease lasted seventeen days, during which time twenty ounces of the tincture were taken. During the first twelve days the patient took from half a drachm to two drachms every hour.

SOAP LINIMENT.

The officinal process for soap liniment, if the directions are strictly followed, is tedious and inconvenient. A writer in the *Journal of Pharmacy* suggests a change in the formula, by designating the alcohol as strong alcohol, and accordingly diminishing the volume one eighth, and doubling the quantity of water. He also changes the manipulation by bringing the soap into the form of No. 12 powder (easily obtained by simply sifting the dry soap shavings which accumulate so abundantly), adding all the prescribed water with one sixth the quantity of alcohol, and heating. "This," he says, "had the effect to dissolve the soap with marvellous rapidity, the application of heat for only a few moments sufficing to completely dissolve 24 troy ounces of dry soap, No. 12 powder, in a mixture of 3 pints of water and 8 fluid ounces of strong alcohol. From this result, and by increasing the officinal formula 6 times, the following process is derived: —

Take of soap (genuine Castile, mottled or white), dry and in No. 12 powder	24 troy ounces.
Camphor	12 " "
Oil of rosemary	3 fluid ounces.
Water	3 pints.
Strong alcohol	10½ "

Mix the water with half a pint of the alcohol in a capacious vessel; add the soap and apply heat until solution has occurred; to this add 4 pints of alcohol. In the remaining 6 pints of alcohol dissolve the camphor and oil; to this add the solution of soap; mix. Let the impurities (coloring matter of the soap) subside, and filter."

A correspondent of the *Pharmacist* suggests the following method of preparing this liniment with the officinal materials but modified manipulation, the object being to obviate the use of heat, and expedite the process. The result will be preferable to the officinal, in that it will be less liable to gelatinize in cold weather: —

Take of soap, in small pieces	4 troy ounces.
Camphor	2 " "
Oil of rosemary	½ fluid drachm.
Water	4 fluid ounces.
Alcohol	2 pints.

Beat the soap in a dry mortar until the lumps have disappeared; then add by degrees the water and triturate; when well mixed add the alcohol gradually, afterwards the camphor and oil of rosemary, rubbing with the pestle till all are dissolved, and filter.

MEDICINAL AGENTS NEW AND OLD.

The publishers of the Journal, Messrs. J. R. Nichols & Co., will send free of cost to any physician or druggist in the United States, their new book, "*Chemical and Therapeutical Agents, New and Old, Officinal and Unofficinal.*" Those who write for it will receive it by return of mail. It contains, in addition to a description of medicinal agents new and old, a treatise upon "Chemical Examination of Urine," which, as it treats the subject in a plain and familiar style, is of much interest to physicians.

Cincho-Quinine. — Dr. D. L. Krebs, Elizabeth City, N. C., under date of May 6, 1872, writes as follows of *cincho-quinine*: —

"I have refrained from recommending cincho-quinine, because I did not wish to reach a hasty conclusion regarding it. I was the first to use it in this section, and now I desire to speak of it in terms of high commendation. I have used it for the last five months instead of the sulphate, and as an anti-periodic it has not failed in a single instance when given in the same doses as the sulphate. It is almost tasteless, and can be used in a large number of cases where sulphate of quinine is found to be inadmissible."

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